# An Initial Transportation and Mobility Needs Assessment for the Shoalwater Bay Indian Tribe

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## Abstract

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The Shoalwater Bay Indian Tribe is facing extremely rapid erosion, rising sea levels, and a plausible earthquake and tsunami inundation that together threaten their community and future. In response, the Shoalwater Bay Tribe is now in the planning stage to develop housing and services at nearby higher elevations above inundation levels . The Tribe calls this initiative the 'upland expansion' instead of ‘relocation’, a term tied to deep historical trauma for Tribes across the United States. Upland expansion is as much an effort to meet current housing needs for members on and off reservation as it is a preparation for hazards-driven relocation in the future. Just as an earthquake or tsunami hazard may present the need for a safety tower and uphill assembly area, it also presents transportation and mobility challenges. Using community engagement, secondary data analysis, and a community survey, this thesis identifies the Tribe’s transportation needs and challenges; some of the immediate, short and long-term transportation-related opportunities that will contribute to Tribal goals and values, specifically as related to upland expansion; and how the Tribe may enhance mobility and transportation to support hazards resilience, self-reliance, regional accessibility, and economic development. The data, information and insights from these methods will inform a transportation and mobility needs assessment report for the Shoalwater Bay Indian Tribe. Based on the findings, the research intends to provide language, data, and tailored recommendations for the Tribe as it continues to seek consensus among members, technical assistance, and funding.

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## Acknowledgements

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## Chapter 1: Introduction

Several Tribal communities along the Pacific Northwest coastline face rapid erosion, and rising sea levels in conjunction with plausible earthquakes and tsunamis threaten their lives and communities' future. Located on the north shore of Willapa Bay, the Shoalwater Bay Indian Tribe's situation is extreme in that in an average year the ocean moves another 100 or so feet inland. Erosion has destroyed and will continue to destroy infrastructure, including the Tribe's only access road, State Route 105, which has already been moved inland once to avoid the retreating shoreline (Coil et al, 2020, p. 43). As a result, the Shoalwater Bay Indian Tribe (SBIT) is in the planning stage to move most of their community nearby into clear cut land that is a part temperate rain forest adjacent to their coastal lands. The SBIT calls this massive initiative the 'upland expansion' development. In addition, there is an expectation that if the community village is built, more members will return to live on the reservation and affordable housing is a widespread issue in coastal counties. The upland expansion planning is happening while other adaptation and mitigation projects unfold nearby to gain time, including Wash Away No More's dynamic revetment project at North Cove, and the Army Corps of Engineers' dune construction on Empire Spit (Garth, 2020; Washington Coastal Hazards Resilience Network, n.d.).

**Figure 1**


*Location of Shoalwater Bay Indian Tribe. Source: Google Earth, 2023.*

The lands of the Shoalwater Bay Tribe are situated in southern Pacific Washington along Willapa Bay in the Coastal Temperate Rainforest ecosystem (Figures 1 and 2). The Shoalwater Reservation is next to Tokeland and the closest towns are Heather, Grayland and Raymond. Currently, the Tribe's trust and fee lands amount to approximately 3,388 acres, the upland timberlands total to 2,512 acres (Coil et al, 2020, p. 5)

**Figure 2**

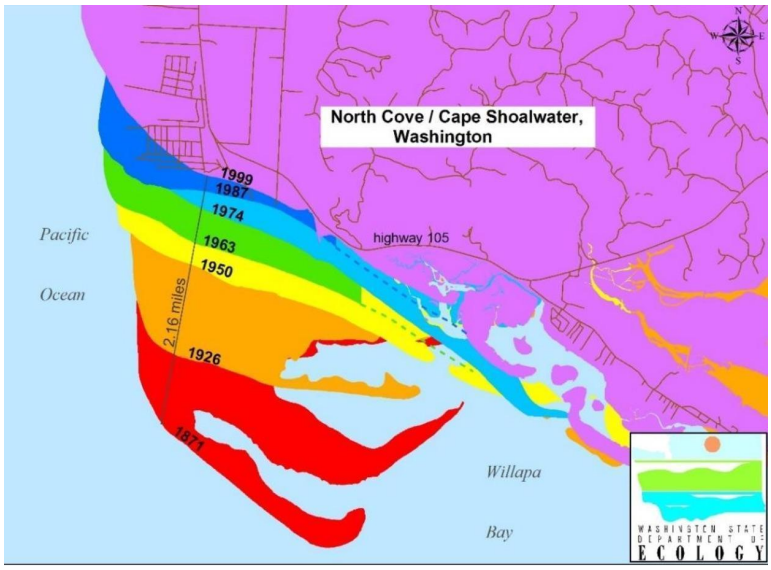

*A Coastal Ecology: The Foundation of Place. Source: photo by Swift, 2021.*

The coast, waterways, and the environment are important to their culture (Shoalwater Bay Indian Tribe, n.d.). Their original territory bordered the Chehalis and Chinook nations (Shoalwater Bay Indian Tribe, n.d.). Ancestors traditionally traveled via canoe to visit, trade or obtain food and on foot to hunt, gather, and forage (Shoalwater Bay Indian Tribe, n.d.). Ancestors fished with handmade tools such as the salmon spear and salmon hook (Swan,1857). American Indian studies scholarship underscores that the negative impacts of settler-colonialism on the SBIT, other Tribes and Indigenous groups linger to this day *(*forced relocation, loss of land, culture, large health and social disparities, etc.) and settler-colonialism is the genesis to the forced and mass regional movement of Tribes and Native/AI groups (Keene,

2017; Becker et al., 2021). Past injustices, current harms and a high degree of uncertainty have prompted the SBIT and other Tribes in North America to incorporate resilience and self-reliance into their planning (Grossman et al., 2012). There has been positive traction though to support Tribes' climate adaptation community relocation and transportation efforts. This includes expanded federal funding from the Biden-Harris Administration through the BID and an increase in tribal transit funding (U.S. Department of the Interior, 2022; U.S Department of Transportation, 2023). Likewise, the Shoalwater Bay Tribe among other Washington State coastal Tribes has received national and local media coverage for their relocation planning in response to coastal hazards (Flavelle, 2022). Before 2022, faculty from the University of Washington's College of Built Environments formed a relationship and eventually a partnership with the Tribe which led to a multidisciplinary Built Environments McKinley Futures Coastal Adaptation studio and later studios involving SBIT's staff and community.

The SBIT Hazard Mitigation Plan (2020) stresses that "Washaway Beach and Empire Spit at Cape Shoalwater is the most rapidly eroding beach on the U.S. Pacific Coast as Figure 3 depicts (Coil et al, 2020, p. 43). The previous spits, now gone, used to protect North Cove and the Tribe's reservation from winter storms and more extreme weather. The factors that contribute to erosion are jetties, dams, sediment supply, geologic history, wave action, and weather. Altogether this increases vulnerability to the SBIT's buildings, homes, infrastructure, economic assets, and natural resources.

**Figure 3**




*Coastal Loss Map. Source: photo by Coil et al, 2020, p.54 and Washington Department of Ecology, n.d..*

That said, these challenges the Tribe is facing create opportunities for not only status-quo solutions but creative solutions that bring about imaginative Indigenous futures not yet realized by other coastal communities in the region. Hazard threats like earthquakes or tsunamis present opportunities to construct a vertical evacuation tower as seen in Figure 4 (the first free-standing one in the U.S.) and an uphill assembly area on Eagle Hill Road that dramatically increases survival and resilience. Similarly, there are transportation and mobility opportunities at three levels: the first level is the opportunity to incorporate physically active transportation and all-abilities infrastructure in the uplands; the second level is the opportunity to consider alternative ways to travel to the uplands from the lowlands and vice versa; and thirdly, the opportunity at the regional level to support diverse routes and modes of mobility for the Tribal members that lessens the driving burden and increases resilience (i.e. establishing an

emergency route). Research on how to pursue these opportunities may benefit not only the Tribe but also other coastal Tribal and non-Tribal communities as they have similar conditions and threats.

**Figure 4**

*Tsunami vertical evacuation tower. Source: photo by Daniel B. Abramson, 2023*

My research addresses the knowledge gap on Tribal transportation and mobility challenges and opportunities, especially in the context of erosion, sea level rise, and other natural disaster threats. The thesis intends to provide language, data, and recommendations for the SBIT community as they continue to seek capacity-building resources, technical assistance

and greater funding. Also, the survey results and findings of this thesis can be included in their future comprehensive transportation plan. Even more, the findings can be included in future grant applications and the recommendations can be visualized and formally proposed for members and the Council to increase support for specific strategies, such as a micro-transit program and EV charging stations that increase regional mobility and access to jobs, services, and goods.

Research Questions

1. What are the transportation needs and challenges of the Tribe?
2. What are some of the immediate, short and long-term transportation-related opportunities that will contribute towards their goals and values (ie. upland expansion)?
3. How the Tribe may enhance mobility and transportation to support hazards resilience, self-reliance, regional accessibility, and economic development.

With that, the SBIT defines resilience as the “capability to anticipate, prepare for, respond to, withstand, and recover from significant multi-hazard threats with minimum interruption and damage to social, cultural, and spiritual well-being, the economy, and the environment” (Shoalwater Bay Indian Tribe, Oregon Climate Change Research Institute, & Adaptation International, 2021, p.3).

## Chapter 2: Transportation in the Tribal Context

Given my research focus, it is appropriate for this literature review to examine North American/Alaskan Indian Tribes and their transportation and mobility context and specifically to investigate resilient Tribal Transportation in the context of hazards instead of general urban transportation planning. With that, this systematic review identifies the gaps in the literature and how my research can address those gaps and identifies methods that can be applied to my research.

### 2.1 Tribal Transportation and mobility

Tribal transportation planning sets itself apart in a variety of ways from mainstream urban and rural transportation planning. To start, it's situated in the context of Tribal sovereignty. Washington Indian Transportation Policy Advisory Committee states, "Tribal sovereignty refers to the exclusive right for tribes to govern themselves" (Washington Indian Transportation Policy Advisory Committee [WITPAC], 2015, p.14). Status of Sovereignty derived from Trust and Treaty Rights affords Tribes government-to-government relationships and consultation with state and the federal government and agencies such as the Department of Interior and Bureau of Indian Affairs (WITPAC, 2015). As such, Tribes can own and maintain roads, transit, bike and pedestrian facilities, trails, ferries, and airstrips (WITPAC, 2015).

Another feature that sets it apart is the spatial aspects of Tribal lands and reservations, as Becker et al., (2021) highlight that they vary in size from many small reservations to vast reservations and the average size of a reservation is 2,833 square miles. In addition, most reservations are located in rural areas however some are located close to or are in urban areas

such as the Puyallup Tribe adjacent to Tacoma, WA (Becker et al., 2021). The SBIT is recognized by executive order in 1866 by President Johnson (Shoalwater Bay Indian Tribe, n.d.). Whereas most of the 29 Federally Recognized Indian Tribes in Washington state are recognized by treaty (Governor's Office of Indian Affairs,n.d.). Some Tribes in the state do not even have formal recognition such as the Duwamish and Chinook Indian Nation.

With that, in 2021 a memo produced by the Volpe Center (under the US DOT and Federal Highways Administration) brings to the forefront the many dimensions and considerations (i.e., laws and regulations) of transportation planning in Tribal communities. This memo also identifies several literature gaps for Tribal transportation that it aims to investigate in a research project to be completed in summer of 2023. One major aspect of Tribal transportation planning is the Tribal Transportation Program (TTP), passed through legislation in 2016, which outlines the requirements such as producing a long-range transportation plan and regular updates to be eligible for funding (US DOT Volpe Center, 2021). Additionally, priorities among North American/Alaskan Indian tribes typically are safety, cultural heritage, public health, and economic development (US DOT Volpe Center, 2021).

All these bodies of work mentioned in this section have noted similar features that make it distinct, thus creating a fuller and more accurate definition of Tribal Transportation planning. This working definition is: Tribal transportation planning is working towards the stated goals of the Tribal community, fulfilling the requirements of the Tribal Transportation Program (TTP), and using the TTP's Long Range Transportation Plan or another more authoritative transportation plan to guide future projects and obtain funding.

## 2.2 Assistance and Resources

The federal agencies under the US provide technical assistance, training and capacity building to Tribes through the US Department of Transportation's Federal Highways Administration (FHWA) which began in 1991 with the Intermodal Surface Transportation Efficiency Act (ISTEA) legislation (Federal Highway Administration. n.d.). These come in the form of Tribal Technical Assistance Program (TTAP) centers and in 2022 the program received a boost of funding for centers across the nation (Federal Highway Administration, 2022). As such, the TTAPs and related tribal transportation resources are affiliated with rural support programs such as the Local Technical Assistance Program (Federal Highway Administration. n.d.). Currently, there are six regional TTAP centers in the US, with the Northwestern center housed at the University of Washington (Federal Highway Administration. n.d.). Aside from federal agencies, non-profit organizations, and state agencies also provide technical assistance.

### 2.3 Approaches and implementation

Traditionally, Tribal transportation and mobility are still quite car-oriented, and only recently have community members and planners begun to think about implementing or have implemented different programs that advance walking, biking, and transit in Indian Country. These recent developments in diversifying mobility for tribal communities ties back to the discussion about the challenges Tribes face such as the overall small pool of funding opportunities Tribes can or are eligible to access; reservations being highly auto-dependent; being a rural, isolated, tribal and indigenous (RITI) community; and other historical disinvestment and federal policy that contribute to large disparities. The CSET points out that RITI communities face larger safety issues as they are less populous but account for about half the road fatalities in the U.S. (CSET, n.d.). On top of that, RITI communities usually lack information systems to conduct safety assessments to design and implement better transportation and pedestrian safety facilities (Wang, 2020).

In recent years though, grant funding through the federal government has increased (such as the Bipartisan Infrastructure Law) and the use of funds for more progressive projects has broadened, for instance funding for wildlife crossings and electric vehicle charging stations are now options (US DOT, 2022). Yet, it has been noted that these advances are still facing a funding shortfall and are inequitably applied, considering that death rates on roadways are higher for tribal communities and Indigenous people (NRDC, 2022).

*Regional Tribal transportation planning*

The economic impact of Tribes can be quite large and important for the county or region. As the WITPAC (2015) states, "Tribal governments are major employers; sometimes being the primary economic engine in a county...Transportation is an important driver for a Tribe's economic growth" (p.14). Thus, Tribal transportation planning can help bolster economic development not only for their respective community but for others as well, which gives the Tribe more leadership clout and political pull.

Regarding coordination, there are many benefits and considerations for Tribes and their neighboring small-to-medium towns and counties. This is illustrated in the Toolkit for Rural Community Coordinated Transportation Services. For example, Blackfeet Transit operated by the Blackfeet Indian Tribe stood to gain when they worked with agencies, organizations and community hubs (Burkhardt et al., 2004). Blackfeet Transit worked with the Montana Department of Transportation, health organizations like the Indian Health Services, a supermarket, and other resource programs and institutions (Burkhardt et al., 2004). These gains included increased funding, ridership, and demand (especially for different age groups, not just for the elderly) for the Blackfeet Transit (Burkhardt et al., 2004). Comparatively, Small Urban, Rural and Tribal Center on Mobility's (SURTCOM) work make aware that "Tribal areas have higher concentrations of some transportation disadvantaged populations, particularly low-income populations, people without access to a vehicle, and youth." (Ndembe et al., 2021, p. 4). The Colville Confederated Tribes' transit survey report states, "American Indian reservations remain some of the most isolated, auto-dependent populations in the nation. Both

elderly and youth are under-served, and demand for transit is increasing across rural areas, but especially for large, isolated, low-density reservations'' (Campobasso & Winchell, 2021, p.9).

*Multimodal transportation in tribal communities*

There are already Tribes that have incorporated Complete Streets (Skraastad-Jurney, NA) and other related initiatives to accommodate and promote other non-vehicle modes for recreation and connection within the community. This can also be seen with Tribes that operate their own transit services and on-demand micro-transit services. Demonstrating this further, the Confederated Tribes of the Umatilla Indian Reservation's Kayak Public Transit provides a regional transportation system supporting both the reservation and county that neighbors the reservation (CTUIR, n.d). Shinstine et al, (2015) describe that livability with an emphasis on transportation has been an objective for many urban and rural communities and now even Tribal communities. Shinstine offers a successful case study of Pedestrian Safety Plans for the Wind River Indian Reservation to increase pedestrian pathways (especially for students going to school) instead of walking along dangerous highways. As a case study Shinstine et al,. (2015) creates a three-step process to develop a Tribal Livability Program. In connection to the aforementioned, the organizations, National Center for Safe Routes to School and Safe Routes to School National Partnership (2016) created a policy brief that "provides an overview of some of the considerations unique to implementing Safe Routes to School in tribal communities, highlights strategies that tribal communities are using to provide support for walking and

bicycling to school and showcases tribal communities that have successfully improved safety for walking and bicycling to school" (p.1).

Whereas Deyo (2014) focuses more on the trails aspect of multimodal transportation for Tribes especially in terms of increasing quality of life. Deyo (2014) breaks down the trails within Indian Country with pedestrian and bike trails being the most common type however there are snowmobile, ATV, hunting, logging, fire roads, and nature trails too. Some of the findings are that trails can be used to increase tourism, economic development, and cultural education (Deyo, 2014). Basically, there are several uses, types, and positive benefits (i.e promotion of health) trails can provide and are worthwhile for Tribal communities to consider. With that, Pekow (2016) brings forward some considerations and challenges Tribe faces in implementing these multimodal facilities and programs to light. These include limited staff and resources to obtain available funding through grants and or even implement/manage the programs/projects created (Pekow, 2016). Not to mention, the Bureau of Indian Affairs has yet to establish an official biking and pedestrian program (Pekow, 2016).

## Self-governance and Sovereignty

In 2022, USDOT and the Cherokee Nation advanced Tribal self-determination as both parties signed the Self-Governance Compact, which makes the Cherokee the first to do so after months of discussions (U.S. Department of Transportation, 2022). This compact means that Cherokee Nation and later Tribes will have more flexibility, control, and decision-making over their transportation initiatives (U.S. Department of Transportation, 2022). More specifically, "The approval gives the Tribe the ability to plan and oversee its own road construction planning and transit projects without having to seek federal permission" (U.S. Department of Transportation, 2022). This compact was authorized by section 1121 of the Fixing America's Surface Transportation (FAST) Act which led to the establishment of the Tribal Transportation Self-Governance Program (TTSGP) in 2020 (U.S. Department of Transportation, 2022). At the same time, there are still eligibility requirements in place that reduce smaller and less staffed Tribes' participation in seeking a compact (U.S. Department of Transportation, 2022).

## 2.4 Gaps in the Literature

The overall academic literature on Tribal transportation is sparse and barely touches on other factors connected to it like resilient transportation (and infrastructure) and relocation as adaptation. Given that, this literature review looks at broader contexts and other disciplines because it may also provide some useful insights on the gaps in knowledge. These contexts and disciplines could include other Indigenous communities in other countries, rural transportation planning, resilient infrastructure, and even civil engineering. A list of research gaps emanated from the Volpe report on tribal transportation that fell into eight categories. However, resilience as a stand-alone was not reported as a gap to pursue in the scope of their work.

*Gap #1: Resilient transportation and mobility*

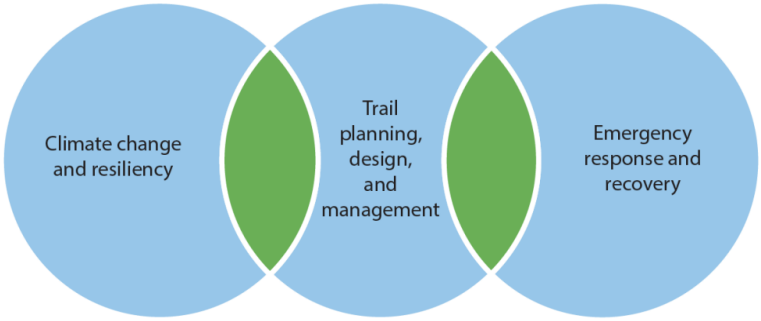
In the face of hazards, especially hazards specific to the Pacific Northwest there is so much more research and literature on resilient infrastructure in general and concerning transportation infrastructure. However, resilient considerations have not been formally introduced to relevant agencies that coordinate and work with Tribes on transportation. Accordingly, the Transportation Research Board generated a report, titled Investing in Transportation Resilience: A Framework for Informed Choices, with Congress and US DOT and the multitude of transportation agencies at all levels of government as the audience. The report delves into improving decision-making for current and future transportation assets and infrastructure by advocating for the use of high-quality data and tools in the context of climate change and other stressors to strengthen resilience (National Academies of Sciences, 2021). The report distinctly examines how transportation agencies evaluate resilience through a variety of

resilience metrics and data inputs and the investment processes to realize better resilience (National Academies of Sciences, 2021). Correspondingly, a resilience decision-support framework within the report is informed by functionality recovery curves and a multi-hazard approach (National Academies of Sciences, 2021). Components of the proposed framework first ask to characterize the natural hazards and climate change effects, then secondly identify assets, thirdly evaluate the criticality of assets, and fourthly evaluate the vulnerability of critical assets (National Academies of Sciences, 2021). Once that is completed, the framework characterizes the consequences of the hazards and climate impacts on assets (National Academies of Sciences, 2021). All the aforementioned components then feed into the analysis that estimates or characterizes the risk (National Academies of Sciences, 2021). After which a benefit and cost estimation occurs for the option chosen from the list of options identified to reduce risk and therefore investment decisions can be made (National Academies of Sciences, 2021). Moreover, the tribal transportation memo produced by the US DOT Volpe Center does note a knowledge gap about how resiliency plays into tribal transportation (US DOT Volpe Center, 2021).

Trails as resilient mobility infrastructure for tribes is not only a research gap in the tribal transportation research topic area but a knowledge gap in the transportation research universe. The Trails and Resilience report by the FHWA points out the several gaps and focuses on three research areas that pertain to resilience trails as Figure 5 shows (Davis et al., 2023). The report conveys that trails can provide “critical access in emergencies for people without access to a car

or transit services, trails can accommodate motorized use, enhance search and rescue, boost safety from wildfires, or other emergency response operations" (Davis et al., 2023). Additionally, "the COVID-19 pandemic has also demonstrated the importance of trails for improving health and wellbeing during public health emergencies" (Davis et al., 2023, p.1). There are examples of trails that have positively impacted a region's ecosystem and community by acting as a buffer to erosion and floods, increasing vegetation for wildlife and habitat connectivity (Davis et al., 2023). Hurricane Sandy in New York City and New River Trails State Park in Virginia are the two cases that support the precedence of trails as evacuation routes (Davis et al., 2023). For instance, Hurricane Sandy flooded the subway stations massively and this caused the increase in use of bicycle and pedestrian networks (Davis et al., 2023). Some design considerations for evacuation include adequate vehicle access and large-capacity gateways such as bridges (Davis et al., 2023). The future guidebook will bridge and integrate several disciplines and other applicable guidebooks to address the three main elements of resilience trails.

**Figure 5**




*Venn Diagram of the FHWA's research on resilience trails. Source: Photo by Davis et al., p.4, 2023.*

*Gap #2: Tribal-led managed retreat*

Today, some tribes have undergone or will undergo managed retreat due to environmental and climate change and due to disastrous hazards events. However, little academic literature, reports or news articles investigate what the implications are for tribal transportation and mobility. Nevertheless, the Quinault Indian Nation (QIN)'s Taholah Relocation Master Plan (2017) goes into minor detail on transportation and discusses how the plan aims to install more bus shelters in the new village location. QIN's Queets Village Relocation Vision Plan (2018) dives into transportation a bit more with its suite of policies and recommendations to improve safety, and connectivity between the old and new villages and constructing roads to support multimodal transportation. The Queets Village Relocation Vision has a section called Transportation networks that is committed to have all residents of ages and abilities traveling safely within the QIN reservation and region (Quinault Indian Nation & Ripple Planning, 2018). The 10 goals that pertain to the transportation networks section are in

congruence with the overarching objective and are not completely auto-centric (Quinault Indian Nation & Ripple Planning, 2018). For instance, goal 5.3 is, “Build more trails to connect destinations within the village. Use trails to connect the village to other places like the river, the ocean, and other destinations away from the street network. Illuminate trails that are within the developed area as appropriate” (Quinault Indian Nation & Ripple Planning, 2018, pg.138). The goal’s symbols next to it denote there is interest among the residents who participate in the plan’s workshops and its positive impact on the community would be solitude and safety (Quinault Indian Nation & Ripple Planning, 2018). In relation to goal 5.3, goal 5.7 sees trails and paths as a part of the evacuation process and increased wayfinding as a major action to pursue (Quinault Indian Nation & Ripple Planning, 2018, p.141). Again, the plan denotes that there is interest among residents for this goal to be implemented to increase capability to get to higher ground in the event of a tsunami (Quinault Indian Nation & Ripple Planning, 2018). The goal also received a high positive impact rank (Quinault Indian Nation & Ripple Planning, 2018).

For the Village of Napakiak in Southwest Alaska, the Napakiak Managed Retreat and Land Use Plan features a section which focuses on the “Key Concerns Moving Forward” ((Village of Napakiak & Summit Consulting Services Inc., 2021, pg.39). One key concern is the decision to either build a road or an airport because time is limited with the airport projected to be negatively impacted from erosion by 2030 (Village of Napakiak & Summit Consulting Services Inc., 2021). At the time of the report’s release, both options for Alaska Department of Transportations & Public Facilities to construct a new airport on or a new road on a certain island and slough have not been given a green light yet (Village of Napakiak & Summit

Consulting Services Inc., 2021). In the meantime, the plan says Napakiak reverts to continued erosion mitigation measures (Village of Napakiak & Summit Consulting Services Inc., 2021).

*The benefit of transportation research*

This thesis grapples with an even more fundamental question. How can academic literature be of use to professionals and staff in the fields? Deakin and Yip (2018) tackle this exact question and state, "Research can produce new conceptual frameworks and understandings for policy and planning, develop new products or processes that enhance wellbeing, increase economic productivity by reducing costs or increasing output, provide a better understanding of markets for products, uncover process strengths and weaknesses and ways to improve them, enhance decision tools and strategies, identify best practices for improved safety, environmental protection, and social equity in transportation systems, and more" (pg. 2). Which led to the recommendation that the research findings need to be explicit in the implications of the research findings on the policy and practice and be written for wider audiences (Deakin and Yip, 2018). Lastly, agencies like the FHWA and US DOT specialize and execute technology transfers through the regional TTAP centers (Federal Highway Administration. n.d.).

## 2.5 Existing Conditions at Shoalwater Bay Tribe

Typically, a transportation needs assessment report includes an existing conditions element that primarily explains how the transportation system is being used now and in the future. The existing conditions usually also contain demographics. Secondary data will inform the existing conditions section below for the Shoalwater Bay Tribe's needs assessment.

*SBIT's Values*

The SBIT values that came forward (during the autumn studio's engagement) for the community's upland expansion planning are culture and community, health and wellness, stewardship, seven generations and self-reliance (Fall 2022 Mickinley Futures Studio, 2023, p.10). The values guided each of the studio team's work and projects in a number of ways. There are several quotes that underpin each value. For example, a tribal member emphasized seven generations when they stated, "We've been talking about moving to the uplands our whole lives" (Fall 2022 Mickinley Futures Studio, 2023, p. 10). Even more, Chairwoman Nelson gave prominence to the SBIT value for resilience when she said, "go with the flow but don't let it flow over you" (Fall 2022 Mickinley Futures Studio, 2023, p. 10).

*Demographics and Employment*

There are over 400 members of the Tribe with around 90 that reside on the reservation. According to the American Community Survey for 2017-2021, the employment rate is 4.1 percent, and the median household income is $59,375 (U.S. Census Bureau, n.d.). In addition, 12.5 percent of the SBIT members hold a bachelor's degree or higher. Currently, the housing

inventory within the boundary of the reservation has 43 households and 33 of those are owner-occupied and 9 are rented out (U.S. Census Bureau, n.d.). According to the Shoalwater Bay Tribe's Climate Vulnerability Assessment, "Residential housing on the Reservation consists of 48 structures, 30 of them maintained by the Housing Authority" (Shoalwater Bay Indian Tribe, Oregon Climate Change Research Institute, & Adaptation International, 2021, pg.78). The Climate Vulnerability Assessment also states that a variety of other buildings belong to the Tribe. These include, “the Tribal Center, Shoalwater Bay Casino, Wellness Center, Tribal Police Station, Shoalwater Bay Learning Center (library), Gymnasium (also used as an Emergency Shelter), Natural Resources offices, Smoke Shop, and Fireworks Stand” (Shoalwater Bay Indian Tribe, Oregon Climate Change Research Institute, & Adaptation International, 2021, pg. 78). Many of these buildings just mentioned are owned by Willapa Bay Enterprises, the SBIT’s economic development engine and incorporated in 2007 (Willapa Bay Enterprises,n.d.). Willapa Bay Enterprises employs 85 to 125 people annually and strives to maintain a diversity of businesses (Willapa Bay Enterprises, n.d.). Given this, it’s most likely that many members work or worked for the SBIT or WBA (Willapa Bay Enterprises, n.d.). A couple of community members indicated that the Tribe is a major employer for Pacific County during the October 24th community engagement meeting. In fact, Pacific County's largest industry sector is farming, specifically shellfish farming as Willapa Bay in the county is the nation’s largest farmed shellfish producer (Vleming, 2022). Washington State’s Employment Security Department states, “government is the largest employer” for the county (Vleming, 2022). Many of the people who work on the reservation commute from surrounding communities, from Aberdeen, Raymond

and beyond. Also, some of the WBE sites are quite distant from the reservation for example the tribally owned tidelands in Willapa Bay where the oyster nursery is (Willapa Bay Oyster Company) and tidelands that are leased to tribal members (Hammock, 2019).

*Major transportation facilities and assets*

The SBIT's Long-Range Transportation Plan (LRTP) inventory shows much of the right of way is owned by the Tribe at 32 percent (Red Plains Professional Inc., 2021). State owns 30 percent and local governments own 6.4 percent (Red Plains Professional Inc., 2021). The Bureau of Indian Affairs (BIA) only owns 2.6 percent of the right of way (Red Plains Professional Inc., 2021). This LRTP is required to receive funding from federal agencies like the BIA and US DOT (Red Plains Professional Inc., 2021). Moreover, each LRTP needs to have a Tribal Transportation Improvement Program (TTIP) that outlines what projects the Tribe aims to prioritize (Red Plains Professional Inc., 2021). The following projects are in order from first to least prioritized. The first is the upland development project and its subprojects that will be implemented in phases, Transportation Program Administration, Transportation Planning and NTTFI Management, Master Plan (System Wide), Safety Plan, Transportation Safety Improvements, Comprehensive Multimodal (Pedestrian and Bicycle) Plan, and other plans and specific projects (Red Plains Professional Inc., 2021). The LRTP does not include traffic studies to show the current level of service and volumes nor future projections, but these aspects could be added to the future transportation plan. Also, the LRTP's improvement section shows that drainage overall (i.e., culverts) and road conditions of a few roads need maintenance (Red Plains Professional Inc.,

2021). Therefore, these parts of the existing conditions will not include trip generation numbers or traffic models so the future use of the transportation will not be discussed.

For walkers and cyclists, there is a dedicated pedestrian and bike path along Tokeland Road that stretches about a quarter of a mile and is scenic due to the dune and tidal inlet west of it. Tribal members are allowed and have access to the acquired property in the uplands, so this expands the opportunities for hiking, walking and other outdoor activities. As for public transportation, there are a couple of bus routes that go to the community. Grays Harbor Transit operates Route 171 to Tokeland, as a dial a ride service to reach Route 70 which can be a transfer to the route that goes to Aberdeen (Grays Harbor Transit, n.d.).

There are a few high-use and moderate-use roads that connect to the SBIT community. State Route 105 and Tokeland Road are the major roads that serve the SBIT and Tokeland community. These two roads act as the only entrance and exit of the reservation and Tokeland. In addition to that are the low-level use roads that are mainly used by community members. Eagle Hill Road is the main low-level road used among members as it leads to the evacuation community center.

Three major areas provide parking capacity for events, gatherings, and community meetings (Google Earth, 2023). Again, community engagement made us aware that at times there is not enough parking, and many wished for increased parking. One area for visitors and the public can visit is tribal administration and wellness center buildings. The second area would

be the Casino if it was permitted by the Tribe for special circumstances. The third area is the SBIT community gym which also can accommodate overfilled parking. There is concern among community members who attended the community engagement workshops that parking on the side of the road poses safety issues with traffic and no adequate lighting at night.

Figure 6 shows the Tribe's mobile command center vehicle that is ready to deploy during emergency and hazard events to enhance communications to facilitate local response with relevant entities. Mobile command centers have satellite, radio and video capabilities built in.

**Figure 6**


*The SBIT's mobile command center. Source: photo by Daniel B. Abramson, 2018.*

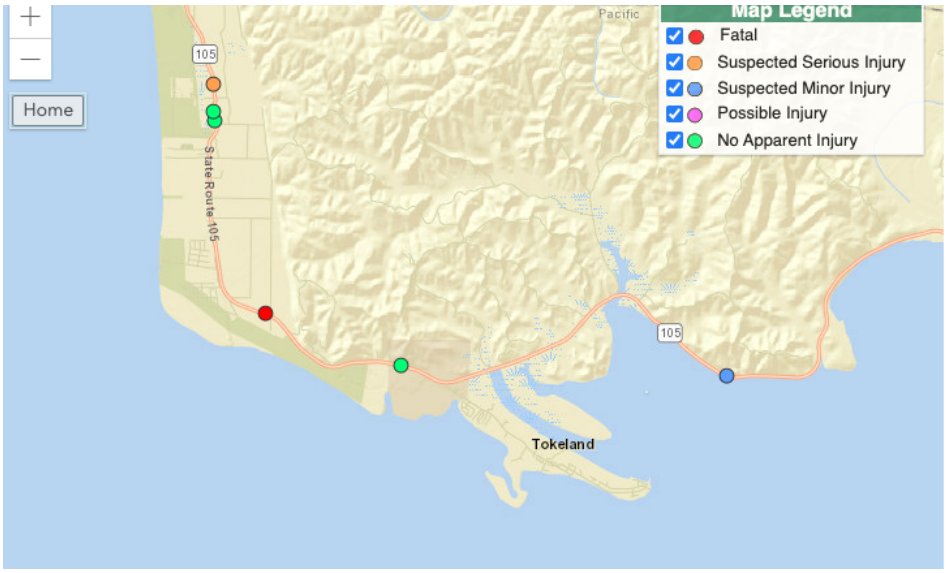
The FHWA Recreational Trails Program defines trails are used for nonmotorized and motorized trail uses and activities such as "pedestrian activities, including wheelchair use; skating or skateboarding; equestrian activities, including carriage driving; nonmotorized snow trail activities, including skiing; bicycling or use of other human powered vehicles;  aquatic or

water activities; and motorized vehicular activities, including all-terrain vehicle riding, motorcycling, snowmobiling, use of off-road light trucks, or use of other off-road motorized vehicles" (Davis et al., 2023, p. 3). No trails in the Shoalwater Reservation and the Tribe's acquired land or the Tokeland area are recognized by Washington State Parks, a state agency. However, community members do hunt and pick berries and other plants nearby and in the hills upland. The closest public outdoor spaces and trails are Grayland Beach State Park in North Cove, Westport, and the Raymond Trail (Washington State Parks, n.d.). The Raymond Trail is at the tail end of the Willapa Hills State Park Trail beginning in Chehalis, this trail is also part of a multistate regional trail network (Washington State Parks, n.d.). Grayland Beach is favorable for kite flyers and available to host campsites (Washington State Parks, n.d.). Despite not having trails there are a variety of logging roads still in place in the uplands, land that SBIT acquired, that can be developed into trails and roads. The 2018 Pacific County Recreational Development Plan discusses how development and upgrades to trails in the region could spur tourism and increase revenue (Pacific County Economic Development Council, 2018).

*Safety and traffic information*

The Washington Department of Transportation's Crash Portal provides crash data for all counties and the SBIT community is in Pacific County. Adjusting for Pacific County, Figure 8 shows that in 2020 there have five events of no apparent injury (uncertain if the events involved pedestrians or cyclists and does not have characteristics like age) to one suspected serious injury nearby the community in Tokeland (Washington State Department of Transportation, 2023). In 2021, Figure 7 shows fewer crash incidents in and nearby the community (Washington State Department of Transportation, 2023). Also, in 2021 one fatal crash occurred near Heather which is close to the SBIT reservation (Washington State Department of Transportation, 2023). It is difficult to prove if safety has improved without more supplemental data like vehicle speeds, number of infractions and tickets given to drivers within and near the reservation.

**Figure 7**




*Map of Crashes in 2021. Source: Photo by WSDOT - Crash Data Portal*, 2023.

**Figure 8**


*Map of crashes in 2020. Source: Photo by WSDOT - Crash Data Portal, 2023.*

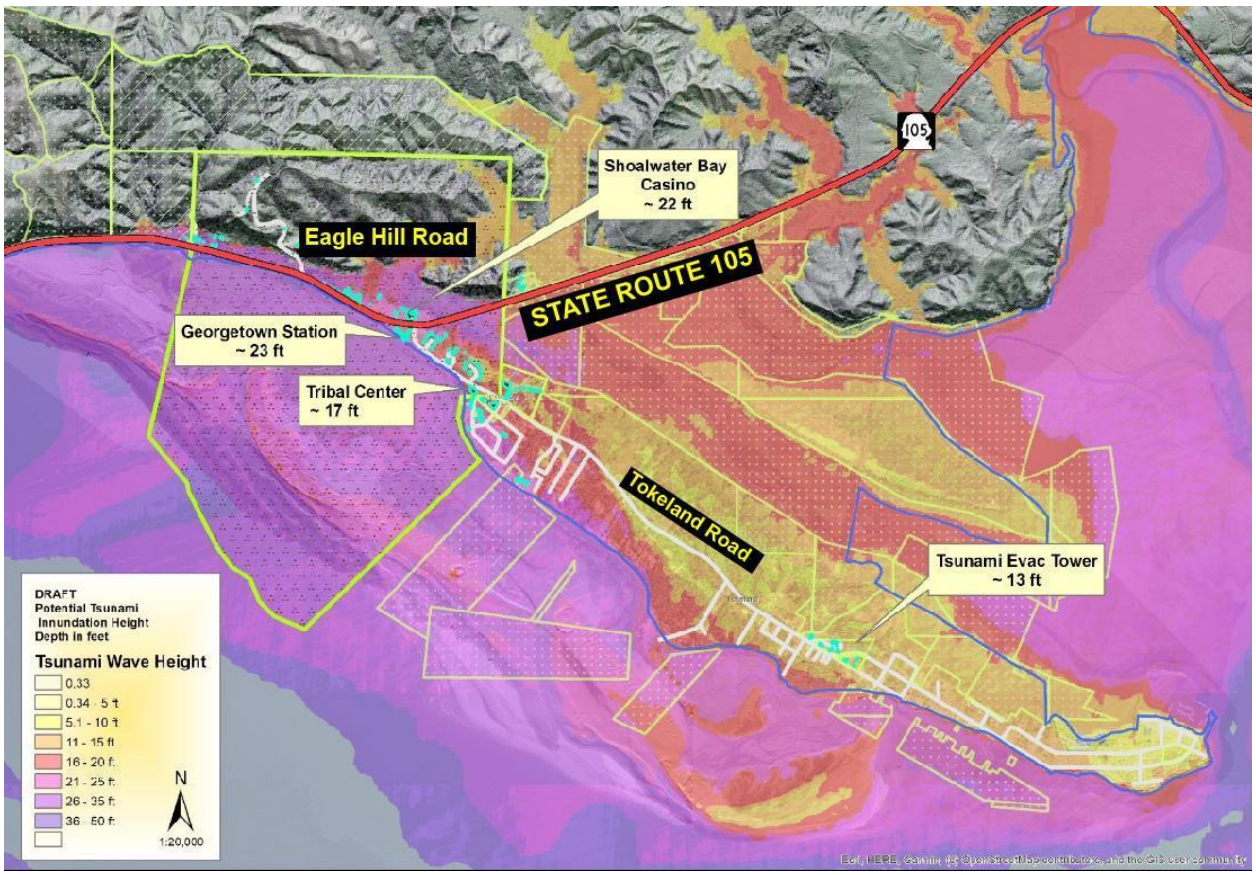
Two traffic counters off SR 105 are operated by WSDOT's Traffic Count Database System (TCDS) to monitor traffic volume. In 2022 the first counter recorded 1,993 vehicles that passed through 105 daily as the AADT, which is 10 units from 2021 (Washington State Department of Transportation, 2023). The second counter has a lower count AADT at 1,095 for 2022 and just 2 units less for 2021's AADT (Washington State Department of Transportation, 2023). The volume trend is steady at 0% annual growth which is a stark contrast to 2021's at 8% annual growth (Washington State Department of Transportation, 2023). And, the volume trend table shows 2022's annual growth rate at one percent, down from the previous year's 8 percent (Washington State Department of Transportation, 2023). The overall trend based on the two counters shows the trend of traffic volume was negative in 2020 and but after that year it has steadily risen to stable levels and could rise back to almost pre-pandemic levels.

*Climate risks and hazard threats*

The Tribe faces multiple challenges such as impacts from climate change, impacts from coastal erosion, earthquakes (secondary impacts), landslides, severe weather storms, tsunami, and wildfires (Coil et al, 2020). In response, the SBIT updated their hazard mitigation plan (HMP) in 2021. The plan describes how these threats are associated with the transportation system such as a blocked road from a landslide that creates situations of intense isolation (Coil et al, 2020, p. 54). With that, a main threat is a tsunami spurred by an earthquake (Coil et al, 2020, p.33). A tsunami would cause large scale property damage, injuries and loss of life due to landslides and flooding (Coil et al, 2020, p  33). In particular, a post Cascadia earthquake would cause “land subsidence of up to 8.5 feet, would permanently inundate all of the Tribe’s coastal

properties” ( Coil et al, 2020, p.64). Also, a combined earthquake and tsunami would block and damage Eagle Hill Road and SR 105, which is state jurisdiction (Coil et al, 2020, p.70). In that case, roads are highly vulnerable as this would severely hinder evacuation and post-event emergency efforts (Coil et al, 2020, p.70). Climate change exacerbates these threats by increasing landslide risk, destabilizing slopes, and intensifying wildfires (Coil et al, 2020, p.34). In connection to climate change the HMP states, *“*Of concern is the long-term estimate of sea-level rise [because] from 2090-2190, sea level at Shoalwater Bay is estimated to increase by 1.7 feet." (Coil et al, 2020, p.41).

**Figure 9**

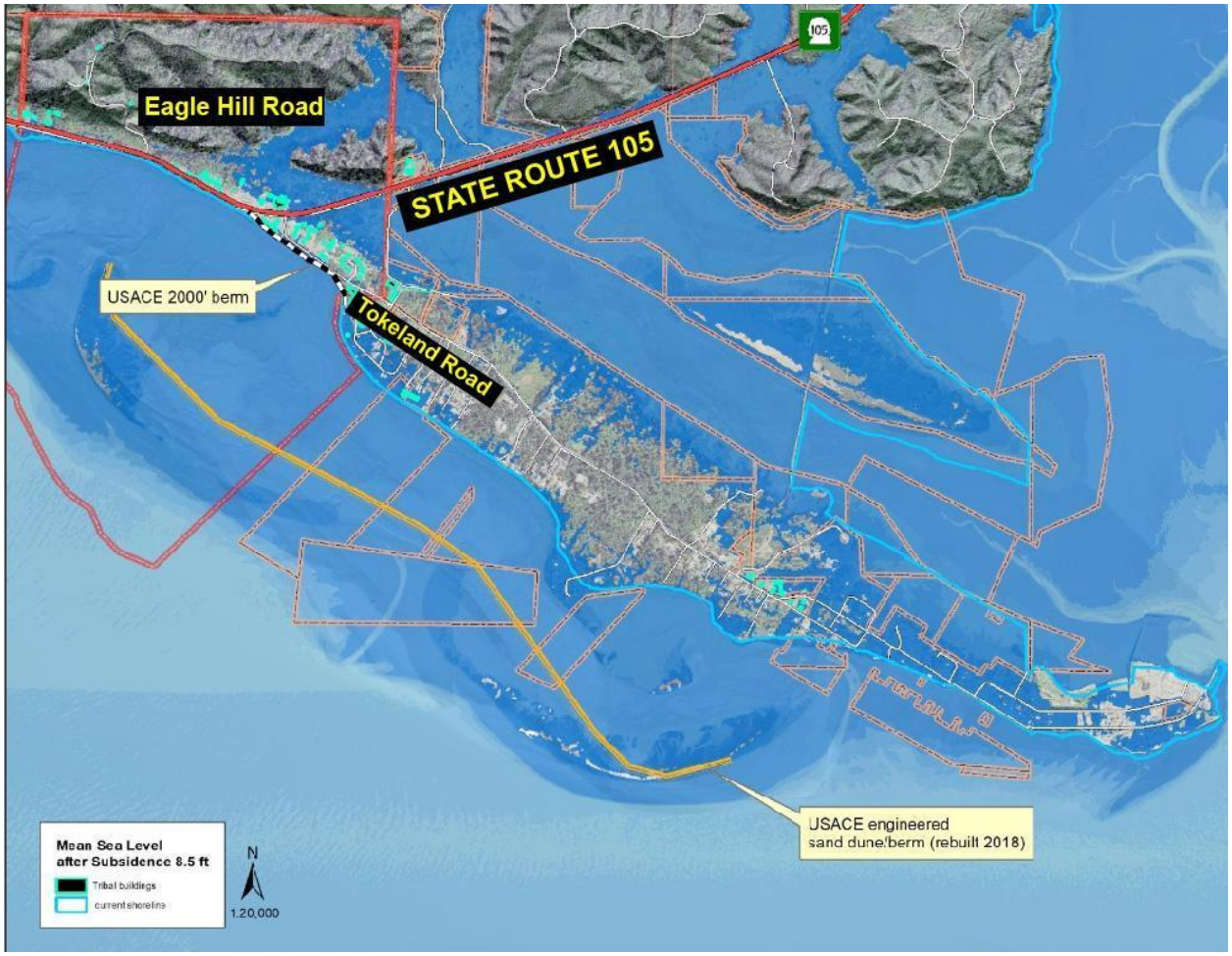



*Inundation Map. Source: Photo by Coil et al, 2020.*

Again, roads in particular are at high risk of being damaged or destroyed that in turn create traffic delays, harm the SBIT's economic development, and increase isolation. Regarding roads, the HMP states, "The tribe is also vulnerable to isolation from blocked roads, loss of power and communications…and the tribe would most likely have to wait while systems are prioritized and restored in higher population areas'' (Coil et al, 2020, p. 54). Consequently, the HMP discusses that longterm the casino's revenue would decrease dramatically, loss of income, jeopardize jobs and prevent staff from working (Coil et al, 2020, p.33). One strategy that is in the HMP and is in progress wants relevant departments "to develop alternate routes; develop right

of way agreements as necessary and negotiate removal or unlocking of gates with locks" (Coil et al, 2020, p. 11).

**Figure 10**




*Sea Level Rise Map. Source: Photo by Coil et al, 2020.*

*Efforts and strategies*

The SBIT Climate Resilience Plan highly prioritizes erosion control actions such as berms and other efforts to restore areas and build up protection while the upland planning and development continue (Shoalwater Bay Indian Tribe, Oregon Climate Change Research Institute, & Adaptation International, 2021). The plan also promotes the incorporation of redundant and resilient infrastructure for energy, water, and telecommunications systems (Shoalwater Bay Indian Tribe, Oregon Climate Change Research Institute, & Adaptation International, 2021). In regards to actions to build resilient infrastructure, specifically for transportation, the Climate Resilience Plan's goal I-13 emphasizes trails networks to protect from erosion, streamflows and climate impacts to "provide alternative transportation routes and access to culturally-important and traditional use areas that are critical to maintaining use of these resources and maintaining the health and vitality of the community" (Shoalwater Bay Indian Tribe, Oregon Climate Change Research Institute, & Adaptation International, 2021, p. 21). Additionally, goal I-13 aims to Introduce and increase the planting of culturally relevant species into the trails for increased resilience Shoalwater Bay Indian Tribe, Oregon Climate Change Research Institute, & Adaptation International, 2021, p. 21). Goal I-17 of the Climate Resilience Plan aims to ensure that culvert bridges and roads can withstand higher peak stream flows, be multi-model and partner with Washington state and regional transportation organizations, especially regarding the inclusion of the climate impacts into upgrades and infrastructure resilience.

*Trip generators and Attractors*

The Tribe's casino on the reservation is a local and regional trip generator and attractor. There was no public data to account for the daily/weekly/or annual visitors to the business for a general frequency. Tokeland Cannabis could also be a moderate trip generator and attractor among local and regional residents; the next closest cannabis store is in Raymond. The Tribe's gas station is a place for local community members gas and other household goods like water, food (not all types of grocery food), and toiletries.  Another Willapa Bay Enterprise that attracts visitors is the Tradewinds on the Bay motel and event space for its scenery of the tidelands and oceanfront views.

## Chapter 3: Methods

The main research question is ‘What are the transportation needs and challenges of the Tribe?’. The two other research questions are ‘What are some of the immediate, short and long-term transportation-related opportunities that will contribute towards their goals and values (ie. upland expansion)?’ and ‘How the Tribe may enhance mobility and transportation to support hazards resilience, self-reliance, regional accessibility, and economic development’. To answer those three research questions the three research methods (in order) are secondary data analysis, community engagement and a transportation and mobility survey for the community. A secondary data analysis was conducted first in order to understand the SBIT’s context and the existing conditions of the community’s transportation. The engagement with the community occurred alongside the analysis until December. After those were completed, the survey design process began to better understand the SBIT community’s transportation needs and challenges, especially concerning the upland expansion. The data, information and insights from these methods will inform a transportation and mobility needs assessment report for the Shoalwater Bay Indian Tribe. In particular, inform the findings and recommendations of the needs assessment. This will also answer the other two research questions.

### 3.1 Secondary data

This method pulls information from the relevant documents and material listed in the table below to inform the existing conditions, discussion, and recommendations sections of this transportation and mobility needs assessment. These documents were read from the early on in the studio up until the completion of the existing conditions draft in March. The secondary data

sources listed in Table 1 were referred to often in order to create the recommended strategies. The sources listed in Table 1 influenced the work I produced for the studio, specifically the alternative routes strategy, small powered vehicle community, bioswales as erosion and landslide control, and the mobile enterprises strategy (Granados, p.102). The SBIT's Hazards Mitigation Plan and climate plan trilogy were also foundational to the upland expansion community's site analysis.

**Table 1**

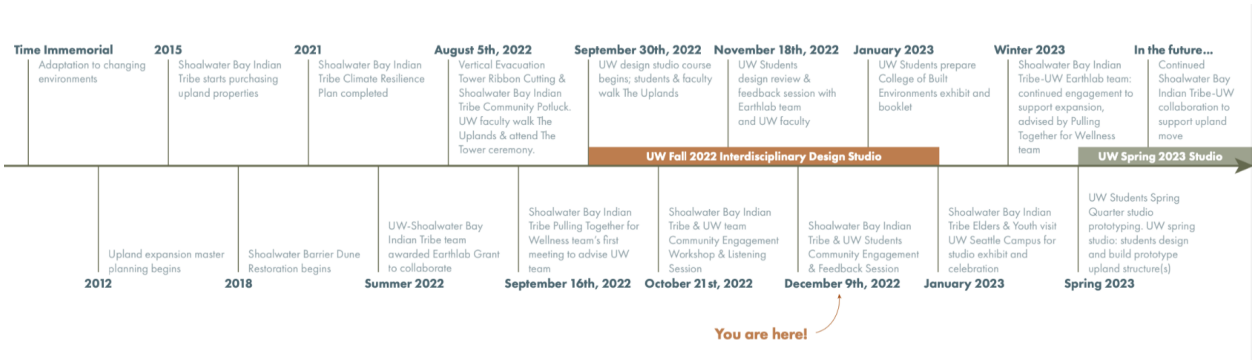
| Title | Aspect or Condition | Reference |
|---|---|---|
| SBIT Hazard Mitigation Plan | Climate and environmental hazards regarding transportation infrastructure | Shoalwater Bay Indian Tribe |
| SBIT Climate Resilience Plan | Strategies and transportation-related planning/projects | Shoalwater Bay Indian Tribe |
| RAISE Grant and review notes | Features and comments | Shoalwater Bay Indian Tribe |
| WSDOT Data | Crash and volumes data | WSDOT Open Portal |
| 2018 Pacific County Recreational Development Plan | Trails Network as Resilience and mobility infrastructure | Pacific County Economic Development Council |
| SBIT Long-Range Transportation Plan | Major transportation infrastructure and facilities on the reservation/nearby | Shoalwater Bay Indian Tribe |
| American Community Survey Census | Demographics | Census |
| Willapa Bay Enterprises Website | Demographics and employment and trip generators/attractors | SBIT |

| | | |
|---|---|---|
| Google Earth | Parking space | Google |

### 3.2 Community engagement

A cornerstone of the Coastal Adaptations McKinley Futures studio in the fall of 2022 was engagement with the Shoalwater Bay Indian Tribe community. Preceding the studio Figure 11 shows a timeline of the several major events that led up the autumn studio such as the UW-SBIT team being awarded an Earthlab Innovations Grant in summer of 2022 and the completion of the SBIT Climate Resilience Plan in 2021.

**Figure 11**




*UW & SBIT Engagement Timeline. Source: Photo by Hannah Simonsen, 2022.*

The studio included two rounds of direct engagement with the Shoalwater Bay community members and staff for the studio: a Friday-Monday series of two interactive workshops, a listening session on October 21st and a design/visioning charrette on October 24th. Students then presented their work for feedback at a one-day open house on Friday, December 9. Insight from these meetings led to the formation of this thesis capstone project in partnership with SBIT and the design and implementation of a community survey on

transportation. For the studio, the community input helped develop the recommended strategies grounded in resilience for the SBIT's future economic development strategic plan. The strategies put forth aimed to reduce the need for regional travel while also increasing access and regional attraction. Such as a larger food market or co-op that provides fresh food, more opportunities for economic development, educational centers that offer remote and in-person learning, mobile medical clinics and increased telehealth capacity, and more housing for members currently living at a distance.

For the two workshops on Friday, October 21st and Monday, October 24th, Reese McMichael, a fellow Master of Urban Planning student, and I presented a regional map activity as an element of the listening session on the first day and during the intervening weekend we took what we heard from the community to design our next activity for the design charrette workshop on the following Monday. The following section will go into detail about the two activities' functions and a summary of what was gathered from the community.

The first activity utilized a regional map including Tokeland and the surrounding towns Westport, Aberdeen, Raymond, South Bend, Olympia, and Elma (Figure 9). Additionally, the map shows the main roads such as Route 105, 101, and 107. This wide pan of the area was used to identify the places the members of the community went to for needs and recreation. However other places like Seattle and other towns were not included for members who went farther out. As for labeling, the map's legend has six different colors that signify the type of destination and where pinpointed on the map. Pink is work, green is recreation, orange is household goods like food, red is health, blue is education, and yellow is other. A member

would indicate where they go for these necessities with colored dots that correspond to the legend. Reese and I created the second activity for the October 24th event based on what we heard on October 21st. Those details will be expanded upon later in the findings section (Table 1). The second activity asked a member to take as many ideas as they like from the 20-idea options laid out before them on sticky notes and place the sticky notes on the ideas board under one of four concerns columns. For flexibility, a person could write down their own idea on a sticky note to add to the board or place the same idea under more than one concern column.

At the end of the studio, we held a meeting to showcase student deliverables with adequate time for community members, staff, and the public to give comments and feedback, and to develop trust and collaboration with the university team as both planners and researchers committed to supporting the Tribe's priorities. The December 9th event was also an opportunity to create a mini survey for the community on economics and transportation. With that, the activities in association with this thesis were the listening session, regional mapping activity, strategies and solutions brainstorming activity. These activities sought to reveal members' general regional travel and transportation desires as they relate to the uplands community and throughout its development. A quick preliminary survey was also created for the December 9 event to ask further about regional travel and desires. There were four questions to gather more specific responses from members in relation to frequency, economic development and desires for the uplands more. Among the six respondents, trails and food systems related responses stood out. The full findings and key takeaways of the community engagement will be in the findings section.

### 3.3 Survey

The rationale to do a survey came down to it being an instrument to directly answer the first research (What are the transportation needs and challenges of the Tribe?) and through the engagement we understand that transportation and mobility is indeed a large component of the upland expansion planning. So a survey could be designed in such a way that upland development could be explored more too. The SBIT did conduct a transportation survey for community members however it was conducted over five years ago. In addition, other tribes have recently conducted a transportation needs assessment survey so there were references and guidance to create one for the SBIT.

In the initial development of the survey, the survey questions generated were based on and informed by previous transportation need assessment surveys created by rural agencies, Tribes, or consultants hired by a Tribe and the household survey from the US census. To further its development, a survey protocol table was made that shows both the question and answer choices, in the second column explains the rationale for each question, and if applicable the question's reference. There were regular meetings with my committee members and meetings with Shoalwater Bay Tribal staff, and faculty and partners from the fall studio to provide feedback and guidance on the survey. The final 22-question survey was housed on the Survey Monkey platform for its extra capabilities. A poster was created to share through the SBIT's social media platforms for members to see and take the survey. After the two-week period, a total of 450 respondents took the survey. The data cleaning protocol was layered to ensure

most of the bots were identified, there were about 401 bots. The traits that flagged respondents as bots were randomly generated email addresses and email addresses in foreign languages. In addition, many of the IP addresses showed up more than twice for supposedly different respondents. On top of that, the very short amount of time it took the respondent was also suspicious. Yangfeng Xu et al. (2022) discusses that this is a major problem especially if online surveys have a monetary incentive. But there are several measures to detect and to prevent bots (Xu et al., 2022). We did not anticipate this problem, and thus were forced to attempt to filter out the bots after collecting the data. To filter out the bots, I set the filters on Survey Monkey to only show complete and partial responses, from dates 4/7/23 to 4/23/23 as the survey was scheduled to run for two weeks, and response time greater than 5 minutes and 10 minutes. The filters brought it down to 49 genuine respondents. I then looked at emails to locate suspicious bot-like emails that were long, in a foreign language and randomly generated usernames. In addition, I looked for repeating IP addresses and cross-referenced them with email and responses to see if they were bots or different members of the household or SBIT staff that took the survey. An Excel spreadsheet was downloaded from Survey Monkey of all the responses and individual responses. I then transformed those responses in Excel spreadsheets into different charts. My analysis procedures of the results are to synthesize them with the results of the community engagement meetings and findings from the existing conditions. Moreover, the analysis will aim to correlate answers to one question with those of another question or questions (i.e., respondent's age and car access). For privacy reasons, I have anonymized all the emails and have omitted the IP addresses of the spreadsheets and placed them in a folder in a secured Google Drive folder. Lastly, as compensation and reciprocity, two

50-dollar gift cards for Eighth Generation and Amazon were given at random to two respondents.

### 3.4 Limitations

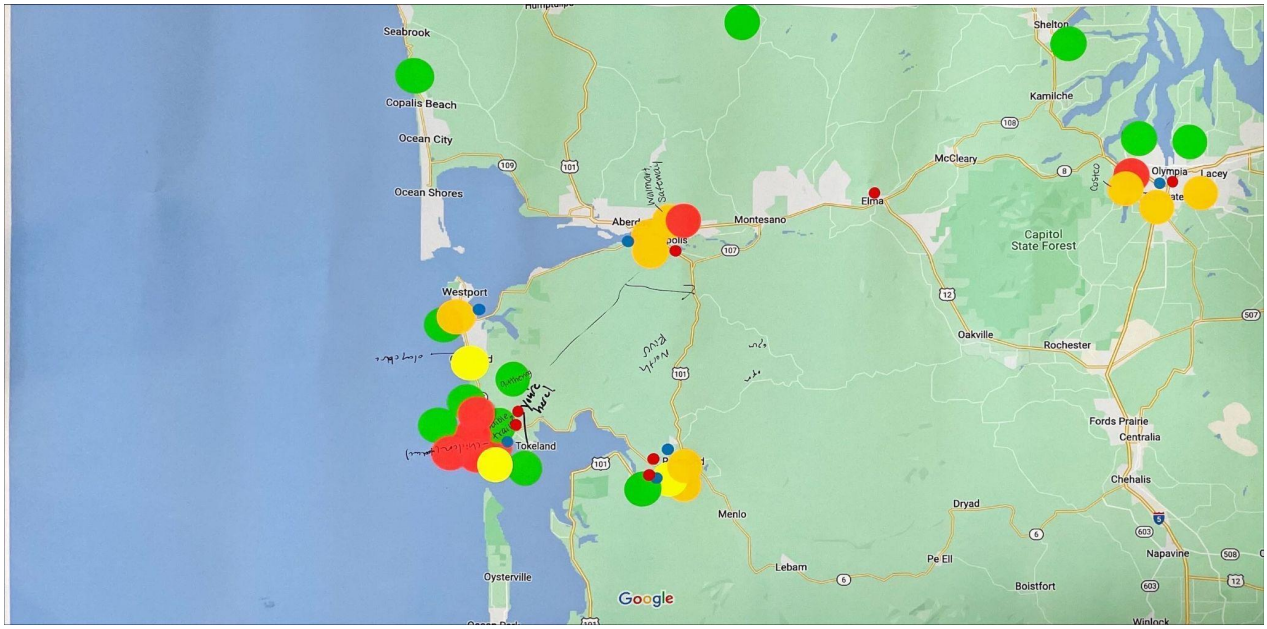
One limitation of this thesis project is the timeframe of 5 months to explore the transportation and mobility needs and challenges of the SBIT, which may reduce the degree of comprehensiveness compared to other assessments. In addition, survey responses were largely from bots which ultimately affected the data analysis and the sample. In addition, the relatively small number of usable responses after data cleaning (49) and the fact that respondents were self-selecting, reduces the representativeness of the data. Lastly, generalizability to other Tribal contexts may not be appropriate given the diversity of Tribes and their circumstances in the region.

# Chapter 4: Results

## 4.1 October 21st Engagement Event

To reiterate, the October 21st community engagement event aimed to understand members' general regional travel and transportation options they would like to see happen in regard to the upland community to inform the studio work. There were about fifteen participants for both workshops. The October 21 listening session's mapping activity's key takeaway was the need to travel regionally for groceries, school and work. Also, Figure 12, the completed map activity, demonstrates that recreation and employment could be done near or within reservation. A couple of the key takeaways from the second activity were that trails were the number one sticky note placed on the ideas board and bioswales were also of interest to the community participants.

**Figure 12**




*Completed Regional Map Activity. Source: Photo by Granados and McMichael, 2022.*

The key takeaways from this mapping activity were:

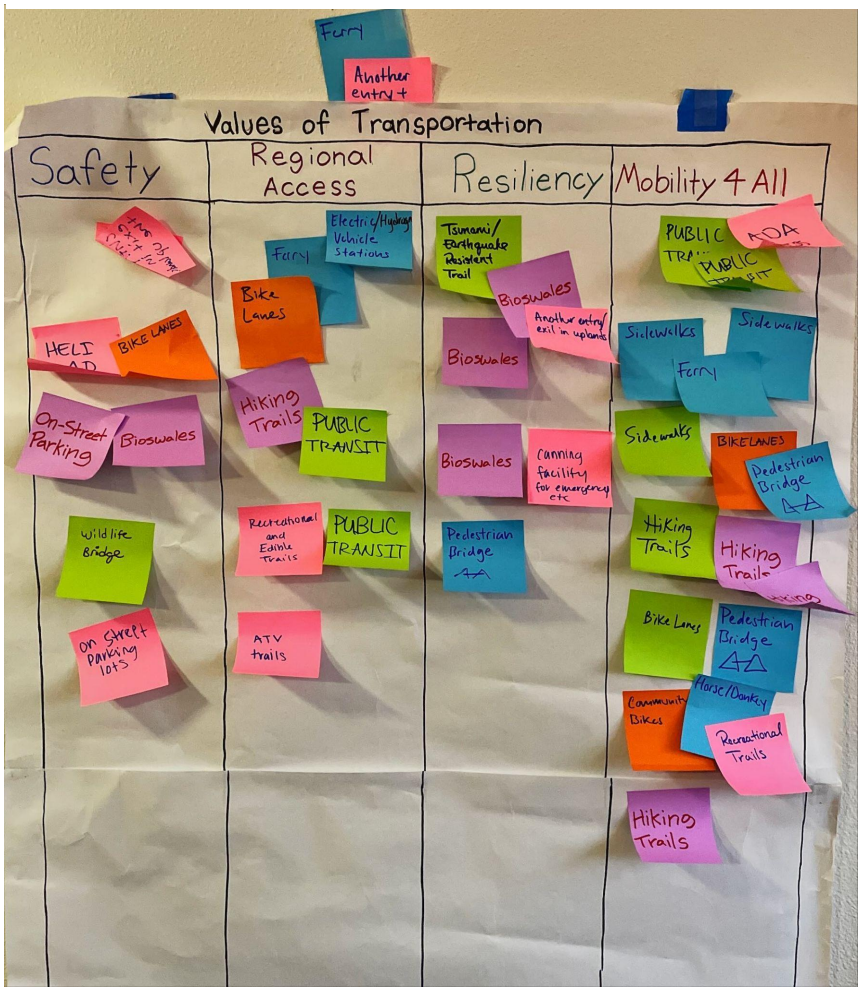
- Much of the community's employment is concentrated in the Shoalwater Bay Tribe's Reservation and Tokeland area.
- Household goods are obtained and bought elsewhere rather than in the immediate community.
- Youth and higher education students seek their education in Westport, Raymond, South Bend, Aberdeen, and Olympia. As there is no K-12 school in the reservation or Tokeland.
- Members mainly go nearby for recreation and in the region to towns and larger cities. Even into forested areas too.
- Health needs are also met in other towns like Raymond and Aberdeen because of the hospitals and other healthcare centers there. The Tribe's current wellness center is still viewed as an essential service to fulfill the health needs of many community members.
- A couple of members traveled outside this region for work-related needs and recreation (i.e., to visit someone).

**4.2 October 24th Engagement Event**

Based on the listening session and map responses, the transportation and mobility team (Reese McMichael and I) gathered that the main four concerns are safety, regional access, resiliency, and mobility for all. Safety is made apparent with member' comments on car crashes and having to park on the roads. Regional access is made apparent as the regional map shows the community travels to get most of their necessities and health and educational needs.

Resiliency was exemplified with the comments on roads being obstructed by landslides and therefore traveling in and out of the community was difficult. And mobility for all is highlighted because people in the community do not have driver's licenses and conditions that contribute to car reliance. With that information, Figure 13 displays the completed activity that we developed so that members can choose from over 20 ideas as possible solutions to address the four concerns and that connect the community to the uplands and the region.

**Figure 13**




*Completed Ideas Activity. Source: Photo by Granados and McMichael, 2022.*

The key takeaways from the second activity were:

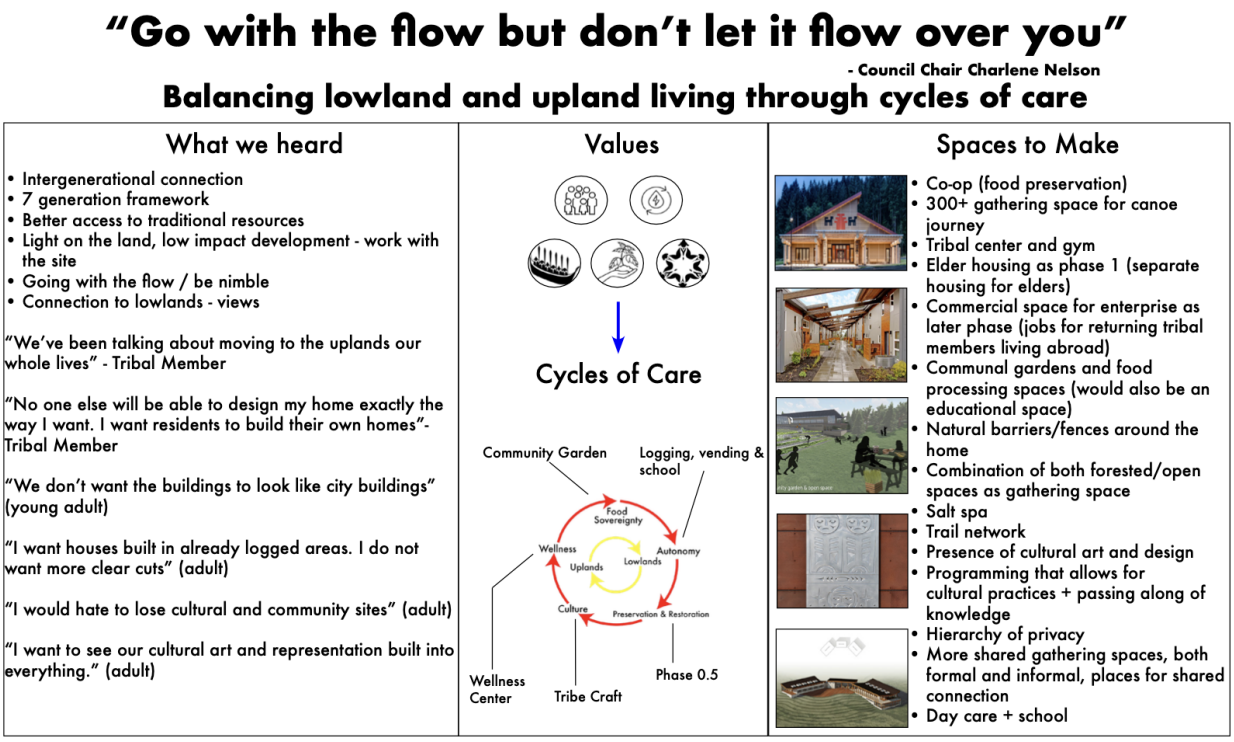
- Bioswales were of interest to the community. After we explained what they are for community members who participated, most of them placed the bioswale sticky note on the ideas board.
- Public transit was placed 4 times on the board under regional access and mobility for all columns.
- The trail is a popular idea!
- Participants seem interested in multimodal travel with bike lanes and sidewalks (4 bike lanes post it notes are on the board).
- Horses and donkeys were not exactly well received as it got one placement from a member.
- New ideas generated from members are a wildlife bridge, ATV trails, different types of trails, and a canning facility.
- More parking is on the board twice under the safety column. A couple of members pointed out the various festivals, gatherings, and events held in the area such as Canoe Journey.
- Another entry and exit and ferry are placed in both regional access and resiliency columns.
- Members placed ‘another entry/exit in uplands on the board 3 times. And, during the activity members discussed "back roads" connected to Route 101 as an option.
- Public transit had 4 sticky notes on the board

- Many of the sticky notes with the ideas written on them that were placed on the table for community members to choose from were not put on the ideas board. This may be because members who attended were not familiar with some of the ideas or did not know how they would be used exactly in the context of the upland expansion and meeting their regional transportation needs. Also the various ideas written on the sticky notes were simply not important or priority for participating community members. For instance, drones were one idea written on sticky notes however no one chose it to put on the board.

**4.3 December 9th Open House**

A large poster was presented at the open house that had the key values, quotes, cycles of care concept and wish list of spaces and features gathered from engagement on it (Figure 14). Following the December 9th open house, the considerations and recommendations for the SBIT were outlined in the official studio booklet. This includes considerations and recommendations under the five categories: resilient economic development, regional integration and transportation, capital planning for 7 generations, lowland to upland connection, and future programming (Granados, p. 100-103).

**Figure 14**




*December 9th Open House Poster. Source: Photo by Granados, 2022.*

In addition, for the final studio open house in December, I created a quick preliminary survey to tease out regional travel and desires a bit more. The questions and the responses verbatim from the six participants are:

1. Is there anything you travel outside the community for that you would like provided for here? Why?
    - Produce from the garden is very nice. Fruit trees planted here and there is nice too.
    - I frequently drive locals to Olympia for medical specialist appointments. Some

more gerontology resources.

- Grocery stores
- Food! Long drive to buy affordable groceries.
- Groceries
- Agriculture. Daycare.

2. How many times a week do you travel outside the community? For work or something else?
    - Once a month for groceries, pet food, etc..
    - .3-.5
    - 1-2
    - Once , for groceries. In general I try to minimize driving because of the price of gas.
    - 1 x wk - food + sundries
    - I live outside the community. There is no housing here for me.
3. In October the most picked ideas were bike lanes, hiking/recreational trails, public transit. From the list what would you like to have first?
    - Hiking and creational trails, it's fun to take the grandkids on "adventures" through the wilderness. And great exercise.
    - Hiking trails
    - Trails
    - Recreational trails
    - [blank]

- Hiking trails

4. Which businesses or services would you like to see started or developed soon than later? Do you support the expanded ecotourism in the uplands?
    - The tribal center, clinic is also needed.
    - Social services. not a fan of tourism. Shuttle from lowland to upland
    - museum./library
    - Groceries is the major one. Not the biggest fan of ecotourism - tourist season is a drag.
    - No
    - Food processing? Energy - clean. Agriculture - hemp. Recycling.

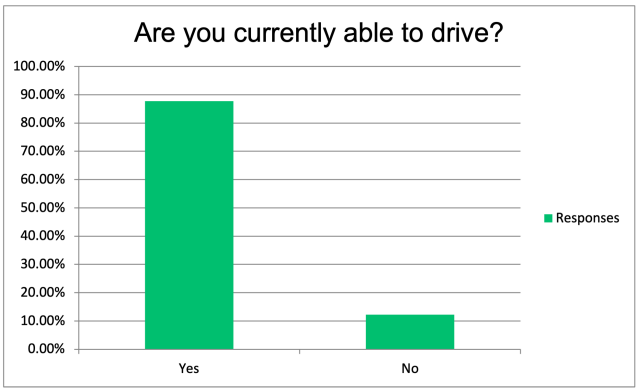
With that, one takeaway of this survey was that participating community members provided food and food systems related responses to question one on what they would like provided for in their community. There were varied responses to question two on frequency of travel ranging from does not apply to a participant (because they lived elsewhere) to once a month to one or two times a week. Another takeaway was that all the participants put down trails (hiking/recreational) to question three. And lastly for question four, two participants desired improvements be made around access to food and their food system in general such as growing their own food to consume. Half of survey takers (three participants) currently do not support ecotourism in the uplands. Medical services and social services were chosen among two participants. On top of this, the engagement shed light on some tensions between the community's priority of self-reliance and the need to travel and communicate across a large

region – particularly, the Tribe's need to gather occasionally with other Tribes and its members outside the reservation and interact with the larger society and economy.

### 4.4 Transportation Needs Survey Results

The survey's poster flyer that was distributed via the SBIT's social media and the newsletter and information provided to request participation in Appendix D. After filtering out the over 400 respondents for the data cleaning, the total respondents came down to 49 respondents and their responses.

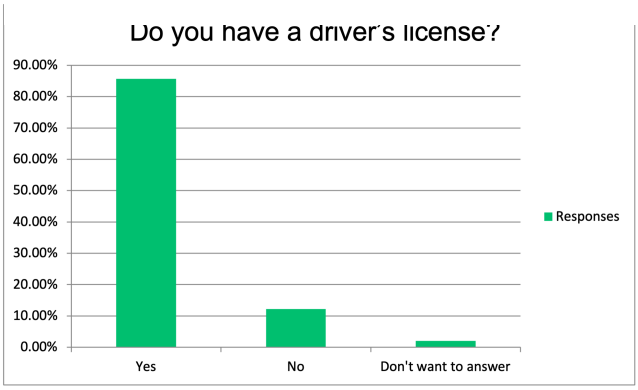
**Figure 15**




*Survey Question 1.*

Figure 15 shows survey question 1 which is "Are you currently able to drive?". Respondents overwhelmingly (87.76%) said yes they are able to drive. Only six respondents said no they are not currently able to drive (12.24%). Most of the respondents' fell into 18-29 and 30-61 age groups.

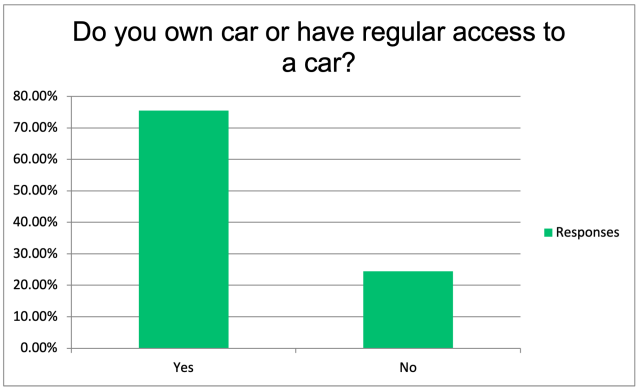
**Figure 16**




*Survey Question 2.*

Figure 16 shows survey question 1 which is “Do you have a driver's license?”. For this question, most respondents (85.71%) said yes that they have a driver's license and six respondents (12.24%) said no they don’t have one. One respondent did not want to answer the question.

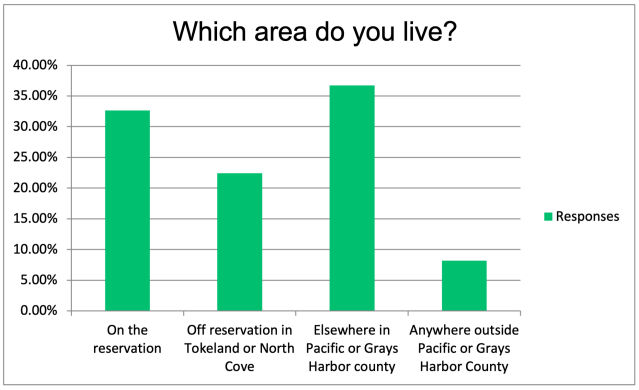
**Figure 17**




*Survey Question 3*

Figure 17 shows survey question 1 which is “Do you own a car or have regular access to a car?”. Again, most respondents said yes (75.51 percent) they have their own vehicle or have access to one. Then 12 respondents said no (24.49%) and the 'no' response was higher for this question than the previous questions (question one and two).

**Figure 18**




*Survey Question 4.*

Figure 18 shows survey question 1 that asks “Which area do you live?”. Out of the 49 respondents, 18 respondents or 36.73% percent said they live elsewhere in the Pacific or Greys Harbor County. And 16 respondents said they live on the reservation (32.65%) and 11 respondents answered Tokeland or North Cove. Four respondents, or eight percent, lived outside the region. Combined, most respondents live in the western Washington region.

**Table 2**

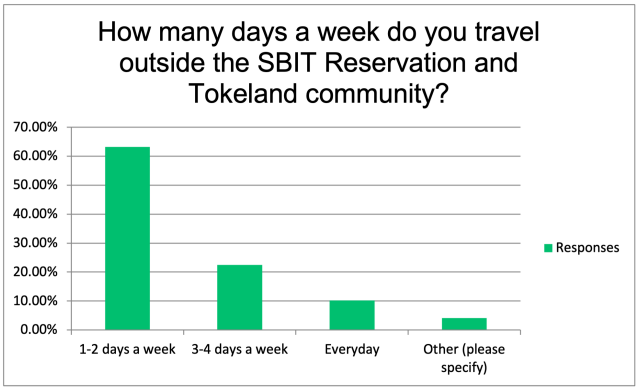
**When you travel, what is your main form of transportation?**

| Answer Choices | Responses | |
|---|---|---|
| Carpool/Riding with someone else | 2.04% | 1 |
| Private car | 63.27% | 31 |
| Bus/Public transit | 20.41% | 10 |
| Walking or rolling | 4.08% | 2 |
| Biking | 2.04% | 1 |
| Taxi/uber/lyft | 6.12% | 3 |
| Other (please specify) | 2.04% | 1 |
| | **Answered** | **49** |
| | **Skipped** | **0** |

*Survey Question 5.*

Survey question 5 asks “When you travel, what is your main form of transportation?” (Table 2).The main mode of transportation among the respondents is the private car and following that is the use of public transportation with 10 respondents. One respondent chose carpooling as their main form of transportation and two respondents have walking or rolling as their transportation. Only one respondent selected biking and three respondents use a car-hailing service as their transportation.

**Figure 19**




*Survey Question 6.*

Survey question 6 (Figure 19) asks “how many days a week do you travel outside the SBIT Reservation and Tokeland community?”. Based on the chart, 63.27% of respondents travel outside the reservation and Tokeland community about 1 to 2 days a week. Eleven respondents (22.45%) answered that they travel outside the reservation and Tokeland community 3 to 4 days a week. A handful of respondents answered that they travel outside the community every day (10%) and 2 respondents chose 'other' and stated that they were "Currently in the military and trying to move back".

**Table 3**

| Answer Choices | Responses | |
|---|---|---|
| Commute/work | 26.53% | 13 |
| Grocery shopping/errands | 32.65% | 16 |
| Medical | 14.29% | 7 |
| Recreational | 51.02% | 25 |
| Educational | 14.29% | 7 |
| Other (please specify) | 2.04% | 1 |
| | **Answered** | **49** |
| | **Skipped** | **0** |

*Survey Question 7.*

Survey question 7 (Table 3) asks, “Select the reasons for traveling outside the SBIT Reservation and Tokeland community”. Most of the respondents travel outside the immediate community for work, household goods and errands, and for recreational purposes such as hiking. Traveling for medical and education reasons are tied with seven marks for each of those. One respondent answered ‘other’ and said “all” meaning they travel outside the community for all these reasons.

**Table 4**

| Answer Choices | Responses | |
|---|---|---|
| 1-2 times | 52.63% | 20 |
| 3-4 times | 15.79% | 6 |
| 5 or more times | 26.32% | 10 |
| Everyday | 2.63% | 1 |
| Other (please specify) | 2.63% | 1 |
| | **Answered** | **38** |
| | **Skipped** | **11** |

*Survey Question 8.*

Survey question 8 (Table 4) asks participants “How often each week do you travel within the SBIT Reservation and Tokeland community?”. For this question, over half of the respondents (52%) travel within the SBIT Reservation and Tokeland community about 1-2 times a week. The

second largest response among the respondents is '5 or more times a week' at 26% or 10 respondents. And 15% of respondents (6 respondents) said they traveled 3-4 times a week. One respondent chose that they travel every day.

**Table 5**

| Answer Choices | Responses | |
|---|---|---|
| 1-2 times per year | 24.32% | 9 |
| On average once per month | 32.43% | 12 |
| On average once per week | 27.03% | 10 |
| Multiple times a week | 13.51% | 5 |
| Never | 0.00% | 0 |
| Other (please specify) | 2.70% | 1 |
| | **Answered** | **37** |
| | **Skipped** | **12** |

*Survey Question 9.*

Survey question 9 (Table 5) asks participants “How often do you travel to the reservation or Tokeland? Please skip if you live on the reservation or Tokeland community?”. The largest response for this question was 'on average once per month’ at 32.43%. And the second most frequent response was ‘on average once per week’ at 27%. Nine respondents (24%) said they travel to the community ‘1 to 2 times per year’. Zero respondents selected never. And one respondent said "when I can" for the 'other' option.

**Table 6**

| Answer Choices | Responses | |
|---|---|---|
| Shopping/Grocery Store/Bank | 36.84% | 14 |
| Medical/Dental Appointments | 34.21% | 13 |
| Events | 23.68% | 9 |
| Educational services | 23.68% | 9 |
| Traditional practices (for example hunting) | 39.47% | 15 |
| To visit family | 39.47% | 15 |
| I don't drive anymore | 2.63% | 1 |
| Other (please specify) | 5.26% | 2 |
| | **Answered** | **38** |
| | **Skipped** | **11** |

*Survey Question 10.*

Table 6 shows the complete responses to survey question 10 which is “If you drive, to which of the following local (like Raymond or Westport) destinations do you drive to?”. There was a good distribution of the responses received. Traditional practices and 'to visit family' received the same amount of responses at 15 respondents each at 39 percent. Shopping/errands (36.84%) and medical-related appointments (34.21%) almost received the same results. And both choices 'events' and 'education services' both received 23.68% of responses. One respondent chose 'I don't drive anymore' as their answer. The answers put for 'other' included "all" and "in the military".

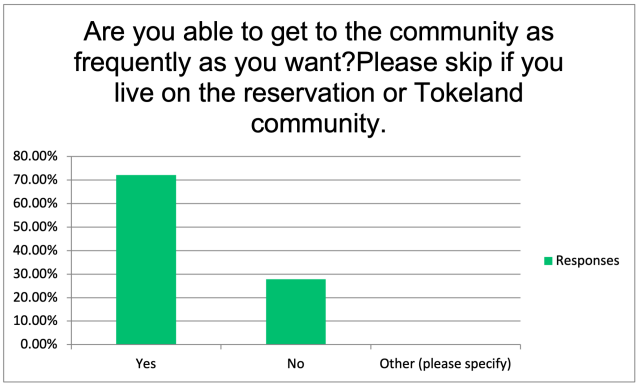
**Table 7**

| Answer Choices | Responses | |
|---|---|---|
| All of the time | 28.26% | 13 |
| Over half of the time | 34.78% | 16 |
| About half of the time | 23.91% | 11 |
| Less than half of the time | 13.04% | 6 |
| Never | 0.00% | 0 |
| | **Answered** | **46** |
| | **Skipped** | **3** |

*Survey Question 11.*

Survey question 11 (Table 7) asks participants “Are you able to get to the places you need to go?”. The "over half of the time" respondent group was the largest group at 34.78% and "all of the time" was the second largest respondent group. The third largest answer group for the question was 'about half of the time' at 23.91 percent. The rest of the respondents fall under the 'less than half of the time' group.

**Figure 20**




*Survey Question 12.*

Survey question 12 (Figure 20) asks participants “Are you able to get to as frequently as you want?”. For this question, 72 percent of the respondents (26) answered yes to the question and 27 percent answered no (10 respondents).

**Table 8**

| Answer Choices | Responses | |
|---|---|---|
| For all my trips | 4.17% | 2 |
| For about 75% of my trips | 14.58% | 7 |
| For about 50% of my trips | 18.75% | 9 |
| For about 25% of my trips | 50.00% | 24 |
| For none of my trips | 12.50% | 6 |
| | **Answered** | **48** |
| | **Skipped** | **1** |

*Survey Question 13.*

Table 8 shows the responses to survey question 13 that asks “During the past 3 months, how much do you rely on others for transportation?”. For this question, half of the respondents right at 50 percent chose that a quarter of their trips were supported by others. Followed by 18.75% of respondents (9) who answered 'for about 50% of my trips'. And the '75% of my trips' and 'none of my trips' almost tied at 14% and 12.50% respectively. Two respondents said they relied on others for all their transportation.

**Table 9**

| Answer Choices | Responses | |
|---|---|---|
| Shopping/Grocery Store/Bank | 10.42% | 5 |
| Medical/Dental Appointments | 22.92% | 11 |
| School | 16.67% | 8 |
| Work | 27.08% | 13 |
| Out of state work or travel | 29.17% | 14 |
| I have no difficulty traveling to any destinations | 41.67% | 20 |
| Other (please specify) | 4.17% | 2 |
| | **Answered** | **48** |
| | **Skipped** | **1** |

*Survey Question 14.*

Survey question 14 (Table 9) asks participants "During the past 3 months, were you unable to travel to any of the following destinations?". For this question, 41% of the participants said that they have no difficulty traveling to any destinations. Apart from that, participants were unable to go out of state for business or travel, to get to work, and unable to get to medical-related appointments. Some members were unable to get to school or stores/places for errands.

**Table 10**

| Answer Choices | Responses | |
|---|---|---|
| Health | 51.06% | 24 |
| Walking paths available | 40.43% | 19 |
| Nature or scenic views | 53.19% | 25 |
| I feel safe | 25.53% | 12 |
| Job | 27.66% | 13 |
| To shop | 25.53% | 12 |
| Seek services | 12.77% | 6 |
| Community meeting | 17.02% | 8 |
| No drivers license | 0.00% | 0 |
| Other (please specify) | 2.13% | 1 |
| | **Answered** | **47** |
| | **Skipped** | **2** |

*Survey Question 15. Why do you walk, roll, and/or bike in your community?*

Table 10 shows the complete responses to survey question 15 (Why do you walk, roll, and/or bike in your community?). For this question, 'Nature or scenic views' and 'health' are the

top answer choices to this question. Additionally, ‘walking paths available’ and 'job' are the second most popular answer choices. And 'I feel safe' and 'to shop' are both tied with receiving 12 marks each among respondents. The lowest chosen are 'seek services' and 'community meetings'.

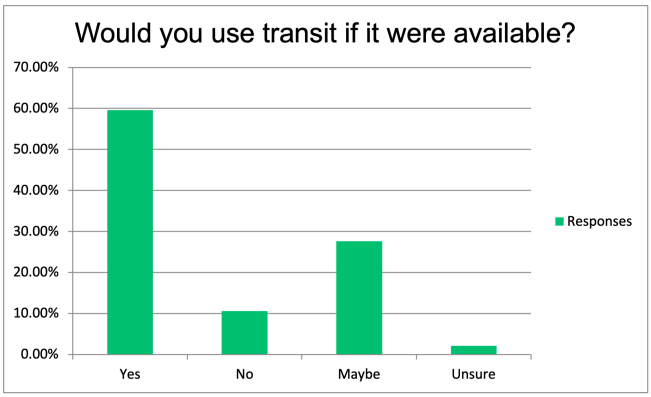
**Table 11**

| Answer Choices | Responses | |
|---|---|---|
| Cost of gas | 19.15% | 9 |
| Cost of maintenance & repairs | 40.43% | 19 |
| Cost of cars or car payments | 29.79% | 14 |
| Cost of auto insurance | 29.79% | 14 |
| Cannot drive | 10.64% | 5 |
| Finding others to drive | 4.26% | 2 |
| Distance to travel | 34.04% | 16 |
| Time to travel | 23.40% | 11 |
| Maintained car and tires (safety concern) | 23.40% | 11 |
| Unhoused | 0.00% | 0 |
| | **Answered** | **47** |
| | **Skipped** | **2** |

*Survey Question 16.*

Table 11 shows the complete responses to question 16 (What do you see as your biggest transportation problems?). The 'cost of maintenance and repairs' and 'distance to travel' had the highest amount of marks as transportation barriers. Other type of vehicle costs make up the top five answer responses. Followed by 'time to travel' and ‘maintained car and tires for safety reasons’ both got eleven marks. And the cost of gas and finding others to drive both received the fewest marks (nine for the former and two for the latter).

**Figure 21**




*Survey Question 17.*

Figure 21 shows the complete responses to survey question 17 (would you use transit if it were available?). More than half of the respondents said that they would use transit if it were available (59.57%). And 27% of respondents said that they maybe would use transit if it were available. Ten percent of respondents said no they wouldn't use transit. One respondent said they were unsure.

**Table 12**

| Answer Choices | Responses | |
|---|---|---|
| A transit-system with fixed-route bus stops and scheduled pick-up times? | 27.66% | 13 |
| A shared transit-system that could be called-on-demand (could deviate frc | 34.04% | 16 |
| A private van system, or chauffeured transit-system that you could call-in | 25.53% | 12 |
| A self-driven vanpool or carpool? | 6.38% | 3 |
| Short transit system for vehicle-for-hire (car-pool sharing)? | 4.26% | 2 |
| Uber or Lyft services | 2.13% | 1 |
| | **Answered** | **47** |
| | **Skipped** | **2** |

*Survey Question 18.*

Table 12 illustrates the responses to question 18 (There are several options for a local transit system. What would best meet your or your community's needs?). First, 34% of SBIT community members who participated in this survey chose a shared transit system that could

be called on-demand as a transit system option. And, 27% of participants chose a standard transit system with fixed-route. Thirdly, 25% of respondents selected a private van system. The least chosen options were vanpool/carpool, vehicle-for-hire and car hail services.

**Table 19**

| Answer Choices | Responses | |
|---|---|---|
| A type of transit service | 19.15% | 9 |
| Safety (i.e. lighting, traffic calming) | 48.94% | 23 |
| Alternative routes | 14.89% | 7 |
| Internet access to services | 42.55% | 20 |
| Parking | 25.53% | 12 |
| Trail system | 25.53% | 12 |
| Walking paths | 21.28% | 10 |
| Bikes | 14.89% | 7 |
| Wildlife crossings | 10.64% | 5 |
| Electric vehicle charging stations | 23.40% | 11 |
| Walkability between Housing & communal areas | 27.66% | 13 |
| Zip line | 6.38% | 3 |
| Gondola system | 6.38% | 3 |
| Water transportation | 6.38% | 3 |
| Horses | 2.13% | 1 |
| Other (please specify) | 2.13% | 1 |
| | **Answered** | **47** |
| | **Skipped** | **2** |

*Survey Question 19.*

Survey question 19 (Table 13) asks participants “What transportation and mobility resources would you like to see in the local community?”. The two top marked answers choices are safety and internet access to services. The next most popular answer choices are walkability, parking, transit, a trail system and walking paths. After that, some respondents marked alternative routes, bikes, and wildlife crossings. The least chosen options were water transportation, zip line, a gondola system and horses.

**Table 14**

| Answer Choices | Responses | |
|---|---|---|
| A type of transit service | 20.83% | 10 |
| Safety (i.e. lighting, traffic calming) | 37.50% | 18 |
| Alternative routes | 22.92% | 11 |
| Internet access to services | 35.42% | 17 |
| Parking | 20.83% | 10 |
| Trail system | 22.92% | 11 |
| Walking paths | 8.33% | 4 |
| Bikes | 12.50% | 6 |
| Wildlife crossings | 6.25% | 3 |
| Electric vehicle charging stations | 35.42% | 17 |
| Walkability between Housing & communal areas | 10.42% | 5 |
| Zip line | 6.25% | 3 |
| Gondola system | 12.50% | 6 |
| Water transportation | 8.33% | 4 |
| Walkability between Housing & Communal Areas | 6.25% | 3 |
| Horses | 4.17% | 2 |
| Other (please specify) | 6.25% | 3 |
| | **Answered** | **48** |
| | **Skipped** | **1** |

*Survey Question 20.*

Table 14 shows the complete responses to survey question 20 (What transportation and mobility resources do you think would be useful in the near future (in about 3-5 years)?). The top three selected answers are again safety, internet access, and instead of walkability its electric vehicle charging stations. And the second batch of top chosen answers are a transit service, alternative routes, parking, and trail system. The least chosen were wildlife crossing, zip line, horses, and walkability.

**Table 15**

| Answer Choices | Responses | |
|---|---|---|
| Walking and biking paths and facilities | 43.75% | 21 |
| Recreational trails | 50.00% | 24 |
| Shuttles to and from the new community | 41.67% | 20 |
| Emergency/alternative roads | 45.83% | 22 |
| Small power vehicles to get around | 37.50% | 18 |
| Closer knit community that is walkable | 14.58% | 7 |
| | **Answered** | **48** |
| | **Skipped** | **1** |

*Survey Question 21.*

Table 15 shows all the responses to survey question 21 (What kind of transportation and mobility options would you like to see in the uplands specifically?). All the answer options for the most part are almost equally distributed save for a 'closer knit community that is walkable' and ‘small power vehicles to get around’. Recreational trails received the most marks along with alternative roads and multimodal paths. Small-powered vehicles got the least percentage of responses.

**Table 16**

| Answer Choices | Responses | |
|---|---|---|
| A type of transit service | 17.39% | 8 |
| Safety (i.e. lighting, traffic calming) | 41.30% | 19 |
| Alternative routes | 23.91% | 11 |
| Internet access to services | 39.13% | 18 |
| Parking | 32.61% | 15 |
| Trail system | 23.91% | 11 |
| Walking paths | 21.74% | 10 |
| Bikes | 10.87% | 5 |
| Wildlife crossings | 4.35% | 2 |
| Electric vehicle charging stations | 23.91% | 11 |
| Walkability between Housing & communal areas | 10.87% | 5 |
| Zip line | 6.52% | 3 |
| Gondola system | 2.17% | 1 |
| Water transportation | 2.17% | 1 |
| Horses | 0.00% | 0 |
| Other (please specify) | 4.35% | 2 |
| | **Answered** | **46** |
| | **Skipped** | **3** |

*Survey Question 22.*

Table 16 shows the response to survey question 22 (What transportation and mobility resources do you think you would need once the uplands community is completed?). The top three selected answers are again safety, internet access, and this time instead of electric vehicle charging stations its parking. And the second batch of top chosen answers are EV charging stations, alternative routes, trail system and walking paths. The least chosen options are wildlife crossings, water transportation, zip line and a gondola system.

## Chapter 5: Analysis

The analysis of the survey results (survey data was analyzed in Excel to create charts and graphs for each question), community engagement, and existing conditions uses a major findings approach to answer the first research question directly. Additionally, the survey results will be compared to results from The Colville Confederated Tribes' survey and relationships (correlations) between the responses to survey questions will be identified.

### 5.1 Key Findings

- **Most participating community members have access and ability to travel** within the immediate SBIT community and regionally by vehicle. The results from question one and two show most have access to a vehicle or own one. Most of the participating community members who took the survey have driver's licenses. The main mode of transportation is private cars which makes traveling via car the preferred and most convenient option. This finding supports the notion that "American Indian reservations

remain some of the most isolated, auto-dependent populations in the nation" (Campobasso & Winchell, 2021, p.9).

- **There is a segment of the participating community members who do not have this privilege** (questions 11, 13 and 14) for a variety of reasons that the results allude to (that will be discussed in another finding below) and other reasons not highlighted in the data. Also, this finding connected to the relevant transportation accessibility issue that rural areas and rural tribes face especially for elderly and youth populations.
- **Regional travel is frequent and is not just for work** (question 6 and 7) among participating community members that live on the reservation, Tokeland, and Pacific County. Major reasons for travel include needing to obtain household goods and to run errands, for recreational purposes, medical appointments, and going to school.
- **Transportation challenges for members include costs associated with vehicles & distance** (question 16) as such this finding connects to demographics that many work off the reservation. This factors into the discussion about members desiring (from engagement) a grocery store, medical facility, WIFI, and expanded enterprises for increased jobs in the future that could reduce the distance challenge.
- **Transit is of interest to participating community members** – in particular, a standard transit system and an on-demand transit system (question 17). However, transit did not make it to the top five responses in the last four questions on transportation options for their community and upland expansion development. This will most likely remain a lesser priority strategy for SBIT to target.

- **WIFI and electric vehicle parking stations made it to the top five responses** (Q 19, 20, and 22), showing participating community members value technology as a transportation and mobility strategy. Currently, it is still uncertain if electric vehicle charging stations are a feasible feature for the lowlands and uplands for community members and the public to have access to.
- **The community is in favor of increased walking, rolling, and biking infrastructure for the upland expansion planning and development.** The survey results (question 19 to 22) illustrate that the community would like to see more safety infrastructure in place, active transportation paths and facilities, and trails.
- **A comparison to the Colville Confederated Tribes' survey results** (Campobasso & Winchell, 2021)**:**
    - Comparatively, both tribes are on the same page with both having the cost of maintenance and repairs as the same transportation problem. However, the Colville's Confederated Tribes (CCT) departs from SBIT in that the second biggest problem for them is the cost of gas (Campobasso & Winchell, 2021),. Whereas distance is the second largest problem for SBIT. This is interesting because the cost of gas has risen considerably due to inflation and other factors since when the CCT survey was conducted.
    - Both tribes agree on the two types of transit systems that would meet their needs. Yet, SBIT community respondents liked the shared transit system that

could be called on-demand more so than the standard fixed-route system that the CCT liked more (Campobasso & Winchell, 2021).

- The CCT survey results revealed a higher percentage of their community do not have a driver's license (38 out of 157 yes) compared to the SBIT community (Campobasso & Winchell, 2021). But the surveys had two different response rates (the CCT's was higher), so accuracy of this is affected somewhat. The report emphasizes that Colville community members without drivers' licenses pose a safety concern because they most likely got it revoked due to driving while intoxicated or other driver infractions (Campobasso & Winchell, 2021).
- The question "Do you often ride with someone else?" in the CCT survey is similar to question 13 (During the past 3 months, how much do you rely on others for transportation?) posed to SBIT community members who participated (Campobasso & Winchell, 2021). Both show a high percentage of participants riding with others for transportation or relying on others out of necessity to a specific destination. As mentioned, half of the SBIT respondents selected 'yes' that in the past three months, they've relied on others and responses for this question in the CCT survey shows a sizable group of 66 respondents riding with others on a weekly basis, but the frequencies are unclear (Campobasso & Winchell, 2021).
- Very similar results appear with the same question on transit ('Would you use transit if it were available?') posed in both surveys. Most of the respondents for

both surveys said yes and most of the respondents of both surveys selected 'maybe' rather than outright selecting 'no'.

- **A transportation data gap is apparen**t after the existing conditions section was completed for the needs assessment. Unfortunately, this is a common challenge for tribal transportation practitioners and for rural and small-town contexts (Grisham, 2021). The data not identified nor available includes traffic studies (volume and speed data), models that establish the future use of the community's transportation system i.e., roads, Route 105 conditions, and Pacific County transit user data. To add, many transportation practitioners have voiced their needs for training on how to collect data themselves and having a centralized data management system. The limitations section above notes that the comprehensiveness of this needs assessment is not to the degree of other reports due to time constraints and data not available or created yet. Nevertheless, the data provide useful information to bolster a federal transportation grant specifically the benefits and costs analysis (BCA) component. For instance, for the RAISE grant, data and transportation models can account for the possible increased traffic in the reservation due to business (new ones) and more members being able to live there.
- **Survey data reaffirms takeaways from community engagement** that the following are reflective of the community: desire for multipurpose trails and an on-site medical facility with more services; dependence on regional travel and ridesharing/carpooling with

neighbors or community members; and wanting emergency alternative routes in the event of an earthquake and tsunami.

- **Safety is most likely associated with concern about hazards and climate change.** Safety as a transportation option was the top answer choice for question 19, 20 and 22). Alternative routes ranked high as a transportation option choice in question 21. In addition, the engagement for the Hazards Mitigation plan included a survey that highlighted community members who took the survey are worried most about roads being damaged in the event of tsunami or earthquake (Figure 22). Because of this, the needs assessment sees that roads and mobility concerns need to be addressed around safety and enhance resilience. Safety and resilience is a primary need and challenge.

**Figure 22**

*Survey Question 4: In the event of a major disaster, such as a tsunami or earthquake, what community assets are you most concerned about getting destroyed or damaged?*

Figure 12: Survey Question 4 Responses


*SBIT Hazard Mitigation Plan Survey Question 4 Responses. Source: Photo by Coil et al, p.26, 2020.*

- **Correlations and contrast between questions in the survey**
    - Transit is one conflict because although there is some interest in transit among participating community members (59.57% said yes, they would use transit if it were available for question 17), it is not among the top five responses to questions 19 to 22 that focus on transportation options and needs throughout the development of the upland expansion.
    - A correlation process was conducted examining the responses to questions 11, 13 and 14 (that highlight the segment of participating community members who sometimes or at many times do not have the full ability to travel) to questions one and two. Using a cross-tabulation table to correlate the data summary table in Excel showed a few relationships between responses, in two categories (see appendix for full table). The first category consists of questions one and two from the beginning of the survey on accessibility and ability to travel and the second category consisted of questions 11 and 13 to gauge disruption to travel. If a respondent answered no for both questions in the first category and was above a certain threshold in the second category for both questions they were flagged as red to highlight a significant hardship in transportation accessibility and ability to travel. Then, if a respondent answered 'no' to a question in the first category and was above a certain threshold in the second category for both or one question they were flagged as orange to highlight some significance. The threshold for question 11 in the second category is 25% and above and the threshold for

question 13 in the second category is 'about half of the time' and below that. Henceforth, the first relationship is that a 'no' answer to the first category's questions usually means that they will select a 25% or higher percentage in the second category's question on 'how much do you rely on others for transportation?'. The red group did not contradict themselves with question 14 by selecting 'did not have trouble getting to any destination' as several other respondents did. This supports the relationship between the categories that if accessibility is inadequate their travel will be negatively impacted. For the red and orange group, the top destinations they couldn't reach in the past three months were medical appointments, school, work, and out-of-state travel. As for age groups, the red and orange groups were made up of different age groups, there was no dominant age group overall. The red group had more respondents in the vulnerable age groups (youth and elderly) whereas the orange group was mostly respondents belonging to the 18-29 and 30-61 age groups.

**5.2 Recommendations**

<u>Short-term recommendations (next six months)</u>

1. The Shoalwater Bay Indian Tribe may want to consider constructing a resilient trail system that would advance the SBIT's Resilience Plan. The proposal can incorporate the key findings and design considerations from the FHWA's Trails as Resilience report; the fall studio products (particularly ideas for edible trails); and take inspiration from Nehemiah Studio's trail system concepts. For the application the Tribe can seek

consultation with those with expertise on resilient trails. This can be developed in conjunction with the phased upland expansion planning and development. Also, this will address the responses from the survey and engagement that show participating community members want and need non-motorized mobility via trails and paths, increased security, and resilience. And it may increase selection criteria scores in the RAISE grant.

a. Action item: Pursue funding under Promoting Resilient Operations for Transformative, Efficient, and Cost-saving Transportation (PROTECT) Program by starting on a proposal informed by the key findings of this project (members are interested in trails) and existing conditions to meet the August 18th deadline.
b. Action Item: Create a material matrix (similar to the example in the appendix) to assist in the decision-making for which trail path material to choose.

<u>Medium-term recommendations (next year to two years)</u>

2. Coordinate with organizations and state and federal agencies to generate relevant transportation data and receive other technical assistance to support future grant applications and the comprehensive transportation plan.
3. The Shoalwater Bay Indian Tribe should consider exploring operating their first ever transit van (that they could potentially purchase using funds). The transit van could be on demand or have scheduled routes/destinations. This will align with their current capacity and the needs of the community as seen in this assessment. A full-time or part-time driver position may need to be created. This could boost the sustainability

element of the RAISE grant with vehicle miles traveled reduced. Lastly, the transit van should transport vulnerable groups during an evacuation event and be used in the future as a shuttle between uplands and lowlands.

   a. Possibly pursuing one of the FHWA rural and Tribal transit grants. Link below.
   b. In the meantime, boost Pacific County's transit program with more coordination and outreach to ensure community members' needs are met (i.e., weekend availability).

4. Consider pursuing a grant focused on providing WIFI for community members to increase access to services (i.e., telehealth and education) virtually and resources. As well as consider installing electric vehicle charging stations with support from the FHWA's Charging and Fueling Infrastructure Discretionary Grant Program, this could boost the sustainability element of the RAISE grant.
5. Consider coordinating and negotiating with appropriate state and local agencies and property owners for road easements or similar processes that acquire permissions to access logging roads that connect to Route 105 or Route 101 across forested uplands during a hazardous event.

<u>Long-term recommendations (next three to five years)</u>

6. Ensure that maintenance and upgrading of transportation facilities and assets are informed by impacts of climate change by incorporating a variety of resilience metrics into the capital improvements prioritization process.

a. SBIT can conduct a transportation vulnerable assessment utilizing the U.S. Department of Transportation's Vulnerability Assessment Scoring Tool (VAST) tool or following the Research Board's decision process discussed in the literature review section. The U.S. Climate Resilience Toolkit website (2021) provides a couple of case studies of communities using the VAST tool. To support this effort, the tribe can identify federal grant funding and technical assistance from FHWA and Northwest Tribal Technical Assistance Program at the University of Washington.

7. Willapa Bay Enterprises may want to contemplate how to capitalize on economic development initiatives that produce more jobs for community members within or near the community to alleviate regional travel and reduce vehicle miles traveled while also increasing regional attraction.

    a. The Coastal Adaptations studio explored how this could be done by constructing a food processing hub in the Tribal Center to enhance the community's food system and food sovereignty initiatives (Fall 2022 Mickinley Futures Studio, 2023, p. 58).

    b. In addition, the Tribe can acquire more land to construct a Spa or Wellness resort that creates more jobs and regional attraction. This Spa-Wellness resort can be built somewhere more appropriately in the uplands where it does not interfere too much with the new community.

c. One of the main resilient economic development strategies is “Ensure that more enterprises and business sectors are more mobile and reduce dependence on the region for employment and goods and services” (Granados, p. 102). This strategy was created in response to rising seas and erosion that may put many of these enterprises’ physical structures at risk. Also, since several businesses have high start-up costs. To add, these mobile enterprises could include construction, general administration and professional services that are already established by some Tribes in North America (Granados, p. 102).

# Chapter 6: Conclusion

## 6.1 Conclusions

Transportation can be challenging due the distance required for regional travel and ability to travel may be inadequate for a segment of the participating SBIT community members. The sparseness of the road network is a major vulnerability for everyone living in the reservation and Tokeland in the case of an earthquake and tsunami, or even just severe winter storms, due to landslides, flooding, and fallen trees. As such, safety and resilience are critical and prompts the need for transportation accessibility. More broadly, the Tribe will have to grapple with how to strike a balance between regional travel, regional attraction, and self-reliance.

High priorities from this assessment are: active transportation infrastructure, including paths and trails; and transportation and mobility infrastructure that enhances safety and resilience, especially alternative emergency routes; and a tribal operated on-demand transit van, appears to be a lower priority but needs further exploration, especially in the case of increased development in the uplands. Electric vehicle charging stations may become a higher priority with rising gas prices; EV feasibility and level of need would need to be investigated further. Like many rural and rural tribal communities in the US, the digital divide is ever-present (Bauer et al., 2022). Tribal members not only want expanded WIFI and/or internet access but need it especially for those interested in telehealth, remote work and online education.

An overhaul of holistic planning, design, and outreach to all community members can help catapult the upland development efforts. Getting back to basics (as one community member put it during a meeting "Well, we know that having no plan hasn't worked") and being creative with solutions has been a realization for the Tribe. There is no doubt the Shoalwater Bay Indian Tribe has a spectacular vision and their actions demonstrate that the upland development as a plan.

This work adds to the body of tribal transportation research because it showcases transportation and mobility needs and challenges in the context of tribal-led managed retreat. Furthermore, the challenges the SBIT faces mirror the transportation and mobility-related challenges for rural tribal communities such as the food and transit deserts, the digital divide, isolation and auto dependence, safety concerns more broadly, systemic inequities and the undermining of tribal sovereignty. And lastly, from this research the SBIT is considered another tribe that is continuing to shift transportation planning from totally being auto-centric towards implementing more active transportation infrastructure.

**6.2 Future research and next steps**

To continue this story, further research alongside the SBIT community can be conducted to understand some of the ambiguous findings more. As noted, certain findings were unclear or seemed counterintuitive. In particular, transit was not one of the top five transportation options in the last four questions. Then for the cross tabulations for some of the questions several respondents contradicted themselves when they selected 'not having a vehicle' for question three and then chose 'over half of time' to question 11 (Are you able to get to the places you

need to go?) instead of ‘about half of the time’ or less. Future research could be more in-depth qualitative interviews and focus groups with SBIT community members and staff on their transportation needs and priorities. Lastly, the interviews or focus groups with community members could gauge level of interest and concerns with autonomous electric vehicles or driverless vehicles. One concern that may arise is costs and infrastructure needed for semi-autonomous vehicles, with one vehicle costing upwards to $80,000 to $100,000 (Mills, 2018).

The Earthlab team and I want to continue this partnership and reciprocity with the Shoalwater Bay Indian Tribe. This may come in the form of future studios in the College of Built Environments and technical assistance with adaptation projects and planning. Another option is to work with SBIT staff and the Earthlab team to create a proposal for the PROTECT grant focused on a resilience trails system for the SBIT community to present to the Council and gain approval. The PROTECT proposal can be supported by responses from the transportation needs survey and the engagement findings which highlight that participating community members would like trails and address their participants' need for increased security, and resilience. In addition, there is an opportunity to connect the SBIT to the UW Northwest Tribal Technical Assistance Program Center to access training and technical assistance. Finally, there is a prospect to present this thesis and network at The National Transportation in Indian Country Conference in September 2023 due to an invitation from two FHWA professionals.

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**Appendix A. All survey data spreadsheets**

Link to Drive Folder containing all anonymized spreadsheets of all and filtered survey data.

https://drive.google.com/drive/folders/1EXWMtNyT7BnBIbj_d89DQW1prsxbGKSX?usp=drive_link

## Appendix B. Cross Tabulation spreadsheet

Link to Google Drive folder with spreadsheet.
https://drive.google.com/drive/folders/1EXWMtNyT7BnBIbj_d89DQW1prsxbGKSX?usp=drive_link

| Respondent ID | What is your age? | Are you cu | Do you ow | Are you able to get to the pla | During the past 3 months, how much do you rely o | During the past 3 months, were you unable to travel to any of the following destinations? Please check all that apply | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Response | Response | Response | Response | Response | Shopping/Grocery | Medical/Dental Appoi | School | Work | Out of state work or travel | I have no difficulty travel to Other (please specify) |
| 1.14239E+11 | 62 or older | Yes | Yes | All of the time | For none of my trips | | | | | | I have no difficulty traveling to any destinations |
| 1.14289E+11 | 18-29 | Yes | Yes | Over half of the time | For about 50% of my trips | | | | | | I have no difficulty traveling to any destinations |
| 1.14289E+11 | 18-29 | No | Yes | Over half of the time | For about 75% of my trips | | | | | | I have no difficulty traveling to any destinations |
| 1.14289E+11 | 18-29 | Yes | Yes | Over half of the time | For about 25% of my trips | | | | | Out of state work or travel | |
| 1.14289E+11 | 18-29 | Yes | Yes | About half of the time | For about 25% of my trips | Shopping/Grocery | Medical/Dental Appoi | School | | | I have no difficulty traveling to any destinations |
| 1.14289E+11 | 30-61 | Yes | Yes | Over half of the time | For about 25% of my trips | | | | | Out of state work or travel | |
| 1.14289E+11 | 30-61 | Yes | Yes | All of the time | For about 25% of my trips | | | | | | I have no difficulty traveling to any destinations |
| 1.14289E+11 | 30-61 | Yes | No | About half of the time | For about 25% of my trips | | | | | | I have no difficulty traveling to any destinations |
| 1.14289E+11 | 30-61 | Yes | Yes | Over half of the time | For about 75% of my trips | Shopping/Grocery | Store/Bank | School | Work | Out of state work or travel | I have no difficulty traveling to any destinations |
| 1.14289E+11 | 18-29 | Yes | Yes | Over half of the time | For about 50% of my trips | | | | | Out of state work or travel | |
| 1.14289E+11 | 30-61 | Yes | Yes | | | | | | | Out of state work or travel | |
| 1.14289E+11 | 18-29 | Yes | No | Over half of the time | For about 25% of my trips | | | | | | convenience |
| 1.14289E+11 | 30-61 | Yes | Yes | Over half of the time | For about 50% of my trips | | | | | | I have no difficulty traveling to any destinations |
| 1.14289E+11 | 18-29 | Yes | Yes | Over half of the time | For about 50% of my trips | | | | | | I have no difficulty traveling to any destinations |
| 1.14289E+11 | 30-61 | Yes | Yes | All of the time | For none of my trips | | | | | | I have no difficulty traveling to any destinations |
| 1.14289E+11 | 30-61 | Yes | Yes | All of the time | For none of my trips | | | | | | I have no difficulty traveling to any destinations |
| 1.14289E+11 | 30-61 | Yes | Yes | All of the time | For none of my trips | | | | | | I have no difficulty traveling to any destinations |
| 1.14289E+11 | 18-29 | Yes | Yes | Over half of the time | For about 50% of my trips | | | | | | I have no difficulty traveling to any destinations |
| 1.14289E+11 | 30-61 | Yes | No | All of the time | For all my trips | | | School | Work | Out of state work or travel | |
| 1.14289E+11 | Under 18 | No | No | About half of the time | For about 75% of my trips | | | School | Work | Out of state work or travel | |
| 1.14289E+11 | 18-29 | Yes | Yes | About half of the time | For about 50% of my trips | | | School | | | |
| 1.14289E+11 | 18-29 | Yes | No | Over half of the time | For about 50% of my trips | | | | | | |
| 1.14289E+11 | 18-29 | Yes | Yes | About half of the time | For about 25% of my trips | Shopping/Grocery | Medical/Dental Appoi | School | Work | | |
| 1.14289E+11 | 30-61 | Yes | Yes | About half of the time | For about 25% of my trips | | | | | | Medical/Dental Appointments |
| 1.14289E+11 | 30-61 | Yes | Yes | About half of the time | For about 25% of my trips | | | | | | Medical/Dental Appointments |
| 1.14289E+11 | 30-61 | Yes | Yes | Over half of the time | For about 25% of my trips | | | | | | Medical/Dental Appointments |
| 1.14289E+11 | 62 or older | Yes | No | About half of the time | For about 75% of my trips | | | | | | Medical/Dental Appointments |
| 1.14289E+11 | 62 or older | No | No | About half of the time | For about 25% of my trips | Shopping/Grocery | Medical/Dental Appoi | | Work | Out of state work or travel | |
| 1.14289E+11 | 18-29 | Yes | No | Less than half of the time | For all my trips | | | | Work | Out of state work or travel | |
| 1.14289E+11 | 30-61 | Yes | No | Less than half of the time | For about 25% of my trips | | Medical/Dental Appoi | ntments | Work | Out of state work or travel | |
| 1.14289E+11 | 30-61 | No | No | Over half of the time | For about 25% of my trips | | Medical/Dental Appoi | ntments | Work | Out of state work or travel | |
| 1.14289E+11 | 30-61 | Yes | Yes | | For about 25% of my trips | | | | Work | | |
| 1.14289E+11 | 18-29 | Yes | Yes | All of the time | For about 50% of my trips | | | | Work | Out of state work or travel | |
| 1.14289E+11 | 30-61 | Yes | Yes | All of the time | For about 75% of my trips | | | | | | I have no difficulty traveling to any destinations |
| 1.14289E+11 | 30-61 | Yes | Yes | Less than half of the time | For about 75% of my trips | | | | | Out of state work or travel | |
| 1.14289E+11 | 30-61 | Yes | Yes | All of the time | For about 25% of my trips | | | | | | I have no difficulty traveling to any destinations |
| 1.14289E+11 | 30-61 | Yes | Yes | All of the time | For about 25% of my trips | | | | | | I have no difficulty traveling to any destinations |
| 1.14289E+11 | 30-61 | Yes | Yes | All of the time | For about 25% of my trips | | | | | | I have no difficulty traveling to any destinations |
| 1.14289E+11 | 30-61 | Yes | Yes | All of the time | For about 25% of my trips | | | | | | I have no difficulty traveling to any destinations |
| 1.14289E+11 | 30-61 | Yes | Yes | About half of the time | For about 50% of my trips | | | | | | I have no difficulty traveling to any destinations |
| 1.14289E+11 | 30-61 | No | Yes | About half of the time | For about 25% of my trips | | | | | | I have no difficulty traveling to any destinations |
| 1.14289E+11 | 30-61 | Yes | Yes | Less than half of the time | For about 25% of my trips | | Medical/Dental Appointments | | | | I have no difficulty traveling to any destinations |
| 1.14289E+11 | 18-29 | Yes | Yes | Less than half of the time | For about 25% of my trips | | | | | | I have no difficulty traveling to any destinations |
| 1.14289E+11 | 30-61 | Yes | Yes | Over half of the time | For about 25% of my trips | | | | | | I have no difficulty traveling to any destinations |

*no is marked

*about half and under that are 'None, 50% and 75% are marked

*yellow means some sort of conflict

## Appendix C. IRB exemption letter

UNIVERSITY of WASHINGTON
HUMAN SUBJECTS DIVISION

**NOT RESEARCH**

April 13, 2023

Dear Solana Granados:

On 4/13/2023, the University of Washington Human Subjects Division (HSD) reviewed the following application:

| | |
|---|---|
| Type of Review: | Initial Study |
| Title of Study: | Resilient Transportation & Mobility for the Shoalwater Bay Tribe |
| Investigator: | Solana Granados |
| IRB ID: | STUDY00017484 |
| Funding: | Name: *Gift through the UW, Grant Office ID: NA, Funding Source ID: NA<br>Funding Title(s): "Earthlab Innovation Grant" |
| IND, IDE, or HDE: | None |

**HSD determined that the proposed activity is not research**, as defined by federal and state regulations. Therefore, review and approval by the University of Washington IRB is not required.

This determination applies only to the activities described in this application. **Depending on the nature of your study, you may need to obtain other approvals or permissions to conduct your activity. For example, you might need to apply for access to data or specimens (e.g., to obtain UW student data). Or, you might need to obtain permission from facilities managers to conduct activities in the facilities (e.g., Seattle School District; the Harborview Emergency Department).**

If you need to make changes in the future that may affect this determination or are not sure, contact us or submit a new request for a determination. You can create a modification by clicking Create Modification within the study.

We wish you great success!

Sincerely,

Dana Gold, MA
IRB Administrator, Committee D
Email: deg4@uw.edu
Phone: 206.543.5602

4333 Brooklyn Ave. NE, Box 359470 Seattle, WA 98195-9470
main 206.543.0098 fax 206.543.9218 hsdinfo@u.washington.edu www.washington.edu/research/hsd

**Appendix D. Survey Flyer**

# Opportunity to provide feedback on Upland Expansion!

You are invited to participate in a survey regarding your transportation needs and housing preferences when thinking about the Upland Expansion.

In partnership with University of Washington graduate students.

**Scan this code or follow the link below to access survey & enter to win a ($50) giftcard!**

**Giftcard Giveaway will be open from**

April 3- April 24

https://www.surveymonkey.com/r/XTCJ6MZ

**Appendix E. Excerpt from the Studio Booklet**

Link to my excerpt (pages 100 to 103)
https://drive.google.com/file/d/1iM0FJiyqCn76euPDYsrqjdYWetZTD5I3/view?usp=drive_link