

Obtawaing Biosphere Region:
Exploring the Expansion & Redefinement of a Biosphere Region

by

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Abstract

The University of Michigan (U-M) Biological Station Biosphere Reserve (BR) has been expanded, redefined, and re-named to the Obtawaing Biosphere Reserve (OBR) following its 10-year United Nations Educational, Scientific and Cultural Organization (UNESCO) periodic review. OBR is part of the UNESCO Man and the Biosphere (MAB) Programme and seeks to establish a scientific basis for enhancing the relationship between people and their environments. It combines the natural and social sciences with a view of improving human livelihoods and safeguarding natural and managed ecosystems, thus promoting innovative approaches to economic development that are socially and culturally appropriate and environmentally sustainable. This expansion will expand the core regions, buffer zones, and transition areas of the MAB Programme BR layout. This expansion will allow collaboration with various partners including but not limited to local land conservancies, academic institutions, governmental agencies, and tribal communities. Due to this expansion, this research team will help OBR understand the needs of its various partners, research other BR practices, geovisualize the region, and support administrative tasks. Methods that were used to answer these objectives included informal conversations with partners in-person and virtually, site visits of the region, online research through websites, reports, and academic articles on national and international BRs, and visualizing the environment and its inhabitants through ArcGIS. This helped support OBR and the Rivers, Trails, and Conservation Assistance (RTCA) program during its redefinition and strategic planning process by continuing to push the project forward and create the space to have much needed conversations.

Acknowledgements

We, the authors of this report, want to acknowledge that throughout our work on this project, we lived, studied, and worked on the traditional and current homelands of the people of the Council of the Three Fires; the Ojibwa, Potawatomi, and Odawa. We also acknowledge the harm and wrongs that befell and continue to befall the indigenous people on their land and seek to improve understanding of the sovereign cultures of First Nations and tribal peoples to support a shared vision for the future of the region.

We also want to thank our advisor and clients for their guidance throughout this process. To the OBR partners who shared the valuable resource of time to talk to us and share their thoughts on the future of OBR. We would like to thank the University of Michigan's School for Environment and Sustainability for their funding and guidance. Lastly, we want to thank our friends and family for their support and encouragement.

Introduction

Relationships between people and their environments influence the biological diversity and the well-being of communities, while bringing to the forefront the concepts of conservation and development. While these relationships are at play, adverse effects of climate change such as higher global temperatures, increased heat waves and droughts, and changes in precipitation patterns are poised to cause significant damage to both human and ecological systems (NASA, n.d.). Given these circumstances, there was an attempt by the international community to find sustainable and equitable ways to manage resources.

Created in 1945, the United Nations Educational, Scientific and Cultural Organization (UNESCO) launched the Man and the Biosphere (MAB) Programme to address this tension and answer the following question: “How can we reconcile conservation of biodiversity and biological resources with their sustainable use?” (United Nations Educational, Scientific and Cultural Organization [UNESCO], 1996, p. 3).

The MAB Programme, created in 1971, had a goal to improve the relationship between people and the environment through a conglomeration of natural sciences, social sciences, education, capacity-building, and economics (UNESCO, 2017). In practice, Biosphere Reserves (BRs) encompass terrestrial, coastal, and/or marine ecosystems, each with a unique approach to conservation and sustainable development (UNESCO, 2017, p. 12). Varying in size, these reserves consist of three main components: core areas that are devoted to long-term conservation of landscapes and genetic variation, buffer zones to conduct research, education, monitoring, and training, and an outer “transition” area where sustainable development is emphasized and reinforced by various stakeholders including local communities and public authorities (Figure 1; UNESCO, n.d.a).

Figure 1

Basic Framework and Layout of a Biosphere Reserve (UNESCO, n.d.a)



In order to implement these goals, the MAB Programme created the World Network of Biosphere Reserves (WNBR) in 1976. While influenced by laws of each state, BRs are internationally recognized as part of the WNBR that as of February 2022 include “727 biosphere reserves in 131 countries, including 22 transboundary sites” (UNESCO, n.d.a). The network encompasses over 680 million hectares of terrestrial, coastal, and marine areas which are home to more than 207 million people (UNESCO, 2017). Regional and thematic networks are created as part of the WNBR to allow for the exchange of information and understanding insights that might come from sustainable development models from similar regions/ecosystems¹.

University of Michigan (U-M) Biological Station

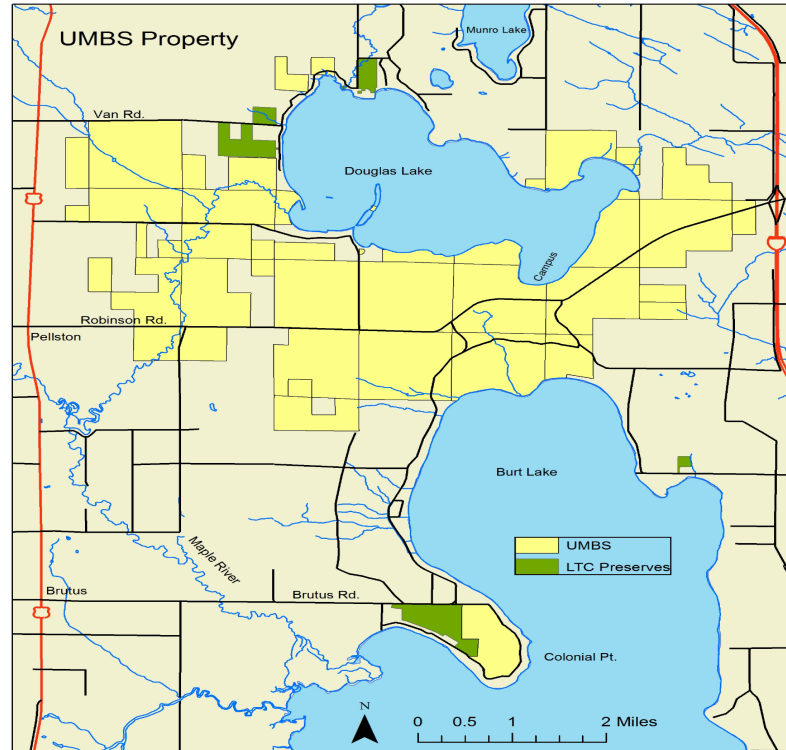
The boundaries of BRs tend to be ever changing to meet the needs and demands of their systems, and the University of Michigan (U-M) Biological Station BR located in northern Michigan is no different. Since its founding in 1909, the U-M Biological Station, also referred to as the U-M Biostation, has been a hub for education and research for scientists from across the globe (University of Michigan Biological Station [UMBS], n.d.) It spans two primary regions, one large area around Douglas Lake and a smaller section near Colonial Point (Figure 2). In its 112 years of existence, the area’s ecosystems have not only been studied but have also been closely monitored (UMBS, n.d.). This history of research and data made the U-M Biostation a prime candidate for biosphere status, but it was not until 1979 that the U-M Biostation was officially approved as a UNESCO Biosphere Reserve (Sherburne, 2021).

Originally, the U-M Biostation was established on lands previously owned by lumber barons who cleared the area of virtually every tree (UMBS, n.d.). Faculty and student researchers vigorously studied the biota and the processes of forest succession (UMBS, n.d.). Forestry researchers and students planted trees to reforest the 10,000 acre property (UMBS, n.d.). Contemporary issues such as invasive species and climate change have proven to be challenges to Northern Michigan, and the U-M Biostation has taken an interdisciplinary approach to address these (UMBS, n.d.). This includes collaboration between individuals in different fields such as natural historians, microbiologists, geologists, climatologists, and ecologists, to understand these natural world interactions (UMBS, n.d.).

¹ Ecosystem/theme-specific include Drylands, Mangroves, Mountains, Savannahs, Tropical Forests, Wetlands, and Marine, Coastal and Island Areas. Regional and inter-regional networks include Africa, Arab States, Asia and the Pacific, Europe and North America, and Latin America and the Caribbean, Portugal and Spain (UNESCO, n.d.b).

Figure 2

Current extent of U-M Biostation Lands in northern Michigan (University of Michigan Biological Station [UMBS], n.d.)

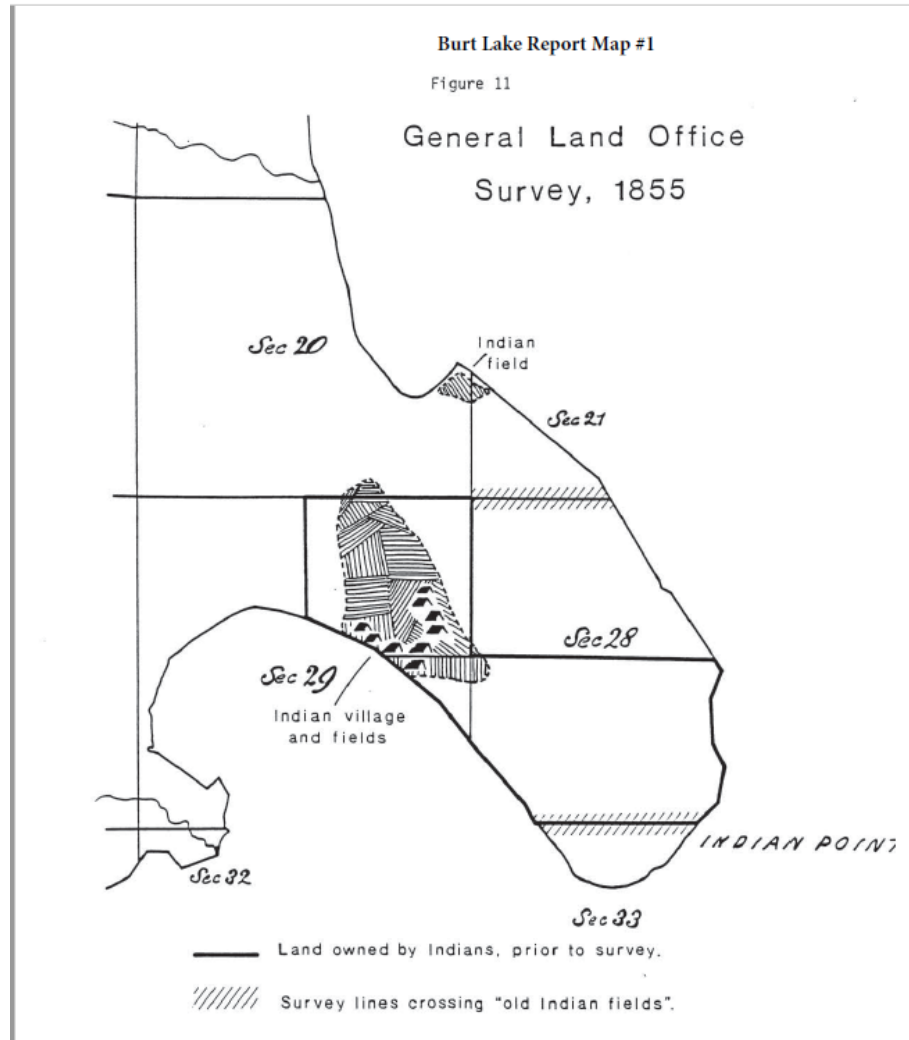


It is also important to note the history prior to U-M and the U-M Biostation. Throughout the northern Great Lakes region, there were different Indigenous tribes that lived in relationship with the land. Research at the U-M Biostation has found cache storage facilities purposefully built dating back to the Late Precontact period (ca. AD 1000/1100-1600) surrounding Douglas Lake (Howey & Frederick, 2016). More recently, U-M created a ‘President’s Advisory Committee on University History’. A report and recommendation by Professor Gone and Mr. Petoskey was shared with this committee and it encouraged the university to reflect on the relationship between the U-M Biostation and the Burt Lake “Burnout” (Gone & Petoskey, 2018). This report and recommendation outlines how in 1900, Cheboygan Sheriff Fred Ming and others burned down every home in Indian Village, a Burt Lake Band of Ottawa and Chippewa community, just south of the main Biostation Campus (Gone & Petoskey, 2018). The term Burt Lake “Burnout” refers to how more than 400 acres of land was then seized, leaving the Burt Lake Band residents with no “geographical home” (Gone & Petoskey, 2018, p. 1). Between 1985 and 1989, part of the land involved in the burnout became owned by the Biological Station and Little Traverse Conservancy, which they hoped to save for public purposes under the threat of logging (Figure 4). The lands adjacent to the village, which

have been farmed by former Burt Lake Band residents are under the control of the Biostation (Gone & Petoskey, 2018).

Figure 3

Map showing Indian Point (now Colonial Point) and Indian Village in 1885 (Gone & Petoskey, 2018)



This recent attempt to increase the awareness of the complicated history between the Native American and White populations in the area near the Biostation has brought to the forefront the need to address past and current social injustices. Although the University did not have a role to play in the Burt Lake Burnout, they now occupy ancestral land belonging to the Ottawa and Chippewa peoples (Gone & Petoskey, 2018). While we only address the history of the U-M Biostation creation and the land it is on in this report, as the BR expands and redefines itself it must recognize the history and injustices may also be present in other parts of the BR. These stories must be shared

despite potential tensions, so that the complete history of the region can be understood in order to create a just and equitable future.

Periodic Review Process

As part of the UNESCO Statutory Framework of the WNBR, Article 9 describes a periodic review that BRs must undergo every 10 years (Ottawaing Biosphere Region [OBR], 2019). The periodic review is meant to update the International Coordinating Council (ICC) of UNESCO's MAB program on the BR's fulfillment of the Statutory Framework criteria, and highlight any changes (UNESCO, 2020b). For the U-M Biostation, this periodic review was submitted in 2017. After their submission, the ICC recommended that this 5,700 hectare BR reassess its approach. In the ICC's response, they described that the BR's "... development efforts were weak. Local communities are involved in research projects in that area, but there is no participatory process to involve them in management in the biosphere reserve or to foster sustainable development and support of the local economy?" (OBR, 2019, p. 4). Furthermore, in order to combat barriers to the BRs success, UNESCO also recommended that, "...the authorities be invited to revisit the zonation of the site, in order to include buffer zone(s), and transition area(s) that can cater for the sustainable development function..."(OBR, 2019, p. 4). These recommendations were evaluated by the U-M Biostation BR and it ultimately led to its transformation.

Interested parties within the University of Michigan began to explore options for improving community involvement and zonations. On October 30, 2018 there was a meeting with parties to understand the interest in restructuring and expanding the U-M Biostation BR (OBR, 2019). Parties included citizens of regional tribal nations, local governments and related organizations, and non-profit conservation organizations throughout Michigan's eastern upper peninsula and the northern lower peninsula. The 21 delegates from the 15 organizations present agreed to the goal of restructuring and expanding, and the renaming of the U-M Biostation BR (OBR, 2019, p. 4). After this meeting and further conversations, a 2019 periodic review was submitted outlining the process the BR underwent and the proposed changes.

The 2019 periodic review outlines this re-naming from the University of Michigan Biological Station BR to the Ottawaing Biosphere Reserve (OBR) and preliminary details around the expansion and redefinition. The intentional renaming comes from a meeting where Frank Ettawageshik, Executive Director of the United Tribes of Michigan and member of the Little Traverse Bay Bands of Odawa Indians, described what the term "Ottawaing" meant. It is an Anishinaabe word that roughly translates as "the half-way, or meeting point" (OBR, 2019, p. 4). This term was deemed appropriate given that: (1) the Native American-First Nations tribal nations in the BR identify as Anishinaabe (also known as the People of the Three Fires, consisting of Ottawa, Chippewa, and Pottawattamie members), (2) the biosphere region is located within the Laurentian Great Lakes Basin with a town called Middle Village in the center of the region, and (3) the goals of the project highlight the collaboration between diverse entities (OBR, 2019).

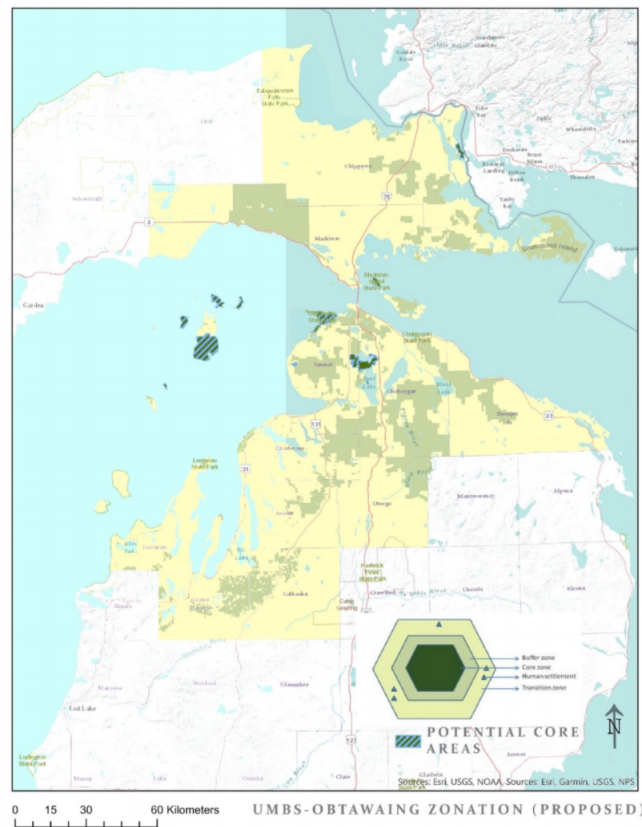
The 2019 periodic review is 71 pages and divided into the following sections: (1) Obtawaing Biosphere Reserve, (2) Significant Changes in the Biosphere Reserve During the Past Ten Years, (3) Ecosystem Services, (4) The Conservation Function, (5) The Development Function, (6) The Logistic Function, (7) Governance, Biosphere Reserve Management and Coordination, (8) Criteria and Progress made, (9) Supporting Documents, (10) Addresses, and (11) Annexes (MABnet Directory of the Biosphere Reserves, Promotion and Communication Materials, Statutory Framework of the World Network of Biosphere Reserves, and Bibliography). This periodic review highlights many aspects of the changes to the BR in varying levels of detail.

Specifically, in terms of amount of land, the planned expansion will grow the current BR to an area roughly spanning Sleeping Bear Dunes in the south, to St. Mary's River in the north (Figure 4). The new biosphere region would include a 54 square kilometer (sq km) core area, a 4,465 sq km buffer zone, and a 15,562 sq km transition area (OBR, 2019, p. 6). The core areas would be lands in different ecosystem and habitat types owned by a variety of partners in OBR, much like the buffer and transition areas. It is important to note that these core areas would all be legally protected areas, whether under state, federal, or private management. For a BR to have multiple core areas is unusual, especially if they are owned and managed by different entities. Importantly, these new borders reflect more of an 'area of influence' than a finite geographic boundary. This allows for plasticity of the transition area when needed.

To successfully respond to its recommendations, this new BR requires the building of a broader coalition of partners ranging from tribal governments to private landowners with the goal of engaging in collaborative regional conservation. As of March 2022, OBR has a network of over 30 partners, many of them representing regional and national land conservancies, tribal governments, and state environmental agencies. In addition to this coalition building, the expansion needs to be done sustainably and equitably with ecological, social, and economic interests in mind (OBR, 2019). As the expansion of this biosphere region will see its population increase from hundreds to hundreds of thousands, conservation and development initiatives need to create a sustainable economy that benefits both people and the environment (OBR, 2019) . This periodic review outlines the changes OBR went through at all stages but leaves room for flexibility as the expansion and redefinition take place.

Figure 4

Map of Approximate Boundary of OBR in Periodic Review (Tallant, 2019)



Project Purpose

The history of the UNESCO MAB program, the U-M Biostation, and the subsequent periodic review processes sets the stage for the involvement of a group of master's students from U-M's School for Environment and Sustainability (SEAS) starting January 2021 until April 2022. In this report, this SEAS team will be referred to as the OBR SEAS 2022 team. While the 2019 periodic review and the proposed expansion was not approved until late September 2021, the group outlined four objectives for the project:

1. Support the U-M members of the BR and the Rivers, Trails, and Conservation Assistance (RTCA) program with administrative and communication tasks
2. Schedule and hold informal conversations with current and potential partners of OBR
3. Research other BRs to gain insights into structure, core areas, and other features
4. Geovisualize OBR through socio-economic and ecological lenses

Below, the objectives will be described in further detail:

1. Support the U-M members of the BR and the RTCA program with administrative and communication tasks

As OBR was recently being formed, those who pushed for the redefinition and expansion at U-M created an informal and temporary committee to ensure the project continued to move forward. The members of this team included: (1) Knute Nadelhoffer, Professor Emeritus and former Director of U-M Biostation, (2) Adam Schubel, Resident Biologist at the U-M Biostation, and (3) Jon W. Allan, Faculty Member, Sr. Advisor, and Sr. Academic and Research Program Officer at SEAS. In this paper, these individuals will be referred to as the U-M OBR team. The OBR SEAS 2022 team collaborated closely with them in defining the project and in ensuring the project moved forward. The team would help schedule weekly meetings among this informal committee, schedule meetings with all the OBR current/potential partners, and any other individual meetings.

Furthermore, OBR engaged the RTCA program as a consultant to help OBR create a strategic plan once the approval for the 2019 periodic review was finalized. The RTCA is a National Park Service program that helps organizations and projects reach their goal whether it be park restoration, community engagement, and/or conservation planning (U.S. National Park Service, n.d.). Given the goals of OBR, the RTCA can leverage its past experience and knowledge to collaborate closely with all parties for a successful outcome. The OBR SEAS 2022 team was tasked with helping the consultant, Mike Mencarini, with the strategic planning process from scheduling dates, helping facilitate certain workshops, and note-taking when needed. Based on the outcomes of the strategic planning process and time constraints, potential suggestions for OBR's management structure may be included. Finally, the OBR SEAS 2022 team was also tasked with creating a brief communication tool to share what OBR was for current and potential partners.

2. Schedule and hold informal conversations with current and potential partners of OBR

The expansion and redefinition of the U-M Biostation BR to OBR lends itself to the opportunity to connect deeply with current and potential partners about their role in this new BR. Through informal conversations, the OBR SEAS 2022 team was tasked to understand various partners' hopes and concerns about OBR, as well as their current capacities to be involved. These conversations were meant to capture a wide range of perspectives and understand where these may overlap.

3. Research other BRs to gain insights into structure, core areas, and other features

OBR is one of 727 BRs in the world as of February 2022 (UNESCO, n.d.a). Given this, there is great insight to be found by gathering and evaluating multiple BR models around that world that have a similar scope to the OBR. The research's primary focus will be looking at information about operational practices and collaboration with various partners and entities, with special attention placed on participatory planning. Research on these will not be limited to a national scope,

and there will be flexibility in additional research that might be beneficial as the strategic planning progresses and the needs of OBR are redefined.

4. Geovisualize OBR through socio-economic and ecological lenses

In order to gain and share information regarding the landscape and communities that encompass OBR, geovisualization of the area is a major component of this project. The primary focus areas of this part of the project deals with the creation of GIS layers, a GIS repository, and a descriptive story map of OBR. Each of these components will shed light on much needed information that will hopefully prove to be invaluable to the project. GIS layers will include various socio-economic and ecological information such as income, land cover, trails, and hydrology. These outputs will be for the benefit of the OBR partner network in order for them to make informed management decisions for years to come. Since the scope of this project is finite, our goal is to set up a geovisualized framework that partners can find beneficial long term. The story map, which will be made in ArcGIS Online, will tell the story of the UM-Biostation, the area's tribal history, and the transition from the UM-Biostation BR into the Obtawaing BR.

These four objectives guided the OBR SEAS 2022 team in their work to support the OBR during this pivotal period.

Methods

In order to fulfill the objectives of the project, methods and roles were assigned to individual members of the OBR SEAS 2022 team. For each objective there is a different level of complexity and detail.

1. Support the U-M members of the BR and the RTCA program with administrative and communication tasks

To maintain open communication throughout the project, a bi-weekly meeting (a meeting occurring every two weeks) was made for the U-M OBR team and the OBR SEAS 2022 team. This 1-hour Zoom meeting used an agenda to guide discussion around pertinent information and topics. As needed, other meetings were scheduled between these two groups, primarily using the tool ‘when2meet’ to schedule. Regional meetings with current and potential OBR partners were scheduled by first finding a time that worked for the U-M OBR team and the OBR SEAS 2022 team. Then an email with OBR updates and a calendar invite were sent to the list of partners available. OBR update emails were used to keep partners aware of progress prior to the official acceptance of the 2019 periodic review. A level of flexibility was used with these administrative tasks but the scheduling of these meetings and calendar invites were done by one person to remove any confusion of responsibility.

Working with RTCA consisted of open communication and flexibility with the Strategic Planning process. While no specific method was laid out for these logistical interactions, emails were exchanged and Mike joined the bi-weekly Zoom meetings as the Strategic Planning Process came underway. Support was provided where needed for a variety of tasks and responsibilities outlined given each unique situation. In supporting Mike’s work and process, the U-M OBR team and OBR SEAS 2022 team also followed the Open Standards for the Practice of Conservation that Mike outlined at the beginning of each workshop to create a strong foundation for our work (Conservation Measure Partnership, 2020).

2. Schedule and hold informal conversations with current and potential partners of OBR

Through a list of current and potential partners, the U-M OBR team and the OBR SEAS 2022 team met to discuss which partners to meet first. Given the vast number, the U-M OBR team’s experience and expertise was leveraged to create a tiered approach for contacting. Based on the number in the first tier, the partners were divided up between the OBR SEAS 2022 team. Then a member of the U-M OBR team selected which conversations they would like to be a part of. Throughout the months leading up to these conversations, a note was added to any OBR update emails regarding these future informal conversations so they would be aware a OBR SEAS 2022 team member they may not know would be reaching out to them.

After deciding which partners to contact and who would be on the call, a drafted email that was reviewed by both teams was sent out to these partners and the involved U-M team members. If there was a response, a 30-minute meeting was scheduled. If there was no response, there would be one or two email follow-ups by the OBR SEAS 2022 team student. If after these three attempts, there was no response, the U-M OBR team member would reach out separately to the partner. This was done as the teams understood that prior relationships and contact with partners could facilitate scheduling meetings. Once the first tier was mostly or fully completed, the U-M OBR team and the OBR SEAS 2022 team met again to determine the next tier and so on.

In preparation for these informal conversions, a list of questions was created. These questions were drafted by the OBR SEAS 2022 team and fell under three categories: (1) individual specific, (2) relating to the project, and (3) about collaboration. A list of these questions can be found in Appendix A. In this document, a range of 2-7 questions in each category was created, as well as an opening and ending script. These questions were reviewed by the U-M OBR team. These questions were not meant to be strict guidelines but rather a loose framework to structure these conversations. The conversations were meant to be led by the OBR SEAS 2022 team member and supported by the U-M OBR team member present. The OBR SEAS 2022 team member was tasked with taking notes and reporting back to the rest of the team.

Once the conversations were conducted, the OBR SEAS 2022 team convened to find common themes throughout all the conversations. These themes were determined by each member reviewing the notes and selecting 2-5 themes they found throughout, as well as unique things to note. When the team members gathered, they compared themes and found commonalities and differences. From this, a presentation was created to communicate the findings to the U-M OBR team and the current/potential OBR partners.

3. Research other BRs to gain insights into structure, core areas, and other features

The research into BRs was divided among the OBR SEAS 2022 team. The team used the UNESCO MAB website to get an understanding of potential BRs to research (UNESCO, n.d.b). Based on the website's list, BRs were selected based on OBR SEAS 2022 team interest and information available outside of the UNESCO MAB website. It was throughout this process that it became clear that not all BRs had outward-facing communication such as websites or forums. As a result, the BRs selected were limited by availability and not representative of all BRs.

Once BRs were selected, each OBR SEAS 2022 team filled out a row on a Google spreadsheet under various headers (shown below).

1. #
2. Researcher
3. Name of Biosphere Region (BR)
4. Date Assigned BR status

5. Location
6. Establishment Method
7. Story Line
8. Value Proposition (*what is the value of participating in this program?*)
9. Foci (*top 2-3; e.g. tourism, fishing rights, etc.*)
10. Management (*how is the BR managed? e.g. steering committee structure, turn over, new member diffusion and integration, old member retirement and recognition, etc. & visual representation*)
11. Evidence of, or Depth, of Community Participation
12. Degree of Engagement with Indigenous Populations (*degree and/or method of engagement; e.g. inclusion of Traditional Ecological Knowledge, Tribal Leadership, Tribal Priorities*)
13. Evidence of Regional Identity
 - a. General
 - b. Foods
 - c. Language/dialect
 - d. Behaviors/norms
 - e. Degree of regional cohesion or lack thereof
14. Actions (*what is being done to achieve these goals?*)
15. UN BR Program Goals (*how are BR's achieving and measuring them*)
 - a. What do they do to conserve biodiversity?
 - b. What do they do to conserve cultural diversity?
 - c. What do they do to improve local livelihoods and achieve socio-culturally and environmentally sustainable economic development?
 - d. How do they measure these achievements?
16. How does the BR support the UN BR Program Goals through the following:
 - a. Research
 - b. Monitoring
 - c. Education
 - d. Training
17. What are or have been the major challenges confronting the BR? How are/were these challenges addressed?
18. Other Things to Note
19. Zone(s)
 - a. Description
 - b. Map/image
20. Website Links

These headers were filled out for each BRs to the best of the OBR SEAS 2022 team's ability given the access to information online, research articles, and/or United States Biosphere Network events. This information was then evaluated by the team and incorporated into reflections and recommendations to the U-M OBR team as part of this report.

4. Geovisualize OBR through socio-economic and ecological lenses

An important component of this project is the use of GIS to visualize OBR through socio-economic and ecological lenses. First, the transitional zone of OBR needed to be changed from county-line boundaries to a finer scale delineation in order to pick and choose areas/regions based on partner input. It was proposed that “HUC-12” watersheds should be used as this delineating factor. It was also suggested that the boundaries be seen as an ever changing “area of influence”, rather than distinct borders since OBR holds no legal jurisdiction over the land it encompasses. There are also a large number of inhabited and uninhabited islands within Lake Michigan and Lake Huron that needed to be included. To better show the land where OBR resides, the HUC-12 watershed shapefile was then aggregated using ArcGIS Pro to show only the outer boundaries of OBR. A Great Lakes islands shapefile was chosen and then was lassoed to only include those in the vicinity of OBR. The HUC-12 watershed and Great Lakes layers were merged to create a visualization of OBR’s borders. After merging, the area of OBR was calculated in square miles by calculating its geometry.

A GIS repository was made available in ArcGIS Online with the expectation that partners would be able to add/take spatial data when needed. The OBR team wanted to jump-start the data sharing process, so layers were chosen that would be relevant to the partners’ wants and needs. This included but was not limited to hydrologic, land-cover, eco-regions, presettlement vegetation, and income data. With help from the OBR SEAS 2023 team, the attributes of relevant layers were recorded in a detailed spreadsheet, reprojected to NAD 1983 Michigan GeoRef (Meters), and then cut to the extent of the OBR transition zone. Some layers were added that encompassed the Great Lakes Region, including counties, HUC codes, and eco-regions. These “Great Lakes” layers were included to be a resource for partners that may do work outside the OBR boundaries.

A story map was also created through ArcGIS Online. It was structured to provide background on the MAB Programme, the history of Obtawaing and the Odawa village, the history of the U-M Biostation, the periodic review, and the processes and deliverables of the project. We leveraged the ability to create express maps, which are interactive maps that help supplement and create visuals for engaging stories (Hackney, 2022).

Results

1. Support the U-M members of the BR and the RTCA program with administrative and communication tasks

From January 2021 until April 2022, the OBR SEAS 2022 team were able to schedule a variety of meetings for general updates and as part of the strategic planning process. High level and detailed notes were taken for each of these meetings and workshops. These were saved in a Google Shared Drive with the U-M OBR team under a SEAS Master's Project (2021-2022) project folder. These notes are available to all those with access to the drive and include the agenda, notes, and if applicable a recording of the meeting.

Throughout this time, various emails were also sent to partners to update them on the ICC's response of OBR's status, workshops that may interest our partners, and any updates of future events/meetings. The three types of meetings primarily scheduled were regional meetings, strategic plan workshops, and individual conversations.

Regional Meeting

A one hour and a half regional meeting was held on December 2, 2021. This meeting was facilitated by the OBR SEAS 2022 team and was guided by an agenda created in collaboration with the U-M OBR team and the RTCA. The regional meeting started with a status update and a land acknowledgement. Then, it detailed the upcoming workshops for the strategic planning process, the new OBR SEAS 2023 team, and potential for projects and collaborations. Due to UNESCO's focus on ecology/conservation, economic/sustainable development, and culture, three partners shared their insights on these topics. Toward the end, there was an update on the OBR SEAS 2022 project, planning for the strategic plan workshops, and ongoing outreach and engagement. This regional meeting re-ignited the excitement among partners about the work to be done, as well as set the foundation for partners to speak and take larger roles within OBR planning.

Strategic Plan Workshops

The strategic plan workshops were primarily led and supported by RTCA. Both the OBR SEAS 2022 and U-M OBR teams supported Mike Mencarini in various capacities from scheduling, defining agendas, and recruiting partners to help decide the direction of the workshops. Table 1 shows the dates for the workshops, agenda outline, and the statements under consideration. Workshop 1, 2, 4, and 5 were meetings for a broader discussion of OBR with the partners, while Workshop 3.1-3.4 honed in on specific goals that partners could pick which to attend based on their interests. Each of these workshops were well attended by a variety of partners.

Table 1

Dates and Statements of the OBR Strategic Plan Workshops Facilitated by RTCA

	Date	Agenda/Statements
Workshop 1	January 11, 2022 2 - 4 PM	<ul style="list-style-type: none"> - Summarize Advisory Council Listening Sessions - Introduce Strategic Planning Process - Identify Stories of OBR - Roles and Responsibilities of the Advisory Council
Workshop 2	February 2, 2022 9 - 11 AM	<ul style="list-style-type: none"> - Vision Statement Discussion - Mission Statement Discussion - Strategic Goals Discussion <p><i><u>Vision:</u> The Ottawaing Biosphere Region is a place where people and beings prosper because of the (adjective?) relationships and responsibilities between people and the natural world. (starting off point)</i></p> <p><i><u>Mission:</u> The partners in the OBR will share ideas and implement solutions to improve the relationship between people and the natural world to advance environmental, cultural, and socio-economic sustainability and well being in the Great Lakes Region and globally. (starting off point)</i></p>
Workshop 3.1	February 23, 2022 9 - 11 AM	<ul style="list-style-type: none"> - Vision and Mission Discussion - Questions and Discussion about Goal 1 - Discuss Goal 5 <p><i><u>Goal 1:</u> Maintain and cherish the cultures and natural worlds of the Ottawaing Biosphere Region. (starting off point)</i></p> <p><i><u>Goal 5:</u> Create a forum for collaboration and information sharing across the region. (starting off point)</i></p>
Workshop 3.2	March 8, 2022 1 - 3 PM	<ul style="list-style-type: none"> - Vision and Mission Discussion - Questions and Discussion about Goal 2 - Discuss Goal 5 <p><i><u>Goal 2:</u> Provide/ share information based on western and indigenous/ Anishinaabe science as well as traditional ecological knowledge to advance the OBR mission and goals. (starting off point)</i></p> <p><i><u>Goal 5:</u> see above</i></p>
Workshop 3.3	March 21, 2022 3 - 5 PM	<ul style="list-style-type: none"> - Vision and Mission Discussion - Questions and Discussion about Goal 3 - Discuss Goal 5 <p><i><u>Goal 3:</u> Recognize and celebrate the interconnections among natural systems, human livelihoods, and diverse cultures through publications,</i></p>

		<i>public programs, and various media platforms. (starting off point)</i> <i>Goal 5: see above</i>
Workshop 3.4	April 6, 2022 9 - 11 AM	- Vision and Mission Discussion - Questions and Discussion about Goal 4 - Discuss Goal 5 <i>Goal 4: Acknowledge and support reconciliation efforts and the integrity of sovereign Indian tribes. (starting off point)</i> <i>Goal 5: see above</i>
Workshop 4	April 25, 2022 10 AM - 12 PM (pending)	Tentative Plan: - Summarize and Discuss Learnings from Workshop 3.1-3.4 - Outline Expectations and Plan for Workshop 5
Workshop 5	TBD	Tentative Plan: - Partner Group Present Strategic Plan Framework for OBR

Through Mike's expertise in facilitating, OBR partners were able to actively participate throughout the whole process. By evaluating the vision, mission, and each goal individually, partners were able to share underlying values and hopes for the direction of OBR. While some suggested specific semantic changes by adding or removing verbs and adjectives, others pushed the group to consider the interactions between humans, non-humans, and the natural world. This has sparked a conversation on how to approach different ways of knowing including Traditional Ecological Knowledge and Indigenous Ecological Knowledge. This includes reflecting on what a relationship with the land and nature mean and how to communicate this with those that view nature through a culture-nature binary lens. These questions and suggestions have pushed the group to consider their role in the region as an educator of what a collaboration of diverse ways of knowing looks like. Furthermore, it has allowed OBR to reflect on how the words of these statements are important not only for the organization and their partners but for other BRs and the surrounding community.

Between the workshops, partners were given worksheets to continue to consider the vision, mission, and strategic goals. This was meant to encourage reflection throughout the strategic planning process so that the workshops would provide the space to have thorough conversations on each perspective. Mike and the OBR SEAS 2022 team were able to capture all these suggestions, in order for Mike to provide a summary for Workshop 4. The goal being that this initial work lays the foundation for a group of partners to create a strategic plan framework for Workshop 5. The opinions and reflections of each partner were respected and built upon, in order to create a collaborative environment. This will hopefully lead to a strong and understanding partnership as OBR finalizes their strategic plan framework and creates an operational plan.

In the following section we will delve deeper into the third type of meeting scheduled, the informal conversations, which were scheduled prior to and during the strategic planning process.

2. Schedule and hold informal conversations with current and potential partners of OBR

Between July 2021 and September 2021, the OBR SEAS 2022 team was able to have seven conversations with current and potential partners about OBR. These conversations included individuals from governmental organizations, regional land conservancies, and tribal governments. An analysis of these conversations resulted in four main themes that were presented during Workshop 1 of the strategic plan. These four themes were: (1) excitement and importance, (2) unique project, (3) interests and capacities, and (4) importance of communication.

Theme one, excitement and importance, came from seeing how animated and engaged partners were about collaborating with OBTAWAING and the importance it would bring to the region. There was a desire for deep collaboration between partners that was authentic and meaningful rather than superficial. Although there were partners from varying organizations with diverse focuses, there seemed to be one clear end goal. This being a goal of respect for both the people and the landscape that creates just and inclusive conservation initiatives. This theme really brought to the forefront that while OBR was suggested with the idea of collaboration by the U-M Biostation, OBR partners were willing to put in the work to make this a reality.

The second theme extracted from the conversations was the uniqueness of the project for the partners. Many partners saw OBR as a chance to create a regional cohesiveness that countless found was missing in the region. For them, it was an opportunity to share information and ideas by building bridges instead of walls between them. Partners made it clear that the issues the region faces required collective action and connection, rather than isolation. There were also three specific words that stood out to the partners which were voluntary, collaborative and diverse. Firstly, OBR is a completely voluntary project for those who choose to participate. At any point, partners can join or leave, but those that are part of the project show incredible dedication and commitment to the well-being of the region on top of all the other work they do. Secondly, the collaborative nature of the project allowed for partners to connect and have honest, open conversations with organizations and individuals they may not have had the opportunity to. This collaboration not only shares the burden of the work to be done, but brings in vast perspectives that can be used to find the best solution for the region. Lastly, the diversity of the partners and participants in the project showed how encompassing it is of the region and important for the goals of BRs globally.

Theme three, interests and capacities, shifted from OBR partners' feelings found in theme one and two toward current abilities to be part of the project. This shift in conversation gave greater clarity on the ability to take actions as part of this project. It was clear that partners had a wide range of interests and focuses for their involvement in OBR. These ranged from ecosystem focused projects like wetland conservation, to more people-centered ones like collaboration with tribes and treaty rights. Although theme two highlighted how no interests work in silos, having partners share

their interests in particular areas allowed OBR to notice the overlap between partner interests. This showed the interdisciplinary and collaborative aspect of the project. In addition to talking about interests, it was clear that partners had varying capacities to be involved. Being part of OBR is only part of what partners do, so involvement will depend on their interest and capacity. This capacity is subject to change over time and for this reason there needs to be open communication and clarity of needs.

This tied nicely to the fourth theme that was the importance of communication. The success of OBR is reliant on clear and open communication. This does not just mean OBR as a whole and its status, but about the partnerships. Communication between partners and the projects they are working on, on our collaboration successes and failures, and on working together with a diversity of voices. What also came out of the conversations was the need to create a space where people could share their goals and hopes for the project within OBR. This specifically was incorporated into the strategic plan workshops in the hopes of creating a strong foundation for the future. In the conversations, people shared their confusion about what the project means and had a lot of questions. OBR needs to continue to have open dialogue throughout the workshop series, as well as share the best way to communicate with the U-M OBR team for any specific logistical questions. Also, in response to this, the OBR SEAS 2022 created a two-pager to communicate what OBR is to new and existing partners in a succinct, digestible way (Appendix B). Furthermore, as the U-M OBR team transitions from leading the OBR project into a more collaborative space, the workshops are meant for open dialogue about these questions and concerns among all partners.

While most of these informal conversations were held in a virtual format, the OBR SEAS 2022 was able to visit two of the partners in-person, the Beaver Island Association and the U-M Biostation. Through these visits, the team was able to experience the region in a deeper way. Conversations with individuals at both of these locations highlighted areas of focus, concern, and excitement, including what they as a partner could benefit from being part of a project like OBR. Specifically, the visit to Beaver Island demonstrated the challenges an island community is facing when it comes to housing, as well as the tight knit community that lives there. On the other hand, the trip to UMBS showed how focusing on the needs of the surrounding community when it comes to economic development is extremely important. The benefits from these in-person experiences and the ability to have these conversations was shared with the new OBR SEAS 2023 team so that they could take advantage of these opportunities with potentially fewer COVID-19 restrictions.

Thanks to the partners who took the time to discuss their thoughts and feelings about OBR, the OBR SEAS 2022 team was able to identify these four themes. With a mix of more theoretical and practical themes, these will allow OBR to circle back and reflect on changes to these in the future. While there is uncertainty on the final path of OBR and its goals, the current strategic plan and time will allow these to come into sharper focus. This will increase clarity for all those involved and it will allow partners to reflect on changes to their needs.

3. Research other BRs to gain insights into structure, core areas, and other features

The OBR SEAS 2022 team conducted research on 11 BRs, six located in the United States of America (USA) and five international ones (Table 2). A varying amount of information was accessible on websites, reports, and articles. The “raw data” of this research was put into a Google Spreadsheet that was shared through the same Shared Google Drive mentioned above. For this report, four main areas were highlighted from this research that could benefit OBR as it redefines itself. These four areas are the BR story, management structure, community and Indigenous involvement, and other important considerations.

Table 2
National and International BRs Researched

National		International	
Name	Location	Name	Location
Mammoth Cave Biosphere Region (MCBR)	Kentucky, USA	UNESCO Biosphere Entlebuch (Entlebuch)	Switzerland
Cascade Head Biosphere Reserve (CHBR)	Oregon, USA	Frontenac Arch Biosphere Network (FABN)	Canada
Congaree Biosphere Region (CBR)	South Carolina, USA	Biosfärområde Vindelälven-Juhtttáahkka	Sweden
Champlain-Adirondack Biosphere Network (CABN)	New York and Vermont, USA	Mariposa Monarca Biosphere Reserve	Mexico
Southern Appalachian Man and the Biosphere (SAMAB)	Georgia, Alabama, North Carolina, South Carolina, Tennessee, and Virginia, USA	Niagara Escarpment Biosphere (NEB)	Canada
Golden Gate Biosphere Network (GGBN)	California, USA		

BR Storylines & Values

The 11 BRs had a variety of storylines depending on geological features, history and culture, collaboration, and specific species focus. Stories are often used to communicate value, but they also

help create an identity. This identity creation is both for the community the BR is found in and also those that are learning about the region. These stories were communicated in various ways through their communication materials but the different focus areas will provide OBR with the opportunity to reflect on what story it wants to tell.

When it came to geological features, there were three BRs that focused strongly on karst and caves. These were UNESCO Biosphere Entlebuch, hereafter called Entlebuch, MCBR, and SAMAB (UNESCO Entlebuch Biosphere, n.d.; Barren River Area Development District [BRADD], n.d.; Southern Appalachian Man and the Biosphere [SAMAB], n.d.c). They often used these geological features to promote tourism and its ecological value, but in the case of MCBR, they also used it to highlight the importance of water in their region. Water is used as a central line through their ArcGIS StoryMap and is used to highlight their large cave system (BRADD, n.d.). Using prominent geological features allows the surrounding communities and visitors to create a connection based on their own experiences with them. For example, everyone has a relationship with water but water can mean different things depending on where you live. Based on this, MCBR's use of water allows them to describe how water affects the surface, bedrock, and karst in their region, which may be different than the relationship of water in a desert biome (BRADD, n.d.). Through highlighting their geological features, BRs communicate their uniqueness but also their relatability to other regions.

Some BRs focused their stories on specific species that often also required some multi-state or -country collaborations. For example, the Mariposa Monarca Biosphere Reserve follows the migration of the monarch butterfly from Canada and the USA to Mexico during its migratory cycle (UNESCO, 2018a). This not only highlights a particular species that is central to its story, but also how in order to conserve this natural heritage and the species it must take trilateral actions in various locations concerning its wildlife and ecosystems (Secretaría de Medio Ambiente y Recursos Naturales [Semarnat], & Comisión Nacional de Áreas Naturales Protegidas [Conanp], 2019). This not only happens internationally but can happen between multiple states. The SAMAB communicates how it is the Salamander Capital of the World due to its cool high-elevations that lends itself to salamander survivability in the moist forests and cave networks (SAMAB, n.d.a; SAMAB, n.d.b). There are a variety of endemic species to Southern Appalachia that require collaboration between Georgia, Alabama, Tennessee, North Carolina, South Carolina, and Virginia in order to address the expanse of this BR. When the boundaries of BR's encompass multiple states like SAMAB or Champlain-Adirondack, there is a different level of collaboration among state governments, non-profits, academic institutions, Indigenous groups, and communities. On the other hand, there are instances like the Mariposa Monarca BR where the BR itself does not span multiple regions, but the species has a migratory path that requires collaboration to ensure its protection. Specific species can become powerful storylines and can inspire collaboration and action among different communities.

Lastly, there were storylines that touched upon the history and culture of the BRs. Three BRs stood out during our research which were Biosfärområde Vindelälven-Juhttátahkka, MCBR, and Entlebuch. First, Biosfärområde Vindelälven-Juhttátahkka touched heavily on the historical use

of land for hunting and fishing, reindeer herding, mining, and forest use (Gardeström et al., 2019). Specifically, they described the Samis use of the land and the cultural importance of their practices (Gardeström et al., 2019). Second, the MCBR communicates the history of the cave network. As tourism evolved in the BRs, they used cave guides for adventurous travelers (BRADD, n.d.). The first guides were Steven Bishop and Mat and Nick Bransford who were enslaved African Americans (BRADD, n.d.). Today, a descendent of the Bransford, Jerry Bransford, is still a guide (BRADD, n.d.). The cultural history of MCBR is strongly influenced by Black history and experiences, and is communicated throughout the ArcGIS StoryMap (BRADD, n.d.). Third and lastly, Entlebuch ties its karst geological features to a story of how the stone desert of the Schratteflue near Sörenberg was created by the devil as a curse of an inheritance dispute (UNESCO Entlebuch Biosphere, n.d.). This story is prominent on its website and exemplifies how stories allow communities to create identities. While history and culture varied by BR and this was only a brief overview, it was clear that they were important in understanding their BR and how they communicated about them.

While some storylines are more prominent than others, they each attempt to create a personal connection that communicates value and a connection with nature. Whether it is focusing on the migratory path of monarch butterflies or highlighting the historical use of the land by the Indigenous populations, each BR's unique story creates an identity for their path forward.

BR Management

Management structures for the BRs had various levels of clarity and complexity. This seemed to be based on how active the BR was and the involvement of partners. Many BRs like Golden Gate Biosphere Network had recently revitalized their BR and had done a series of retreats to create a management structure or were working to evaluate the one they already had like the Congaree Biosphere Region (United States Biosphere Network [USBN], 2021). While others like Entlebuch had a clear management structure based on the municipalities and counties that spanned the BR (UNESCO Entlebuch Biosphere, n.d.). Overall, there seemed to be varying degrees of partner involvement and the use of a central committee with sub-committees. Some BRs also tended to have more complex management systems as a result of the international collaboration or societal impacts. In this next section, different management styles will be described for OBR to evaluate.

There was varying involvement of the number of partners and the degree in which they were part of any operational or management team. There were a few BRs that had a clear centrally located group or office with sub-committees. For example, the Biosfärområde Vindelälven-Juhttátahkka had a central office that is a collaborative area for all stakeholders and partners while also running the day-to-day work (Gardeström et al., 2019). There were 5 sub-committees that focused on different aspects of the BR that connected to the central office (Figure 5). Throughout their application they outlined how they do not have a fully defined management plan for the whole region but the interim board had participants from a range of organizations (Gardeström et al., 2019).

Figure 5

Biosfärområde Vindelälven-Juhttatáhka Management Structure from UNESCO Application (Gardeström et al., 2019, p. 170)

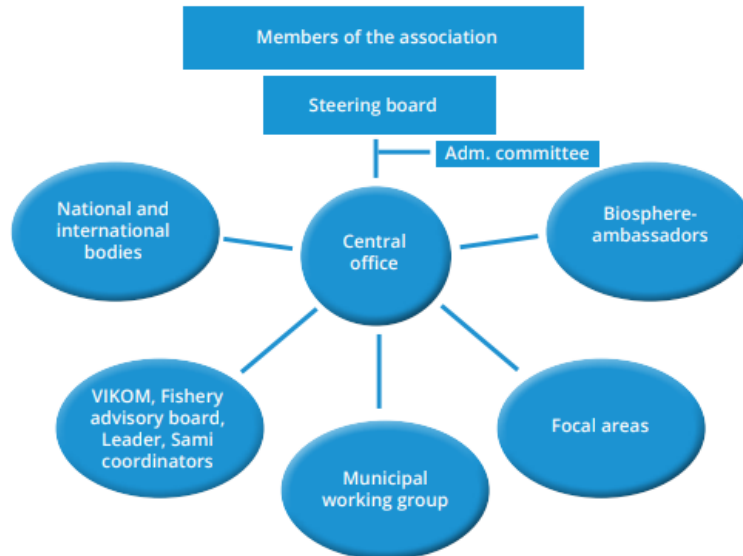


Figure 12. Organisation chart for the planned biosphere reserve Vindelälven-Juhttatáhka

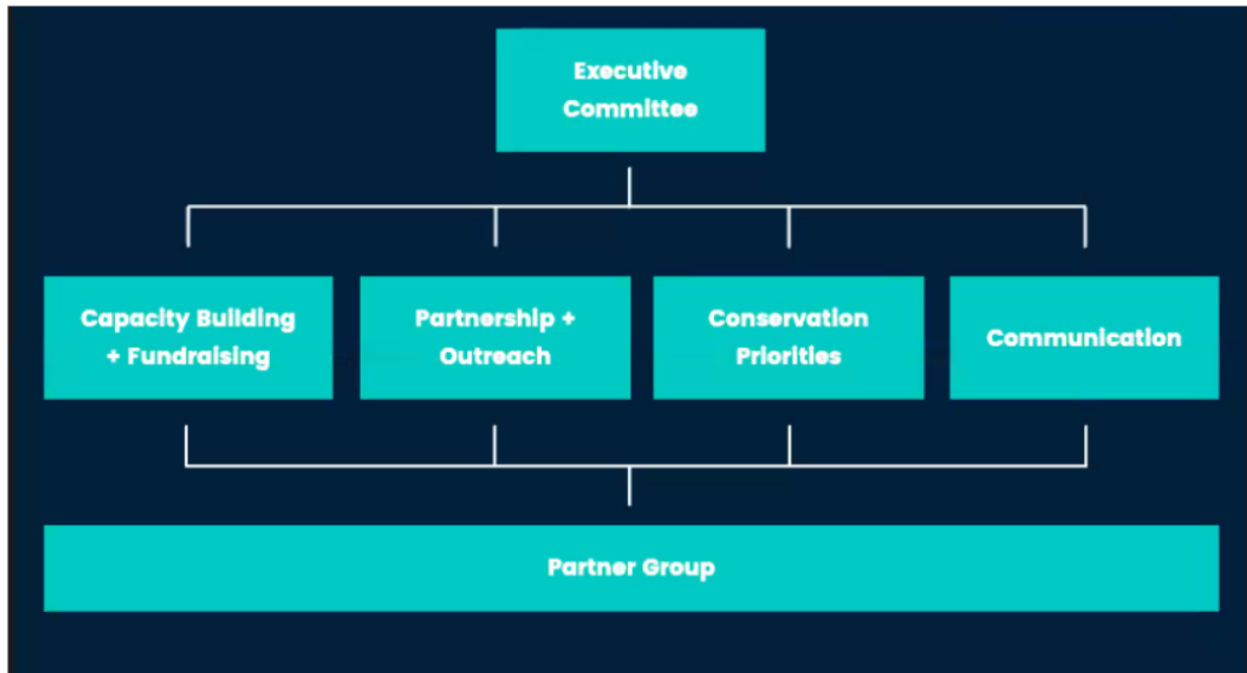
The organisational model for the planned biosphere reserve is illustrated in Figure 12. The interim board serves as a joint coordination structure for the entire planned biosphere reserve (17.1.7). A working committee, comprising the chairperson of the board and the chief executives of Sorsele and Vindeln municipalities, is charged with managing various administrative tasks reducing the burden placed on the board, and with supporting the central office.

The organisation's day-to-day work is run from the biosphere's central office. Since 2015 this work has been led by a coordinator employed by Vindeln municipality, assisted by a communications officer. A fixed municipal working group made up of one representative from each municipality plus one from VIKOM, the Vindelälven municipalities' cooperative, is tied to the central office. In addition to assisting the central office in various tasks, these representatives can also function as local contact persons in the six municipalities (see 4.3.2).

Similarly, the Golden Gate Biosphere Network held a series of virtual retreats in 2021 that resulted in the creation of an Executive Committee and four sub-committees found in Figure 6 (USBN, 2021). The Executive Committee would have 11 representatives of land and marine ecosystems at both federal and state levels, conservation non-profits, utility companies, and others, while the sub-committees would be voluntarily populated from these (USBN, 2021). While this is not to say that other BRs do not have one main centralized group or board, these two (rather recent) examples of management structures demonstrate a centralization of information with the flexibility and support based on partner interests and needs.

Figure 6

Golden Gate Biosphere Network Management Structure Presented at USBN Workshop 3 (USBN, 2021)



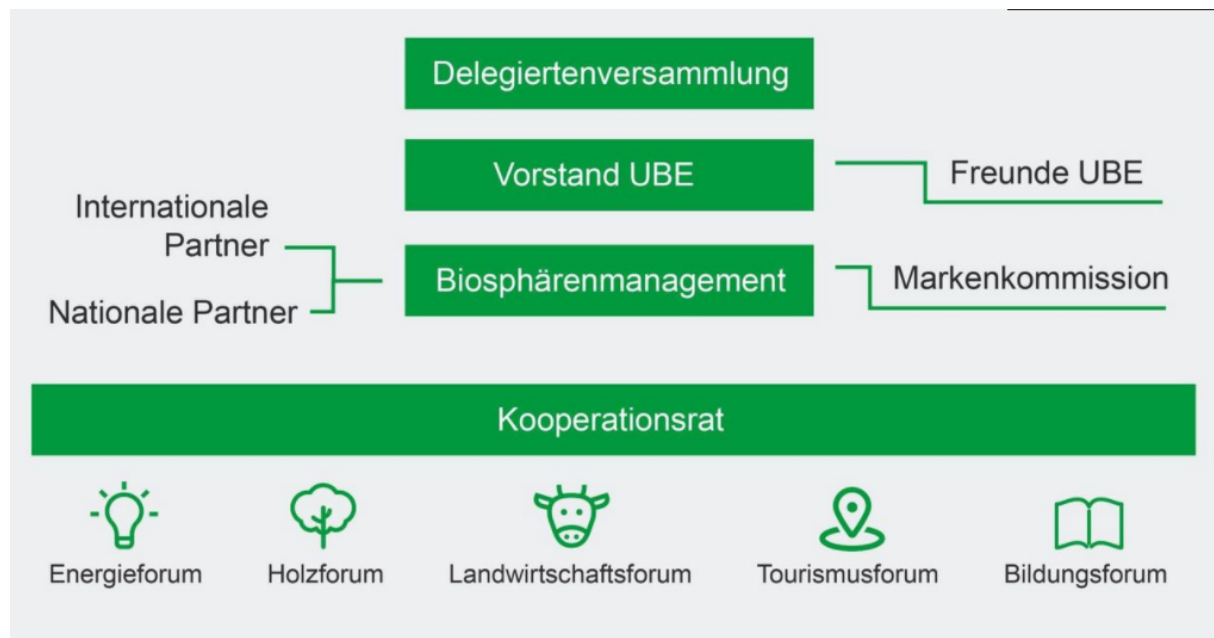
While the two previous BRs mentioned had rough outlines of their management, some BRs had specific processes by which the members were selected and their role within the BR’s management. Here there will be three examples of the different breakdowns of the management and the role specific partnerships and communities had in determining these. First, the MCBR had two tiers of Advisory Council (AC) members based on the “General Agreement between the National Park Service Mammoth Cave National Park and the Barren River Area Development District and Western Kentucky University” signed in 2020. Article III of this General Agreement stated how the AC would be 13 Standing Members who would be those that are strongly aligned with the mission of the BR and 12 At-Large Members that were other key stakeholders like business owners, citizen leaders, etc. (2020). The General Agreement outlined how the Advisory Council would appoint a Chair, Vice-Chair, and Secretary every two years, along with processes to deal with various situations (2020). This Agreement was one drafted, finalized, and agreed upon by three entities in the title above, ensuring that the process was clear and would lay the foundation for future success (2020).

Second, Entlebuch had multiple groups involved in the decision making process and in charge of various areas. The Assembly of Delegates was a group where all municipalities were represented based on the number of inhabitants in the municipality and the area it covered (UNESCO Entlebuch Biosphere, n.d.a). They then selected the Board who had a maximum of 11 members with all 7 municipalities represented, one seat for the Friends of Entlebuch (interested individuals or companies), and two seats selected by the Assembly of Delegates (UNESCO Entlebuch Biosphere, n.d.a). They also had a Biosphere Management for operational activities,

regional marketing, and infrastructure for evaluating the UNESCO goals of monitoring, education, and research (UNESCO Entlebuch Biosphere, n.d.a). Another addition to their operational plan was adding a Forums and Cooperation Council to facilitate cross-community and sector projects like education, energy, and tourism, and partner and network collaborations (UNESCO Entlebuch Biosphere, n.d.a). These different sections of management can be found on Figure 7 with the connection of separate areas to four main pillars.

Figure 7

Entlebuch Management Structure on Website (UNESCO Entlebuch Biosphere, n.d.a)



Organization chart of the UNESCO Biosphere Entlebuch

Note. Translation from German to English is as follows from Google Translate.

Delegiertenversammlung = Delegate Assembly

Vorstand UBE = Board of the UNESCO Biosphere Entlebuch

Freunde UBE = Friend of of the UNESCO Biosphere Entlebuch

Biosphärenmanagement = Biosphere Management

Markenkommission = Trademark Commission

Internationale Partner = International Partner

Nationale Partner = National Partner

Kooperationsrat = Cooperation Council

Energieforum = Energy Forum

Holzforum = Wood Forum

Landwirtschaftsforum = Agriculture Forum

Tourismusforum = Tourism Forum

Bildungsforum = Education Forum

Third and lastly, the Congaree Biosphere Region took more than three years to create their Region Advisory Council (USBN, 2021). They described how hard it was to create a formal management because they felt there were many partners with competing interests (USBN, 2021). However, after many conversations it came down to creating an AC with three of the primary partners who were Congaree National Park (CNP), South East Rule of Community Outreach (SERCO), and Central Midlands Council of Governments (CMCOG) in May of 2021 (USBN, 2021). This last example shows how despite the long process and still defining certain details, three main partners were heavily involved in creating the AC and the management of the BR.

Before discussing community involvement, one BR in particular highlighted the complexity of management due to national and international politics, as well as societal impacts of management. The Mariposa Monarca Biosphere Reserve is located in Mexico and is thus subject to Mexican law. Mexican environmental law only lets the National Commission of Protected Areas (CONANP) to make final decisions so true participative management (effective citizen power including citizen and institutions decision-making process) is not legally recognized (Rees Catalán, 2015). While there may be a variety of stakeholders including institutions, non-governmental organizations, and communities, only certain groups have the right to vote based on agrarian rights (Rees Catalán, 2015). This complexity prevents community participation in the management structure since CONANP is the only one allowed to make decisions. However, there is “an international context of participation in public policies” for citizen participation in protected area management in Mexico (Rees Catalán, 2015, p. 91). Meanwhile, management is also done in collaboration with the USA and Canada due to its common interests (Semarnat & Conanp, 2019). These tensions between social rights and international politics influence BR management structures and need to be evaluated when creating new operational plans.

Above there are many examples of different BR management structures from recently created BRs to more defined management structures. This variety gives examples for OBR to draw upon to determine given its socio-economic and conservation goals, its vision and mission, and what would work best to maintain strong collaboration. While OBR will undoubtedly create a unique structure based on its circumstances, it is important to learn from other BRs.

Community and Indigenous Involvement

All the BRs had varying levels of community and Indigenous involvement based on their journey as BRs and their missions. We will highlight six BRs that have either a high level of community and Indigenous participation or low levels. This analysis was based on what could be found and is not meant to pass judgment on the BRs. Instead it is meant to communicate to OBR the various stages of each BR when it comes to involving others beyond the partners and how they communicate to the public about these.

Those that we identified as having low levels were the Mariposa Monarca Biosphere Reserve, MCBR, and the Niagara Escarpment Biosphere. The Mariposa Monarca Biosphere Reserve is portrayed by the BR and Mexican authorities as having a good practice of participative management

but there is a lack of social justice and participation in community decisions based on who has rights (Rees Catalán, 2015). CONANP has headquarters near the BR but due to frequent changes to the area's directors it tends to impede long term collaboration (Rees Catalán, 2015). Many Indigenous communities often just accept information without looking into further details so there is a lack of transparency and communication (Rees Catalán, 2015). Similarly, the Niagara Escarpment Biosphere, supported by the Niagara Escarpment Foundation, has posted on their website in January 2021 on their process (Niagara Escarpment Foundation, n.d.). It says the Niagara Escarpment Commission is beginning to shift and "encourage and facilitate a more collaborative, community-based governance structure, which includes meaningful engagement with Indigenous Peoples/Communities" (Niagara Escarpment Foundation, n.d.). This makes it clear that their previous practice was not in line with community participation since the current statutory body kept things at a distance, but that they were working on changing this (Niagara Escarpment Commission, n.d.). Lastly, the MCBR seemed to have some community participation like the movement to improve water quality by the local farmers market and organic food movement (BRADD, n.d.). However, this was superficially relayed on the website and unclear how much deeper it goes, besides the involvement as part of the Advisory Council. This is a preliminary analysis of community and Indigenous participation. It shows the impact of social and political regulations, as well as the flexibility to be open to change based on self-reflection and changes to missions.

There were three BR that seemed to have higher levels of community participation which were the Biosfärområde Vindelälven-Juhttáahkka, Frontenac Arch Biosphere Network (FABN), and Entlebuch. The Biosfärområde Vindelälven-Juhttáahkka had a high degree of Indigenous involvement due to the large Sami population. Its application made it clear how they were working to understand the knowledge of past generations with reindeer husbandry and other sustainability ideas to move forward with the BR's sustainability goals (Gardeström et al., 2019). While there was active participation, there were fears expressed due to historical oppression and abuse toward the Sami populations (Gardeström et al., 2019). The application highlighted how many Sami might not prioritize the work for the BR since they were already trying to protect their rights from other agencies and authorities like forestry and wind power (Gardeström et al., 2019). However, the BR was placing importance on sharing Sami history, culture, and reindeer herding, and to maintain open dialogue with the Sami as they would with other stakeholders (Gardeström et al., 2019). Another BR that had high community participation was Entlebuch due to the high involvement of municipalities demonstrated in BR management discussed above. Furthermore, research on Entlebuch highlighted the involvement of regional products and producers in their communication, as well as creating community portraits on their website to show specifics of different regions in Switzerland that are part of Entlebuch (UNESCO Entlebuch Biosphere, n.d.). In Entlebuch there seems to be targeted public participation to maintain involvement in UNESCO goals and interest in the natural world (UNESCO Entlebuch Biosphere, n.d.). Lastly, FABN recognized that it was on Indigenous lands and planned to continue a relationship with them to share knowledge (Frontenac Arch Biosphere, n.d.b). There was also a strong emphasis on science education, especially toward young children who they consider the next generation of climate leaders (Frontenac Arch Biosphere, n.d.a). They organized things like the Nature Programs and Lessons in a Backpack that had free lessons for

teachers on a variety of subjects related to nature and building environmental ethics (Frontenac Arch Biosphere, n.d.a). These three BRs had the most outward facing communication on their involvement of community and Indigenous groups in their goals as a BR.

Overall, BRs had varying degrees of outward involvement with many re-evaluating their past practices. Most of the information analyzed came from websites or online materials that the OBR SEAS 2022 team had access to. It is important to note how community involvement may occur in a non-formal and non-recorded manner. This means that some BRs may have strong community involvement, it just remains unclear based on our research. Having noted this, OBR must consider how to approach and communicate its community and Indigenous involvement.

Other Considerations

The BRs had varying levels of how they support the UNESCO Program Goals of research, monitoring, education, and training. Through the research, there were few that focused on training except for Entlebuch and Biosfärområde Vindelälven-Juhttátahkka (UNESCO Entlebuch Biosphere, n.d.; Gardeström et al., 2019). This might take the form of having a volunteering program to clear the brush on pasture land or other activities based on the needs of the BR (UNESCO Entlebuch Biosphere, n.d.). The Biosfärområde Vindelälven-Juhttátahkka specifically outlined having biosphere ambassador training to increase knowledge and sustainable education (Gardeström et al., 2019). When it came to monitoring and research, many BRs had a degree of this outlined on their communication materials and it often included a variety of partners like governmental agencies or academic institutions. These UNESCO Program Goals are something to constantly consider when creating strategic plans, communicating the BR's action, and collaborating with others.

As OBR reevaluates and expands, it prides itself in being a BR with multiple core areas. In the research, we found that SAMAB also has multiple core areas. Specifically, SAMAB has 5 core areas that include the Great Smoky Mountains National Park, Mount Mitchell State Park, Grandfather Mountain, Coweeta Hydrologic Lab, and the Oak Ridge National Environmental Research Park (SAMAB, n.d.c). The difference between the OBR and SAMAB being that SAMAB spans multiple states. Understanding their communication and storyline might help OBR communicate their uniqueness and also learn how to collaborate with these 5 core areas.

Lastly, a quick comparison of the largest and smallest core areas can be seen in Table 3. This demonstrates that differences in land cover may also influence decisions made by each BR described above. It also shows how the largest land cover does not necessarily mean the largest core area.

Table 3**BR Land Cover and Core Areas**

Largest Land Cover			Smallest Land Cover		
BR	Land Cover	Core Area	BR	Land Cover	Core Area
SAMAB	15,195,341 ha	235,341 ha	CBR	8,222 ha	8,222 ha
(UNESCO, 2019d)			(UNESCO, 2019c)		
Champlain-Adirondack	3,990,000 ha	1,032,636 ha	Entlebuch	39,659 ha	3,301 ha
(UNESCO, 2019b)			(UNESCO, 2018b)		
Biosfärområde Vindelälven-Juhttátahkka	1,329,118 ha	20,865 ha	CHBR	41,291 ha	3,149 ha
(UNESCO, 2020a)			(UNESCO, 2019a)		

Research on these 11 BRs highlighted multiple themes, management structures, and community involvement for OBR to consider. While each BR has its unique challenges, societal and cultural values, and political situations, understanding these gives OBR the opportunity to self-reflect and connect with similar (or different) BRs. OBR is in the beginning stages of its journey of expansion and re-definement. It is set to finish the strategic planning process in the summer of 2022 and will continue to work on collaboration and engagement in years to come. This is a perfect opportunity to evaluate other BRs and use this knowledge to shape the management structure it plans to implement and the story it hopes to tell.

4. Geovisualize OBR through socio-economic and ecological lenses

As seen in Figure 4, the draft OBR boundaries were based on county borders. The counties of Northern Michigan are very large and rectangular, and do not incorporate natural features. Keeping counties as the major boundary was not conducive to the future of OBR, as we wanted to have more options to pick and choose what we included in the transitional zone. Using HUC-12 watershed delineations, a map describing the BR's transitional zone was created using ArcGIS Pro. HUC's (hierarchical hydrologic unit codes) are used by the United States Geological Survey to categorize watersheds based on surface hydrological features (USGS, n.d.). 12-digit HUC's are considered "subwatersheds", and are the finest level of classification (USGS, n.d.). Cross referencing the subwatershed-delineated map with the county-delineated map, we were able to choose what subwatersheds we wanted to include when formulating our transitional zone. Our goal was to

preserve OBR's initial shape, create a more fluid interpretation of its borders, and include only areas where partner participation and community interest were known to be present. With the U-M OBR team's approval, 216 HUC-12 watersheds were chosen, which like the county-delineated borders of Figure 4, started from Sleeping Bear Dunes in the south and went to St. Mary's River in the North (Figure 8). Some areas of Lower Michigan which bordered Lake Huron like Alpena were removed. This was due to a lack of partner engagement in that region. It is important to note that these borders are fluid, and may be subject to change as OBR develops. After dissolving the HUC-12 Watershed boundaries, the new shapefile's geometry was calculated in ArcGIS Pro. The total terrestrial area of OBR was found to be around 3,236,145 square miles. This includes both mainland Michigan and Great Lakes islands (Figure 9). Partners expressed their want for water to be included in the borders of OBR, and this desire will be answered by the OBR SEAS 2023 team whose main research will be on water and hydrology in OBR.

Figure 8
HUC-12 Watersheds of the Obtawaing Biosphere Region

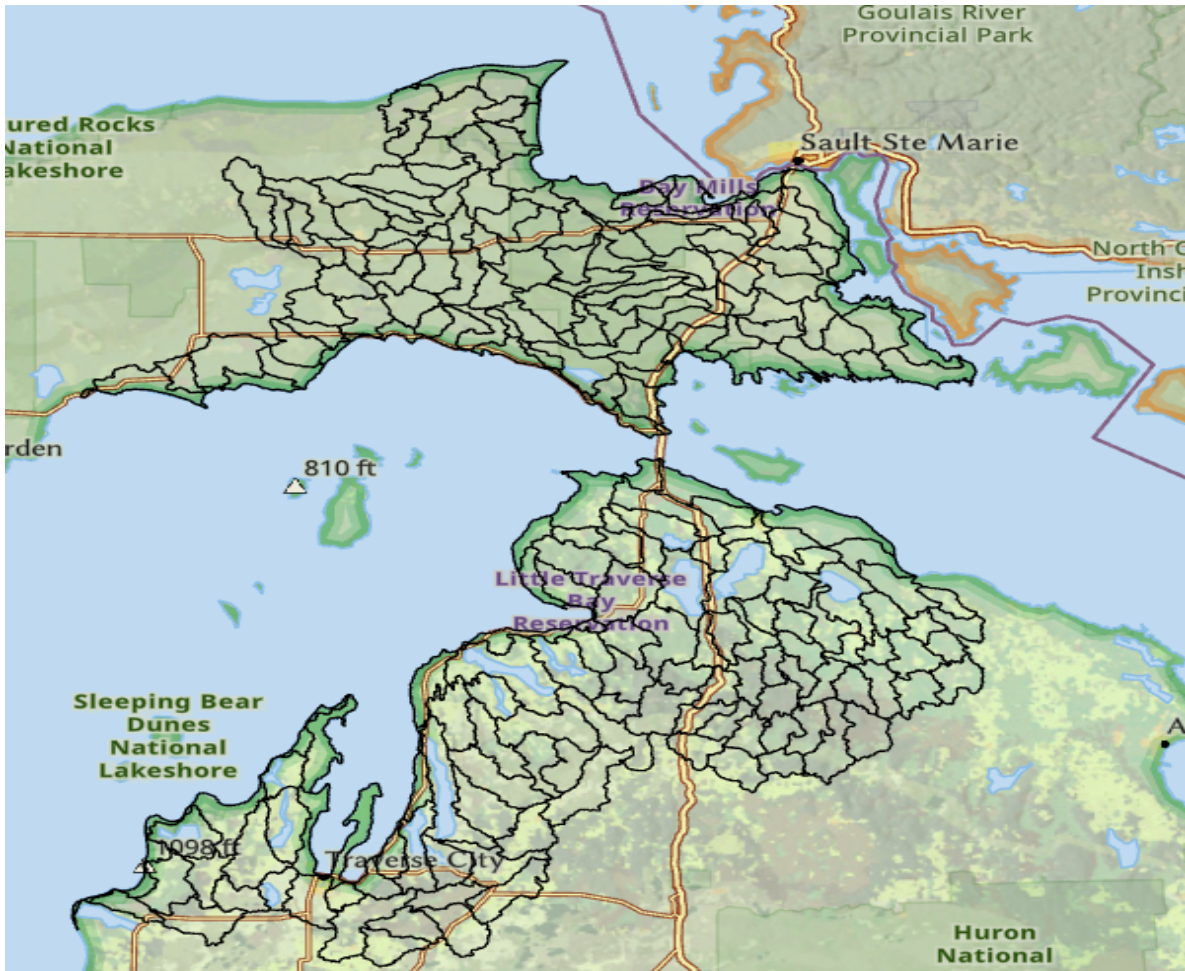
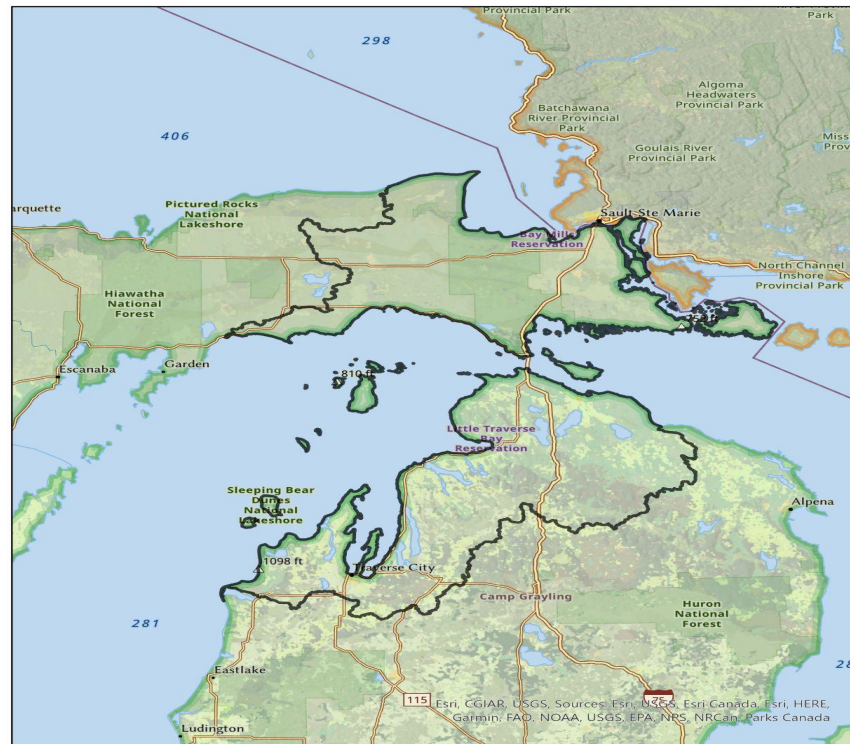


Figure 9

ArcGIS Pro Layout of the Transitional Zone of the Ottawaing Biosphere Region

Ottawaing Biosphere Region Transitional Zone



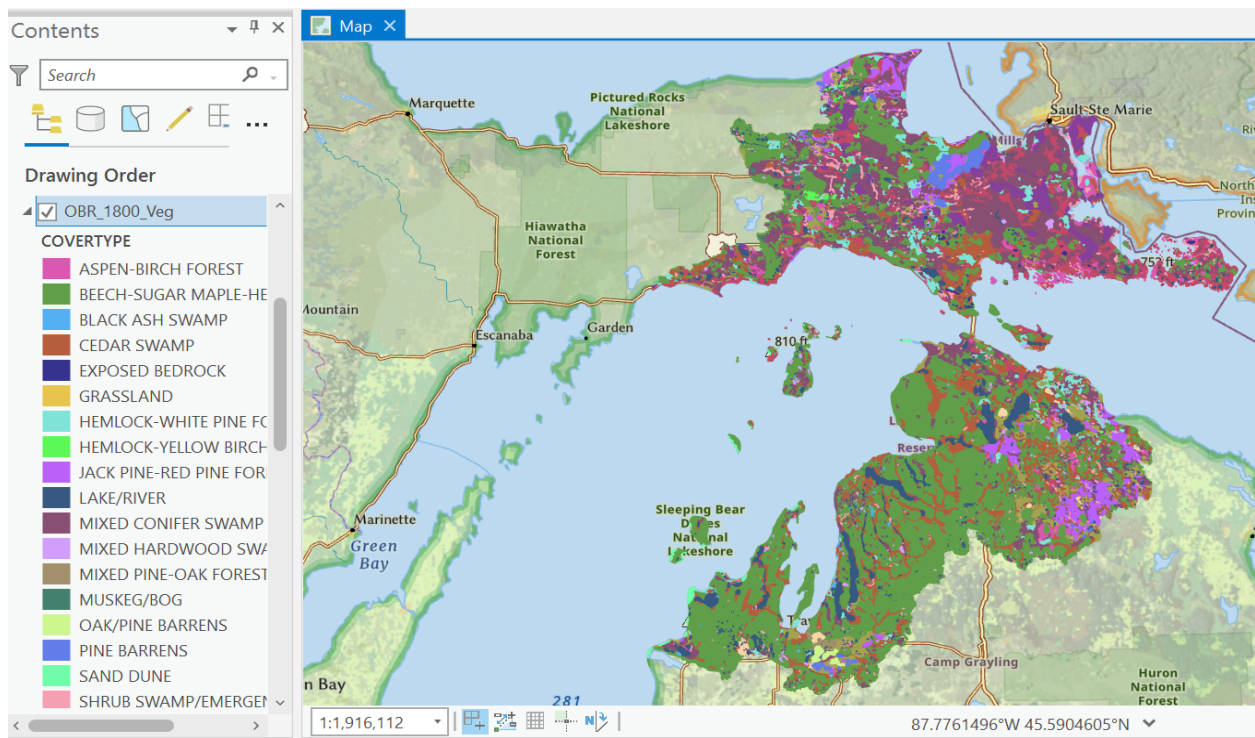
A collection of diverse spatial data was added to the GIS repository in ArcGIS Online. In terms of OBR-specific data, the layers added included:

- **Presettlement Vegetation (Figure 10)** - Michigan Department of Natural Resources(<https://gis-michigan.opendata.arcgis.com/datasets/midnr::michigan-circa-1800-presettlement-vegetation-cover>)
- **Bedrock Geology** - Michigan Department of Natural Resources(<https://gis-midnr.opendata.arcgis.com/datasets/michigan-bedrock-geology>)
- **Brine Wells** - Received by Jon Allan
- **Conservation and Recreational Lands**- Received by Jon Allan
- **Ecoregions** - United States Environmental Protection Agency (<https://www.epa.gov/eco-research/ecoregion-download-files-state-region-5>)

- **HUC-12 Watersheds** - United States Geological Survey(https://developers.google.com/earth-engine/datasets/catalog/USGS_WBD_2017_HUC12)
- **Landfills** - Received by Jon Allan
- **Major Hiking Trails** - Received by Jon Allan
- **Median Income in 2022** - American Community Survey (<https://www.census.gov/data/developers/data-sets/acs-5year.html>)
- **OBR Total Boundaries** - Created by Sam Frederickson using
- **HUC-12 Watersheds** - United States Geological Survey (https://developers.google.com/earth-engine/datasets/catalog/USGS_WBD_2017_HUC12)
- **Reserved Mineral Rights** - Received by Jon Allan
- **Roads** - Received by Jon Allan
- **State Parks** - Received by Jon Allan
- **Statewide DNR Ownership** - Received by Jon Allan

Figure 10

Example of OBR's GIS Repository Showing Presettlement Vegetation in the Region

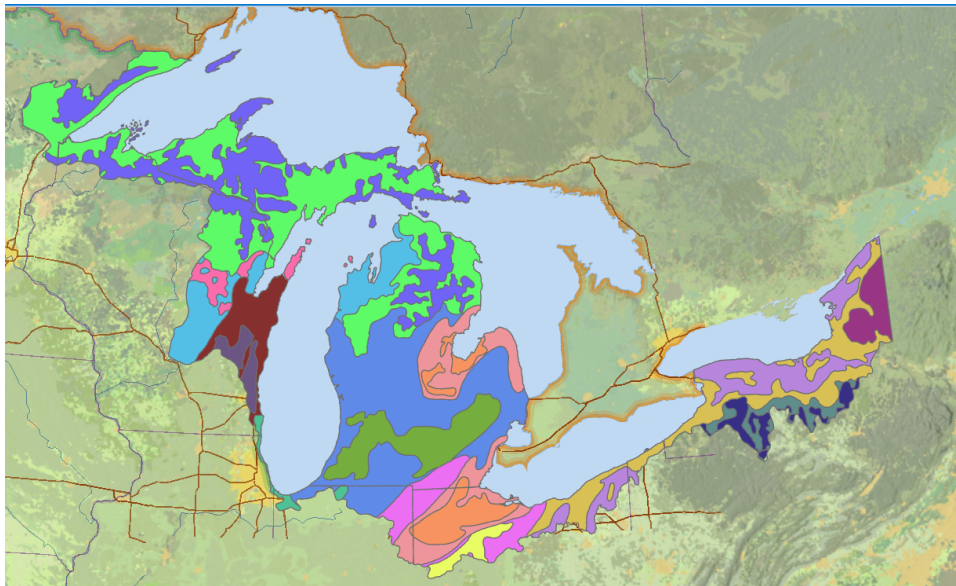


Most layers were provided by the U-M OBR team, while others needed to be researched and downloaded. Adding data directly into the map project from ArcGIS Online was heavily used in this part of the project. Several layers were also added to the repository that encompassed the whole Great Lakes Region. These included:

- Counties- Received by Jon Allan
- Ecoregions- Received by Jon Allan
- HUC Codes- Received by Jon Allan
- Shapefile of the Great Lakes- Received by Jon Allan

Figure 11

Example of OBR's GIS Repository Showing Ecoregions of the Great Lakes Region



We believed that it was important to provide our partners with a wide variety of spatial data that they could use to inform their conservation efforts and management choices. Through ArcGIS Online, new data is able to be added and updated at any time, and our hope is that this repository becomes an asset to the OBR SEAS 2023 team as well as present and future partners. Ownership of the GIS repository will transfer to the OBR SEAS 2023 team or the U-M OBR team as our ESRI license will expire after graduation.

The purpose of the story map was to relay a condensed version of our research into a medium that our partners as well as the general public could easily understand. Since geovisualization and GIS was only one aspect of the project, we used this story map primarily as a storytelling tool with maps as supplementary material versus a pure analysis of spatial data. Three “express” point maps were created in the story maps that helped drive the story. The first map showed current towns that currently occupy the Odawa Village such as Good Hart, Middle Village,

Cross Village, and Harbor Springs. The second map showed the location of the Biostation in relation to all of Michigan. The third map used data from the GIS Repository which displayed the HUC-12 watersheds that make up the Obtawaing Biosphere Region. In addition to these express maps, a screenshot of the GIS repository displaying presettlement vegetation was also used. This methodology suited the flow of the story map and allowed us to tell a detailed story about the region and our work. The story map can be found in the following location:

<https://storymaps.arcgis.com/stories/2a9315dbdb334949aafbbc6bde794f>.

Reflections

OBR SEAS 2022 Team Member - Daniela

OBR is going through a very exciting period of change. This is when partners can talk and collaborate about their hopes and visions for the region. It has been rewarding to see the transition from waiting for the ICC's thoughts on the periodic review to acceptance of the expansion of OBR. The excitement that partners and our clients feel for the project has been very evident, giving me hope that the project will continue to succeed long after we are no longer part of it. Based on the time I have been part of the project, there are a couple things that I hope OBR thinks about as it moves forward.

First, I hope that OBR is prepared for the dynamics that may arise due to the partnerships. There are so many partners from varying organizations and groups that have different historical and cultural approaches to nature and the environment. There may be some conflict and disagreement as a result. I hope that OBR takes some time to reflect on how they would like to approach conflict and maintain a culture of respect. For example, OBR can co-create an agreement on respect and conflict that is read and reviewed periodically. Also, it may be beneficial to have a process for responding to disagreements online and in-person. Based on the meetings and conversations we have had it is clear that the goal is to have respect and trust, but also provide the space for individuals to express their thoughts and feelings. Having open communication and clarity will help build the trust and respect needed for OBR to continue to succeed.

Second, I have been part of a training that has prompted me to reflect on the universal values of OBR and the system shifts that need to occur in order for OBR to transform the region. By universal values, I am referring to values that apply to everyone (Sharma, 2017). These are not values that are not bound by social, religious, or cultural norms (Sharma, 2017). I think it is important for OBR to reflect what its universal values are for the project. This goes beyond thinking what universal values each person and group embodies, but what OBR should be at its core. This means asking "what universal values have to be at the center of each decision, project, and communication?". During my brief time on the project, I think some potential universal values are respect, compassion, and equity. However, that is not for only me to decide. Part of the strategic plan is to understand the vision, mission, and goals, but hopefully OBR will take some time to truly think about the universal values that underpin the BR.

Third, another aspect of the training included understanding the system and cultural shifts that need to be changed to create sustainable outcomes. These shifts are meant to transform the root of the systems that continue to create inequity and injustices (Sharma, 2017). In order to be able to do this, we need to understand what the current system has and shift toward a system that has the universal values in mind. Based on this framework, my time on this project, and my time in the training, I identified three system shifts for OBR.

1. From eurocentric/western ways of managing land to an inclusive and collaborative centered way
2. From individuality to collaboration

- By this I mean from the voices of one partner making decisions, to the voices of all members contributing. This can also be viewed as shifting from exclusion to inclusion.
3. From a culture-nature binary to understanding how we are all part of nature.
 - This includes changing the ways of knowing through collaboration and conversations that get to the root of OBR interests and goals.

These are initial thoughts on system shifts but OBR taking the time as partners to identify these, may help create a long-lasting foundation for change.

Fourth and last, the management and organizational plan for OBR needs to focus on the capacity of partners and their involvement. Based on our research, it is clear that there is a need for a day-to-day and/or administrative person(s) to continue to organize meetings, create newsletters, and keep everyone involved in the process. However, based on different capacities and interests, leveraging sub-committees will prevent OBR from becoming overwhelming for the partners. There are a couple directions these sub-committees can go. On the one hand, it could be focused on the UNESCO program goals. On the other, it could identify certain organizational goals like fundraising/budgeting, communication, community involvement, partner projects, etc. This will be something that OBR will need to decide based on their needs at the moment. This organizational and management structure should remain flexible given the changes in partnerships and capacities, but having an outline will help guide decision making. There is also a big focus on partnership and involving the community throughout the region. A way to continue to foster trust will be to hold in-person meetings when possible. Planning these meetings throughout the OBR region will accommodate people who live in different areas and allow them to experience different parts of OBR. This diversity of voices should be reflected in the management team and operational structure so as to not fall back on U-M leading the process. The management of OBR can seem like a daunting process but it is clear that it needs to be a collaborative process that has OBR's interests in mind.

OBR SEAS 2022 Team Member - Sam

This project has been the most rewarding experience I have been a part of. In the past year and a half, I have grown into a holistic and interdisciplinary student which I attribute to my participation in this project. It was exciting to see OBR start as an idea but then grow into a real-world organization for conservation and sustainability. It is my hope that we have given OBR enough foundation and support so that when Daniela and I leave, it will thrive for generations to come. With the University of Michigan taking a back seat administratively moving forward, it will be interesting to see how the partners will communicate and collaborate when issues arise.

Daniela and I have not provided OBR with one sole solution in regards to how it should be run after we leave. This is because there is no singular way that OBR should be run. In our research, we have found that no one biosphere region works the same. Given the ecological and

socio-economic complexities of each region, they are inherently unique as to how they operate. Moreover, since OBR is a cooperative land management organization, it is not our place to decide, but to give insight and examples. It is our hope through this report and our research that OBR will be a beacon for sustainable development given its ecological and economic importance to the country.

Like Daniela, I have some parting suggestions for OBR as we transition out of this project:

One, OBR should continue to foster meaningful and collaborative partnerships with the tribal communities of northern Michigan. As someone whose first collaborative partnership with tribal communities was this project, I have learned the importance of going beyond a land acknowledgement and actually fostering deep collaborations with tribal communities. The Anishinaabe people have called this region home much longer than any of us, and there is so much to be learned in terms of land management, stewardship, and culture. I hope that as OBR moves forward, there continues to be a seat at the table for native communities.

Two, OBR should utilize GIS as much as it can. In terms of the GIS repository, the OBR SEAS 2023 team and I only included a dozen or so layers, but my wish is that it grows to hundreds. GIS technology and data will hopefully only become more accessible in the future, so its utilization is a key to its success. Also, there may come a time when HUC-12 Watersheds are not suitable to describe the transitional zone of OBR. This is okay, as its area of influence may change over time to include more partners or land. Furthermore, since we were not able to pin down what specific buffer zones we wanted to include, I am looking forward to seeing a fully fleshed map of OBR with its core, buffer, and transitional zones.

Conclusion

The expansion and redefinition of OBR is a new chapter for the BR. It is a new chapter filled with hopes, ideas, and promise for the partners and the region. Through understanding the history of the UNESCO MAB program and the origins of the U-M Biostation BR, we can understand the history that is influencing OBR's changes. With the 2017 periodic review process being the changing point for the U-M Biostation BR, a period of deep self-reflection of what being a BR means for U-M and the region ensued. The realization that this project needs to go beyond one sole institution, sparked a series of events that lead to the collaboration of a variety of partners to define what OBR can be.

This transition in identity for the BR was and continues to be supported by partners, consultants, and student project teams. This interdisciplinary support of individuals at all levels and life stages has brought a unique perspective to the project. It has created a community of respect and trust as the changes and challenges are faced together, rather than alone. While things will continue to evolve for OBR, the strong foundation and communication skills that have been practiced in these initial months will be crucial to continue to cultivate a community.

The OBR SEAS 2022 team has remained flexible throughout the time they have supported and worked with members of OBR. As OBR is still finalizing their vision and mission statements, as well as their goals, its own identity is still coming into focus. This is a process that must not be rushed. However, it can be simultaneously supported with research on partner needs and (inter)national BRs stories and management structures. While no single solution has presented itself for an organizational structure, this report gives OBR multiple options to consider as it moves forward. It has also outlined the theoretical and practical needs and abilities of the partners to be part of this project. By understanding this tension and the potential directions for OBR, partners can reflect on what type of committee and sub-committees they would like to support both the day-to-day actions of the BR and the unique UNESCO goals.

OBR is not meant to solely support the partners, but rather a whole region. In order to do this, it is important to communicate OBR's story in a way that identifies the value it brings to the region. This story can go in various directions ranging from its expansion to the centrality of water and the Great Lakes region to shifting the perspectives of human and non-human relationships. Each of these themes are immensely important and OBR will need to consider what they would like to be at the heart of their communication of value to the region, to other BRs, and to the world. Throughout our conversations and the strategic planning process, it is clear that OBR partners want to continue to be part of the community. Being able to communicate this through their story and identity will help those not aware of the UNESCO MAB program and BRs to understand what OBR is truly about.

As OBR continues to reflect upon what it wants to become, the OBR SEAS 2022 team wishes that they will continue to enjoy this period of transition. The OBR SEAS 2022 worked to support OBR in any way possible and as the work is coming to an end, now hope they were

successful in continuing to move the project forward. By performing administrative tasks, informal conversations, research, and geovisualization of OBR, the OBR SEAS 2022 strived to create a solid foundation for OBR to take its next steps. Periods of transition and change can be equal levels of excitement and fear, but through acts of courage OBR can become an extraordinary part of the region.

Appendices

Appendix A - Informal Conversation Script and Questions

Script for Opening Conversation

Hello, we hope you are all doing well today. Before we start our specific questions today, we just wanted to quickly introduce ourselves (*everyone introduces themselves and their role/ connection to the project*). These initial informal questions are being used to better understand your needs and interests and to begin to strengthen connections between partners in the Ottawaing Biosphere Region.

Some of the questions we will ask today will touch on your individual and organizational involvement, as well as your experiences with collaboration in the past.

Before we begin, do you have any questions and/or concerns?

List of Questions to Ask (will ask all or part depending on time and responses)

Individual Specific

- What is your role with _____?
- What do you do in regards to your organization?
- Is your involvement in this project a unilateral decision or one the organization has embraced?
- Is there anything specific are you hoping to contribute to this project?
- Do you know if this has been discussed with the organization's leadership and/or Board leadership or the Board yet?
- Would you like someone to present on Ottawaing to the organization or the board (or council)?

Relating to the Project

- What attracts you to this project?
- What are your concerns about this project?
- How involved would you like to be with this project?
- Have you been involved in similar projects before?
- How would you like us to communicate OBR related news and updates with you?
- What role can you play in providing information that represents your organization?
- Do the goals of your organization/tribal government/agency/etc. align with any of the OBR mission statement objectives?
- Who else (e.g. what other groups or organizations) would it be worthwhile for us to talk to about this outreach effort?

Collaborating

- How much do you work on collaboration and related projects around the region?
- In your experience, what has been the best way to foster collaboration on projects with different groups of people with different interests?

OBTAWAING BIOSPHERE REGION

Brief Overview

What does
Obtawaing mean?

**OBTAWAING IS
AN ANISHINAABE
TERM THAT
ROUGHLY
TRANSLATES TO
“THE HALF-WAY,
OR MEETING
POINT”.**



What are we?

The Obtawaing Biosphere Region (OBR or Obtawaing BR) is centrally located in the North American Laurentian Great Lakes Basin. It lies at the convergence of two Peninsulas and three Great Lakes highlighting the importance of the water-land interface. It was recognized as a globally significant ecological and cultural landscape by UNESCO in 1979, when it was designated as the University of Michigan Biological Station Biosphere Reserve. It was expanded, renamed, and re-approved in 2021 as the larger and more inclusive Obtawaing Biosphere Region.

The OBR is a non-regulatory, non-governmental consortium of organizations that provides a forum for collaboration and service to people and communities in our region. We work together to conserve biodiversity, support cultural diversity, and encourage economic activities that are environmentally, culturally, and socially sustainable.

Our mission and goals

Our livelihoods and quality of life depend on healthy lands, air, and water, as well as the communities in which we reside and foster. Through our partnerships and diverse perspectives, we work to sustain a thriving environment now and into the future. OBR is committed to connecting people and organizations for collaborations across our water-rich region to protect the integrity of natural systems upon which our region's economic and human well-being rely.

Our partners work cooperatively in a non-regulatory and non-political capacity to address a variety of issues. These include, ecological conservation, cultural conservation, social and environmental justice, and sustainable economic development, all through communication, research, education, and planning.

If you would like more information or would like to be involved in this effort, please contact Obtawaing@umich.edu.

Who is involved?

OBR is developing partnerships with regional tribal nations, government agencies, universities, nonprofit organizations, and local communities. Current partners include:

- Beaver Island Association
- Burt Lake Band of Ottawa and Chippewa Indians
- Central Michigan University Biological Station
- Grand Traverse Regional Land Conservancy
- Huron Pines
- Little Traverse Bay Band of Odawa Indians
- Little Traverse Conservancy
- Sault Ste. Marie Tribe of Chippewa Indians
- Sleeping Bear Dunes National Lakeshore
- Tip of the Mitt Watershed Council
- United Tribes of Michigan
- University of Michigan Biological Station
- USFS Northern Institute of Applied Climate Science
- The Nature Conservancy

Where are we located?

The map below shows the proposed region of cooperation and collaboration.



When and how was OBR established?

Obtawaing BR, originally known as the University of Michigan Biological Station (UMBS) Biosphere Reserve (BR), was initially only University of Michigan owned land. The land was primarily used as an education and research center.

However, with the 2019 UNESCO periodic review that was approved in 2021, there was an expansion, redefining, and renaming of the UMBS BR to the Obtawaing BR. The OBR recognizes the need for diverse voices and collaborations to foster a culturally, economically, and ecologically thriving region.

OBR is one of 727 that are part of the World Network of Biosphere Reserves in 131 countries, 22 of which transcend international boundaries (UNESCO).

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