Incorporating Youth Perspectives into Disaster Planning: Piloting Drone-Based Photovoice to Map Community Assets

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Abstract

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Place attachment, the emotional bond to one's environment, may help mediate long-term psychosocial outcomes among youth experiencing environmental disruptions. Community assets can contribute to or inhibit place attachment; understanding the community assets important to youth may help inform planning priorities around these assets, especially in a disaster planning context. This study pilots a novel drone-based photovoice methodology (DBP) to explore youth perceptions of the community assets that build their connections to place in a hazard-exposed coastal community. After documenting 22 community assets and discussing a smaller subset in a focus group setting, thematic analysis of the focus group transcript revealed that youth participants valued community assets for their economic, cultural, and social cohesion functions. Furthermore, they assigned importance to assets that contributed to their self-development and sense of autonomy. Findings also suggest that DBP was effective at revealing spatial relationships, capturing the full scale of assets, providing additional details about the site, and providing a reference for change over time, which suggests that a similar methodology may be useful in future community asset mapping projects. This study recommends that local planners leverage youth perspectives to identify new important assets, explore additional dimensions of those already deemed important, align youth perspectives with hazard planning to produce co-benefits, and use DBP outputs for whole-community engagement. Participation in the DBP process also may build community capacity that planners could utilize for future disaster preparedness activities.

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Background

Study Overview, Aims, and Significance

This study pilots a novel drone-based photovoice (DBP) method in the service of supporting inclusive and participatory disaster planning that incorporates youth perspectives on important community assets. Specifically, we focus on the places, spaces, and structures that help youth develop place attachment. DBP innovates on traditional photovoice by providing additional spatial context and perspectives through drone footage and imagery to assist youth in identifying and describing assets. By testing this adapted method in a community with high exposure to coastal hazards, the study has three major aims:

> **Aim 1:** Evaluate the potential of aerial drone video and imagery as photovoice inputs in the context of identifying community assets.
>
> **Aim 2:** Identify community assets that contribute to building place attachment among youth.
>
> **Aim 3:** Propose strategies to leverage DBP to incorporate youth perspectives on community assets into local disaster planning.

Focusing on methodological innovation in Aim 1 allows us to investigate the effectiveness of the data collection instrument while contributing to the broader literature and generating valuable information and resources for the community involved in testing the method. Through operationalizing a growing field of technological innovation for social science research, the research addresses both a relevant scientific opportunity in Aim 2 (community assets that help youth build place attachment) and a social gap in Aim 3 (the exclusion of youth from planning processes). In pursuing these aims, this research both expands our understanding of community assets important to youth and develops a drone-assisted community asset mapping process that should be replicable in other contexts to support the integration of under-represented voices in disaster planning.

Place Attachment and Psychosocial Health in Disaster Contexts

How does one feel “at home” when “home” no longer exists? Disasters have the potential to dramatically alter the experience of place in the areas they affected, reshaping once-familiar environments into new and potentially traumatic landscapes. Prior studies have demonstrated that place-based disruptions in the wake of disasters can contribute to the development of or exacerbate existing negative psychosocial health outcomes at both the individual and community level, such as PTSD and stress-related illnesses, though the mechanisms for this remain unclear (1–6). The severing of placed-based bonds, a process that Cox and Perry 2011 refer to as “disorientation” and Scannell et al 2016 comment on as “disaster-disrupted place attachment,” can lead to negative emotions, strong feelings of grief, and diminished relationships and practices that could help prevent more severe consequences (4,5,7–9). Place attachments, the emotional bonds that people form with places important to them, are thus fundamental

components of the human experience of disasters (4,10). There is also significant evidence that place attachment can improve aspects of pre-disaster resilience and facilitate post-disaster recovery. Place attachment has been linked to hazard awareness, self-efficacy in disaster preparedness, taking action to mitigate the impacts of disruptions on important places, and participation in community planning activities, all of which may reduce disaster impacts (5,10–14). It is important to note, however, that this is a complex relationship; place attachment may also undermine resilience by creating community resistance to evacuation and by potentially contributing to a false sense of security (5). Post-disaster, place attachment can facilitate recovery efforts by promoting positive coping strategies, providing a mechanism to leverage social support and other forms of social capital, enhancing the personal meaning of observed community recovery through symbolic connections between person and place, promoting a sense of continuity, and directing rebuilding efforts (3–5,7,8,15). As communities and individuals rebuild and recover, they re-establish bonds with place, making sense of the changes and losses in their community through a process that Cox and Perry 2011 refer to as "reorientation". Reorientation serves as an important component of long-term psychosocial recovery, and facilitating this process may help address underlying psychosocial needs (4).

Place attachment thus plays an important mediating role in psychosocial health outcomes across multiple stages of the disaster cycle. Yet vulnerability to the health impacts of disasters is not universal. Children and youth are especially vulnerable to the psychosocial health impacts of disasters, in part due to their relative lack of social, educational, emotional, psychological, and physical development (16–18). Furthermore, there are a plurality of place attachment styles and processes; children and youth develop place bonds for different reasons and rely on place attachment for reasons that may differ from adults (5,7,19,20).

Scannell et al. 2016 provide a particularly useful synthesis of place-attachment experiences for children and youth across the disaster cycle. Before disasters, places that support the development and growth of children and youth may provide a protective effect against negative health outcomes, and place attachment may improve hazard perception and encourage young people to engage in disaster preparedness (5). In children and youth, disaster-disrupted place attachment has been shown to negatively impact educational achievement; contribute to numerous biological, psychological, and social health conditions (such as asthma, stress-related illness, PTSD, grief, and disorientation), and influence the adoption of more risky behaviors and fewer protective behaviors. Yet, place attachment can assist in post-disaster recovery and resilience to future disasters, as restoring or creating new important places may help children and youth fulfill needs related development (5). These place-related needs include, but are not limited to, developing social support networks; understanding one's place in a socio-cultural context; forming social cohesion and a sense of belonging; building self-esteem; exploring autonomy and independence; taking ownership over self-growth; and restoring a sense of shelter, safety or security (9,19,21,22). As such, it is reasonable to infer both that disruptions to place may have pronounced impacts on the growth, development, and long-term psychosocial health and wellbeing of children and youth; and that place attachments may be leveraged to improve their pre-disaster resilience and post-disaster recovery.

Despite this heightened psychosocial vulnerability and unique needs related to place attachment in disaster contexts, relatively few studies have focused explicitly on children and youth, and even fewer on the specific places that adolescents attach to (5,9,19,21,23). Understanding why certain community assets contribute to place attachment among children and youth may help mobilize these assets across the phases of the disaster cycle to improve psychosocial health outcomes.

Community Assets and Resilience

Community assets, in the context of this study, are the *physical* places, spaces, and structures that provide or serve as locations for the realization of a community's capacities. This language is intentionally used for two purposes: first, to align with the language used in hazard mitigation and other disaster planning, and second, to invoke asset-based approaches to community engagement such as Kretzmann and McKnight's Asset-Based Community Development (ABCD) framework (24–26). The ABCD approach prioritizes community development by focusing on existing strengths and resources rather than adopting a needs or deficit-based model; in doing so, it seeks to implement a more community-engaged and context-sensitive foundation for future planning (26). Several studies have applied asset-based approaches in disaster planning contexts to show that soliciting community knowledge and expertise can improve community preparedness, harden community assets ahead of disasters, and help identify recovery priorities post-disaster (24,27). Other frameworks expand on asset-based approaches by identifying and classifying different "capitals" within a community, such as Flora and Flora's Community Capitals Framework (CCF). The CCF lists seven kinds of capital—built, cultural, financial, human, natural, political, and social--that contribute to community resilience (28). These various capitals and assets can be mobilized by the community as part of their ability to adapt to catastrophic events (24,29–31).

With this framing, community assets can provide or facilitate access to community capital. In the context of place attachment, these capitals may be part of the "importance" that leads to person-place bonds (32). In addition to the functional roles they serve, community assets may have important symbolic significance beyond that may be overlooked in planning processes. Taken together, these assets make up what Hester calls a community's "Sacred Structure" (33). While studying a coastal, rural community, Hester found that everyday use and symbolic identification with key community values imparted additional importance on the places that made up the Sacred Structure such that "the places become synonymous with residents' concepts and use of their town. The loss of such places would reorder or destroy something or some social process familiar to the community's collective being" (33). Hester's research thus points to the link between community assets, place attachment, and community-level psychosocial health outcomes. Place attachment also plays a role in community-engaged planning contexts, as Manzo and Perkins note that "plans that incorporate or enhance elements central to the meaning of the place are better-received" (34). This implies that understanding the place attachments of community members is a critical part of community-engaged planning.

Asset-based approaches center community engagement and responsiveness to community needs. However, youth have historically been underrepresented in disaster planning despite their unique place-based needs and vulnerabilities (5,16,23). Although a growing body of literature points to a willingness among youth to express their perspectives to decisionmakers working on policies and programs that affect them, many youth remain disenfranchised (35–37). Youth contend with numerous factors that restrict their involvement in participatory disaster planning, including structural barriers (e.g., difficulties accessing or exclusion from community meetings), a need for targeted engagement, a lack of power for youth to voice their concerns, and widespread inexperience in working with youth among disaster professionals (16,23,38,39).

Youth engagement may also promote whole-community disaster planning, as youth may serve as touchpoints that facilitate access to marginalized or hard-to-reach groups they may belong to (40). Such groups include non-English speaking communities, transient groups, migrant workers, and BIPOC individuals, all of whom may face additional structural barriers to engaging in disaster planning processes (40). Accordingly, identifying inclusive pathways that integrate youth perspectives into ongoing disaster planning processes may have the co-benefit of promoting broader community engagement.

Youth Engagement Through Photovoice

While researchers may be able to help identify youth-supportive community assets, it is imperative that this knowledge is effectively transmitted to disaster professionals (19). Given its documented effectiveness in elevating youth perspectives, photovoice—a participatory research methodology that enables community members to share both imagery and accompanying narratives– presents one pathway to address this need (41).

In recent decades, researchers and practitioners have demonstrated the potential of photovoice to engage youth, incorporate their perspectives, and bridge existing structural barriers to communicate with policymakers. Developed in the late 1990s by Wang and Burris, photovoice draws out the knowledge and experiences of community members by having them create and discuss photographs in guided settings with the aim of enacting some community change (42–44). Wang identifies photovoice as a tool that can be used to mobilize youth, as it allows them to record and communicate their unique strengths, concerns, and experiences; to promote critical dialogue through facilitated discussions of the imagery they generate; and to use an accepted research method to reach decisionmakers (45). Previous disaster-related studies have used photovoice in disaster contexts, including to identify pathways for disaster risk reduction, promote disaster recovery, explore community perceptions of the built environment, and identify youth perspectives on the COVID-19 pandemic (46–50). A recent study by Pickering et al. engaged youth for disaster risk reduction, employing a variety of arts and technology approaches to solicit youth perspectives (including photovoice), and called for more research that shared disaster preparedness and community resilience knowledge through multifaceted strategies (50).

Bringing Drones into Community Asset Mapping

This study answers the call to implement multifaceted approaches by incorporating emerging drone technologies and visualization through geonarratives into the photovoice process to express youth perspectives. Geonarratives combine narrative materials (text, images, and other multimedia content) with geospatial data and visualization techniques (such as interactive maps or web apps) (51). They are thus well-suited for complex spatial studies that incorporate numerous data types and center community perspectives.

Drones imagery and footage can add important context to these narratives. Prior environmental monitoring studies have demonstrated that drones can bridge gaps between ground perspectives and higher-altitude (e.g. satellite imaging or higher-altitude aerial imagery) data (52–54). Furthermore, youth increasingly rely on virtual media rather than merely in-person experiences and physical media to build their spatial knowledge (55). Conducting initial protocol development with this study's community suggested that while they could describe important assets, many youth could not locate them on a map of the community– nor had they used a physical map of their community before. In a community asset mapping context, this suggests that using drone imagery may provoke insights that neither in-person ground observations nor examinations of existing maps would elicit.

Recent technological advances since the mid-2010's, such as increased affordability and decreased size for drones, have expanded the imaging options accessible to communities (56,57). This has spurred the use of drones in community research and practice, such as participatory mapping workshops to close data gaps (57). Emerging educational frameworks that blend social and technical skills ("sociotechnical thinking") also encourage the use of drones and other innovative technologies in education and youth engagement for social change (58).

DBP therefore presents a novel approach to bridging existing gaps and structural barriers to incorporating youth perspectives into disaster planning by providing new perspectives for asset mapping and encouraging youth engagement. Despite this, drones have not to date been widely adopted as part of photovoice methods. Indeed, a search of the literature has not revealed any studies that have used drone imagery and footage as photovoice inputs.

Case Context

We selected a study site and research cohort that had some drone literacy and prior involvement with the disaster research community in order to reduce logistical barriers (e.g. identifying and relevant community partners) to piloting a drone-centric research method. Westport, WA, provided this ideal local context; the proposed project was inspired by Westport's prior work with the University of Washington (UW) aimed at addressing its exposure to both tsunamis and other coastal hazards and prior UW engagement with students at the Ocosta School District (59–61). Figure 1 below shows compiled satellite imagery from the ESRI Firefly Hybrid baselayer to show the study area and the surrounding geography.

Figure 1: Satellite Imagery Map of Study Area and Local Context

Westport is a small, coastal, rural community with a high poverty rate. The Ocosta School District, which serves Westport and surrounding communities such as Cohasset Beach, Grayland, and Tokeland, has 42% minority enrollment and 62% of the students are economically disadvantaged (62). The district is distinguished, though, by having constructed (funded entirely through its own property taxes) North America's first purpose-built tsunami vertical evacuation structure as part of a rebuild of its elementary school in 2015-2016 (63). Nearly all (99%) of Westport is in the inundation zone of a large Cascadia tsunami, with limited evacuation routes and a short time to impact (64). **Appendix A** consists of the 2019 map of Westport's estimated evacuation times and limited high ground produced by the Washington State Geological Survey in collaboration with federal, state, and local partners (65). Notably, the Ocosta Junior-Senior High School and the Ocosta Elementary School sit on some of the only high ground in the area. When viewed alongside the local zoning map, attached as **Appendix B,** it is apparent that much of Westport's marine industry, residential areas, and commercial infrastructure lie within the inundation zone (66). Furthermore, Westport is likely to be significantly impacted by sea level rise. According to the City of Westport, key assets including the wastewater treatment plant, Westport Municipal Airport, the Marina District ("the Docks"), local low-lying roads, wells, several shorelines and parks, and some residential areas are most at risk from rising sea levels

(67). Figure 2 adapts one of the city's sea level rise graphics to show the Docks, the airport, the wastewater treatment plant, as well as the schools, for additional local context (67).

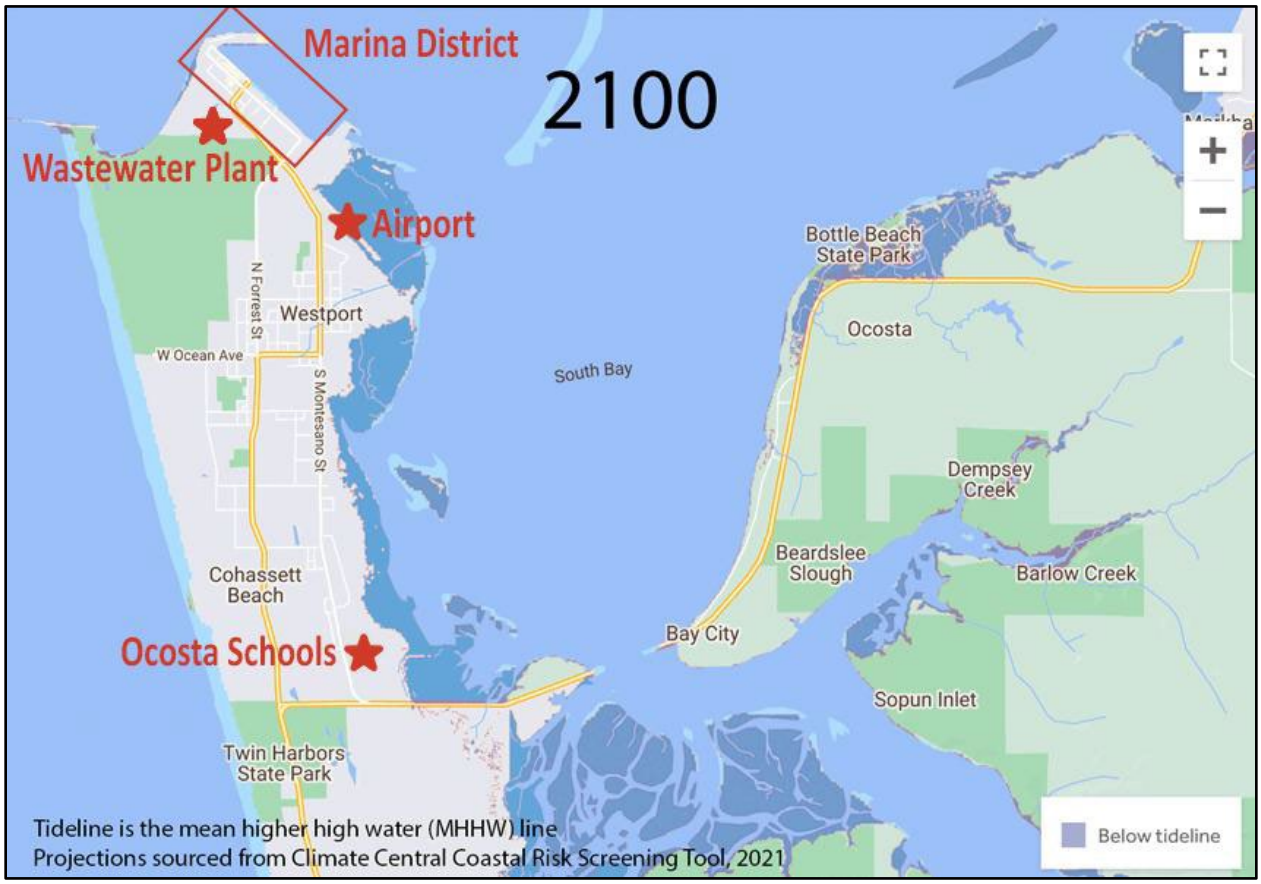


Figure 2: Projected Tidal Inundation and Selected Community Assets

Community leaders and emergency managers have made disaster planning a priority and shown a willingness to work with the most recent technology and modeling, such as by engaging with the UW researchers to develop a 3-dimensional digital model (a "digital twin") of Westport for hazard visualization (68). Notably, UW collaborated with the City of Westport to run a series of community asset mapping workshops with adults in the community in 2018 ahead of the 2021 Comprehensive Plan Update; findings from this exercise may provide important points of comparison (69). Over the last two years, UW faculty, students, and Washington Sea Grant staff have worked with the Ocosta Junior-Senior High School to create an extracurricular Science Technology Engineering Arts and Math (STEAM) club to apply drone flights and Minecraft-simulated modeling to environmental monitoring, enhancing emergency preparedness, and envisioning resilient futures (60,70,71). This project continues this history of youth engagement in the community, with outputs that feed into broader capacity building by serving as potential inputs for future exploration of community asset mapping and participatory disaster planning.

Methods

Design Overview and Conceptual Model

This project's research design expands on the prior engagement activities conducted with the Ocosta Junior-Senior High School STEAM club, which rebranded as a student news network during the study period (2023-2024) due to a shift in student interest and a lack of funding availability. DBP adapts Wang's validated SHOWeD photovoice approach, while including core elements of community-based participatory research (CBPR) and ABCD (24–26,44,46,72). Photovoice commonly involves several stages: conducting photovoice training among community participants, identifying core themes and research questions for data collection, collecting data in the form of imagery, and facilitating group discussions of the collected data (42,43). The SHOWeD approach, partially derived from Brazilian educator Paulo Freire's empowering education theory, helps frame stories told about the selected images during group discussions using structured questions with key words making up the acronym SHOWeD (42–45,73). This progression provided the general structure for our research activities, with the addition of using a youth co-created geonarrative to visualize results. Centering community strengths and substantively involving participants in the study design follows ABCD principles as well as precedent established by numerous prior studies focused on youth and whole-community engagement for disaster risk reduction or community health improvement (45–49).At the same time, the study design incorporates CBPR principles, which include building off community strengths, sharing power, facilitating co-learning, building capacities, developing systems, disseminating findings and knowledge to the whole community, and committing to sustainability in research practices (e.g., building new skills that participants can use in the future) (46,72).

Using DBP outputs as a pathway to incorporate youth perspectives into local knowledge promotes power sharing and dissemination, and builds on prior successes in engaging youth through photovoice, video imagery and geonarrative approaches to pursue community change (45,51,74,75). Specifically, DBP is used to both motivate youth participation and translate their perspectives on important community assets into a form that can be used by disaster professionals. This circumvents many of the barriers youth have previously faced to participating in formal disaster planning. Findings are intended to provide insights about how community assets and the place attachment bonds that youth have to them can be leveraged before, during, and after disasters to mitigate the negative psychosocial health outcomes of these place-base disruptions, as well as to identify gaps in planning for these community assets. **Figure 3** illustrates these connections in the form of a conceptual model.

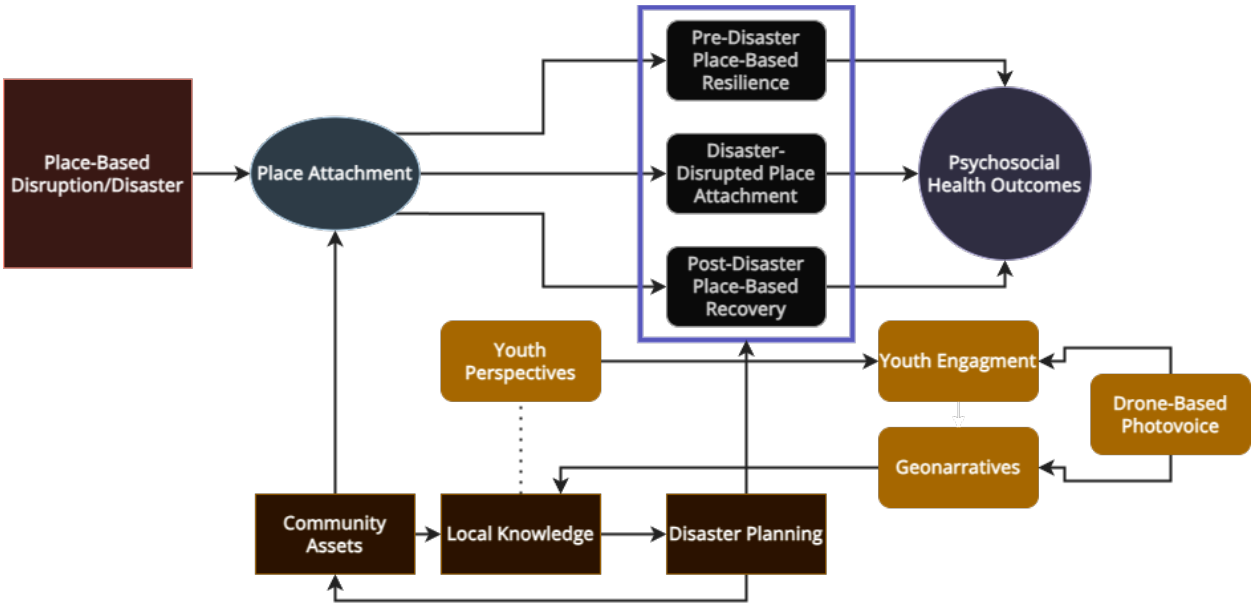


Figure 3: Conceptual Model of Study Process

This conceptual model illustrates how a place-based disruption, modified through the mechanism of place attachment before, during, and after the disruption, influences psychosocial health outcomes in a community. Community assets which might contribute to or improve place attachment can be incorporated into disaster planning through local knowledge. However, youth perspectives are typically excluded from this body of knowledge. Our DBP process serves to engage youth and translate their perspectives into a form usable by local disaster planners through project outputs (e.g. geonarratives).

Recruitment and Youth Cohort

Over the spring and summer of 2023, UW researchers working on several aligned engagement projects made multiple trips to Westport to build rapport with school personnel and students. Researchers also conducted exercises with summer school students (such as having students recreate a map of the community in a large field, race a drone flying at the speed of a tsunami wave and using a tsunami wave tank to observe impacts on assets) to help identify what language and information would be helpful to include in study materials. For instance, the summer school students demonstrated a lack of spatial literacy (as many had not seen a map of their community before, nor could they effectively interpret those shown), which led to the inclusion of several local maps in recruitment materials as well as the development of a mental mapping activity for site selection. These research projects operated under the umbrella of a youth engagement program registered with UW's Office of the Youth Protection Coordinator per university policy. At the start of the 2023-2024 school year, researchers advertised upcoming projects through posters, word-of-mouth, tabling in the cafeteria, participation in the Great Shake Out event, and direct recruitment through school personnel. The UW IRB granted this study (STUDY00019062) exempt status ahead of research activities. Researchers provided interested youth with packets

containing study information and informed consent language, which included forms to document youth assent and parental informed consent. An initial recruitment and intake meeting in November for those students who had completed their paperwork. The meeting provided additional information about the study aims and research process, and was attended by n=9 students, of whom n=8 completed initial research activities at the end of the meeting and became full participants of the youth cohort.

Site Selection

After being introduced to the study's aims and intended methods, the researcher led the students in a brainstorming activity about assets in their communities, why the community valued those assets, and places where those assets might be found. After brainstorming, students drew a map of the community from memory that showed their identified assets, an exercise intended to generate ideas about potential assets to document ahead of formal site selection. Site selection itself was done through a set of Likert-scale, multiple choice and short-answer survey questions adapted from Oregon State University's Coastal Community Assets Survey Instrument for potential comparability of results in the future (76). The brainstorming exercise and site selection survey are attached as **Appendix C**. Each participant identified three community assets in the survey: one viewed as personally important ("my place"), one viewed as important to other youth or the social groups they belonged to ("our place"), and one viewed as important to the community as a whole ("the public's place"). We counted the identified assets across categories and ordered them by total for priority sampling, while noting additional assets identified in the brainstorming activity as second-pass sampling options. Some community assets were nested under others of larger scale or clustered with others; for example, students identified both the marina district as a whole as well as several shops and museums within the district as important assets. These nested or clustered assets were counted together for the purpose of prioritization.

Data Collection

Data collection occurred over four 2-3 hour sessions between December 2023 and February 2024. In total, 22 assets were documented via imagery collection. The team documented several community assets each session, prioritizing them based on total counts and on student interest. Between 3 and 6 members of the cohort participated in each field visit, though all 8 students participated in at least one data collection session. Researcher MK, a FAA licensed drone operator, provided technical support and instruction as the students flew the drone over the community assets. For this project, the cohort used a DJI Air 2S drone, which has the ability to capture 4k video. Participants collected images from the ground, plan-view (top-down) and isometric images, a 360-degree flyover around the asset, a shot that moved up and out to show the asset and the context around it (referred to as a "dronie"), and free-choice video at each asset. Images captured this way were uploaded to DesignSafe under the project "Incorporating Youth Perspectives into Disaster Planning: Piloting Drone-Based Photovoice to Map Community Assets" and are intended to be published alongside the finalized thesis.

The 360-degree flyover and "dronie" were pre-programmed flight paths to give a degree of consistency in documentation across assets, and were the two shots required at each small-scale asset. For larger scale assets, such as a beach, trail, or business district, the students used the drones for a fly-over of the length of the asset and its surroundings. When specifically documenting private businesses, students spoke with business owners or operators to get their consent to document as a community trust-building measure. The data collection protocol, which was initially developed over the summer of 2023 and calibrated throughout November and December 2023 using participant feedback, is attached as **Appendix D**.

Focus Group Discussion

After finalizing data collection, participants discussed the documented assets in a focus group discussion. Researcher MK facilitated the discussion, which was recorded and later professionally transcribed. Informed assent was verbally obtained from each participant before recording and before participation. During the discussion itself, which lasted for approximately 90 minutes and consisted of as many participants from the cohort as were able to attend (n=5), participants first viewed a compiled video presentation of drone-flown video and imagery and images captured from the ground, organized by asset. Much of this footage was sped up in order to fit all the assets in under 20 minutes. After viewing the video together, participants selected the community assets they wished to discuss further. Researcher MK facilitated the focus group discussion using questions adapted from the SHOWeD methodology to fit the context of drone-based collection, community assets, and hazard exposure. This study follows the precedent of adapting the SHOWeD questions to better fit research aims and cultural contexts; **Table 1** presents the original SHOWeD questions and our adapted questions (23,77). In addition to questions about community assets, participants were also asked process questions to evaluate the use of DBP as a data collection instrument and engagement tool. The facilitation guide is included as **Appendix E**.

Table 1: SHOWeD Question Crosswalk

SHOWeD Questions	Adapted Questions
"What is **Shown** here?"	What do you see in this aerial imagery and footage?
"What is really **Happening** here?"	What can you tell us about this place beyond what you see in the images?
"How does this relate to **Our** lives?"	How do you use or interact with this place?
"**Why** does this concern, situation, or strength exist?"	Why is this place important to you, your social groups and/or your community?
"How can we become **Empowered** through our new understanding?"	How can we empower or educate your community through these images and footage?
"What can we **Do**?"	What hazards could impact this place, and how do you think those impacts could be lessened?

Thematic analysis

Researcher MK cleaned the transcript from the focus group and then thematically coded the transcript using a deductive codebook. The codebook relied heavily on adapting Scannell and Gifford's tripartite person-place-process model of place attachment (32). Scannell and Gifford's tripartite model is a conceptual framework that breaks place attachment into *person* ("who is attached? To what extent is the attachment based on individually and collectively held meanings?"), *place* ("what is the attachment to, and what is the nature of, this place?"), and *process* ("how are affect, cognition, and behavior manifested in the attachment?") elements (32). Here, the focus is primarily on the person and place dimensions, examining which specific community assets are deemed important by youth in a hazards-exposed community. The process element is somewhat integrated into the analysis of how youth discuss the assets and the functional roles that they play in their lives, but is otherwise beyond the scope of this study. In addition to the tripartite model, the codebook incorporates elements of prior studies aimed at using photovoice to assess perceptions of the built environment and disaster risk reduction, and follows Scannell et al. 2016 on synthesizing the literature on youth place attachment across disaster phases in order to address the study's three aims (5,32,46,47). The codebook is attached as **Appendix F**.

Using NVivo software, researcher MK applied codes, then read and re-read coded text to identify key themes, with discussed assets as the unit of analysis (since participants answered the same

sets of adapted SHOWeD questions for each). Researcher MK then synthesized these themes to produce code-level summaries as an analytic memo, which forms the basis of the results section.

Geonarrative Development

Finally, participants were engaged from April until May 2024 in the development of a geonarrative to present their findings to their community. In April, students shared the storylines they wanted to communicate to the community. Researcher MK took this information and used it to develop an outline of an ESRI StoryMap that incorporated a feature layer of documented assets, the drone-flown videos and images. Participants reviewed a draft in late May, and their feedback helped refine the outline. The StoryMap is intended to be a living document so the youth cohort can add additional important places beyond the lifespan of this project, but the geonarrative has a concrete short-term goal: to serve as a guiding framework for a presentation to local decisionmakers. Over the summer of 2024, students continued to refine the StoryMap and add content ahead of an intended presentation to Westport City Council in September 2024. The template designed for use in this presentation is publicly available as part of ESRI's archive of StoryMaps under the title "Mapping Westport's Important Places [Template for Students]" at the link https://arcg.is/0110HK. Due to their complex online architecture, we are not currently aware of any archival solutions that preserve both content and functionality of StoryMaps. As a compromise, we intend to package screen captures of the version of the StoryMap presented to city council, any geospatial data used in the StoryMap, and all visual media included in the StoryMap. We intend to upload this package of data as an addendum to this project's listing.

Results

Summary of Findings

Table 2 below summarizes key findings broken out by research aim.

Table 2: Key Findings Aligned with Research Aims

Aim 1 **Evaluate the potential of aerial drone video and imagery as photovoice inputs in the context of identifying community assets.**
DBP was effective in revealing spatial relationships to other assets, capturing the full scale of assets, providing additional details about the site, conveying affective elements of a scene, promoting discussion in a focus group setting, and providing a reference for change over time.
Outputs from the project could be used for advertisement, additional whole-community engagement, and building community pride.
Participants stated that the fun of participating, connections with researchers that could support development, and building skills through the research process were core motivations for participating.
Aim 2 **Identify community assets that contribute to building place attachment among youth.**
At the group level, participants identified the importance of the economic, cultural, and social cohesion functions of assets in creating place attachments.
Individual-level functions of assets that participants noted contributed to their place attachments included the ability to assert control over self-growth or development and the opportunity to exercise autonomy or independence.
Aim 3 **Propose strategies to leverage DBP to incorporate youth perspectives on community assets into local disaster planning.**
Participants stated that Westport was most exposed to coastal and weather hazards, but felt that they could be addressed by engineering solutions.
Engineering solutions should not interfere with local industry or ability to interact with the natural environment
In discussing the key assets, participants were able to identify post-disaster importance, potential uses, and probable conditions

Identified and documented community assets

Through the site selection survey, the cohort initially identified 11 potential community assets that were particularly important to them, their peers, and the whole community. Participants also recorded 22 additional noteworthy assets in free answer spaces over the course of the exercise. Of these assets, one was disqualified from collection for not fitting study criteria, one was disqualified due to safety and legal concerns, and three were disqualified when participants could not provide enough details to locate the asset. Of the remaining 28 assets, 19 were sampled; the remainder were not sampled due to time and distance constraints or lack of participant interest. Finally, while in the field, participants identified three additional assets and collected data on them for a total of 22 documented assets. A full list of identified and documented assets is attached as **Appendix G**. **Figure 4** below overlays the documented assets on an OpenStreetMaps baselayer.

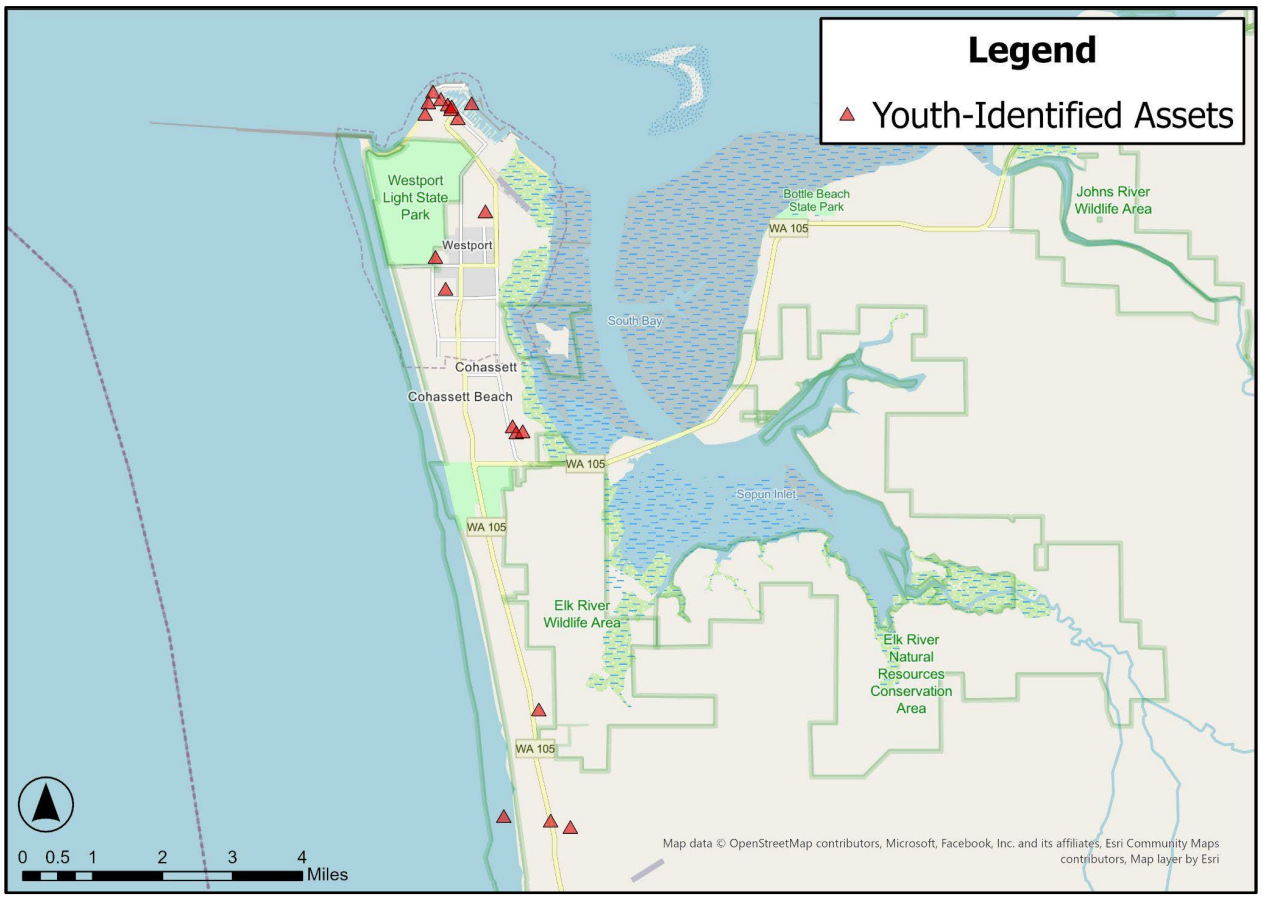


Figure 4: Map of All Documented Youth-Identified Community Assets

Documented community assets consisted of five parks and/or recreation facilities, five businesses, three landmarks, two beaches, two museums, two natural resource industry sites, one religious institution, one commercial district, and one educational facility. Two assets, the downtown marina (referred to by participants as "the Docks") and the Ocosta Central School District campus ("the school"), are nested assets; their spatial scale covers other assets, and the

clustering of other assets within that scale confers at least part of their importance. Eleven of the assets were in Westhaven (the northern portion of Westport around the marina), identified in **Figure 5**; three were around downtown Westport, identified in **Figure 6**; and eight were in Cohasset Beach and Grayland (the census-designated places just south of Westport), identified in **Figure 7**.

Figure 5: Map of Documented Assets in Westhaven

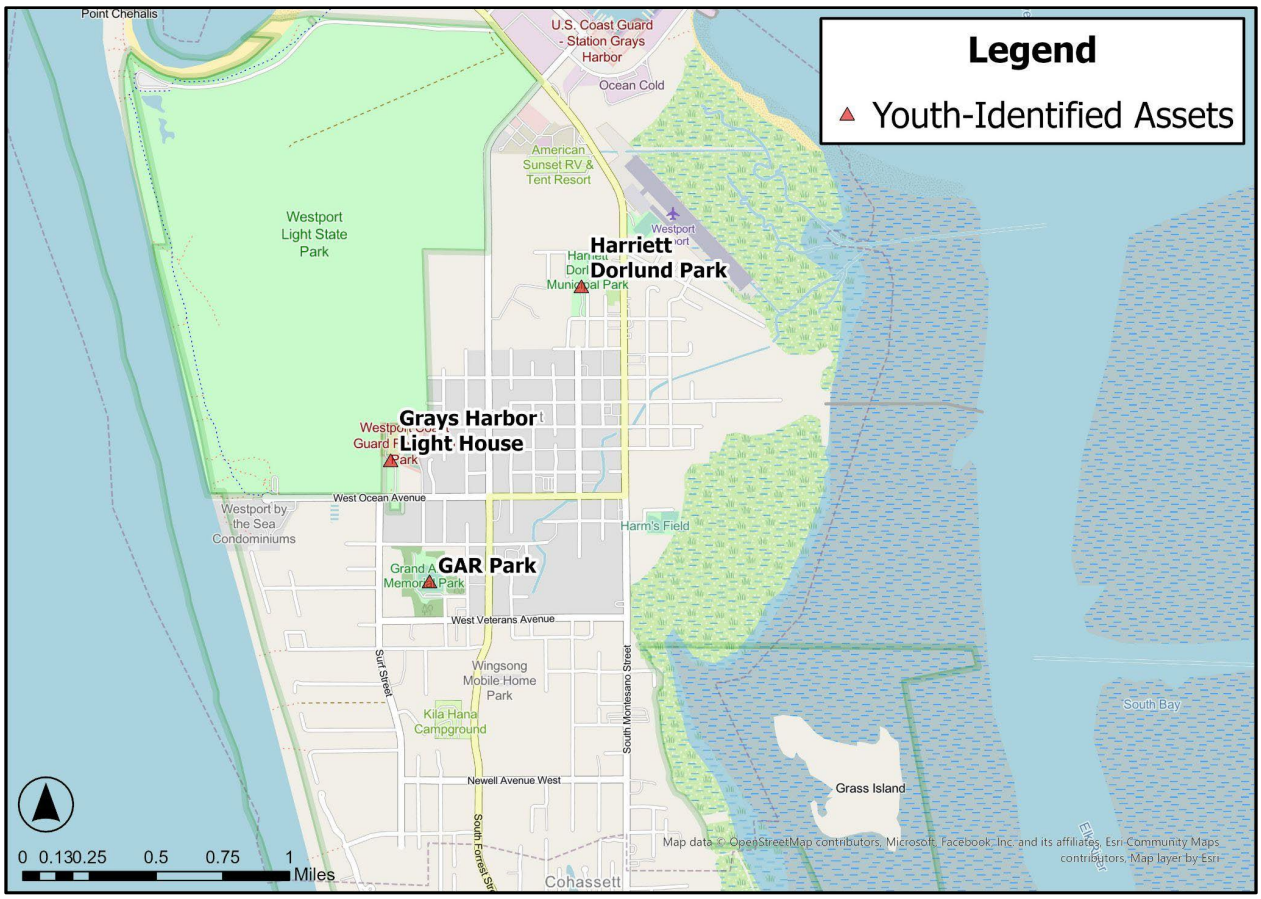


Figure 6: Map of Documented Assets in Downtown Westport

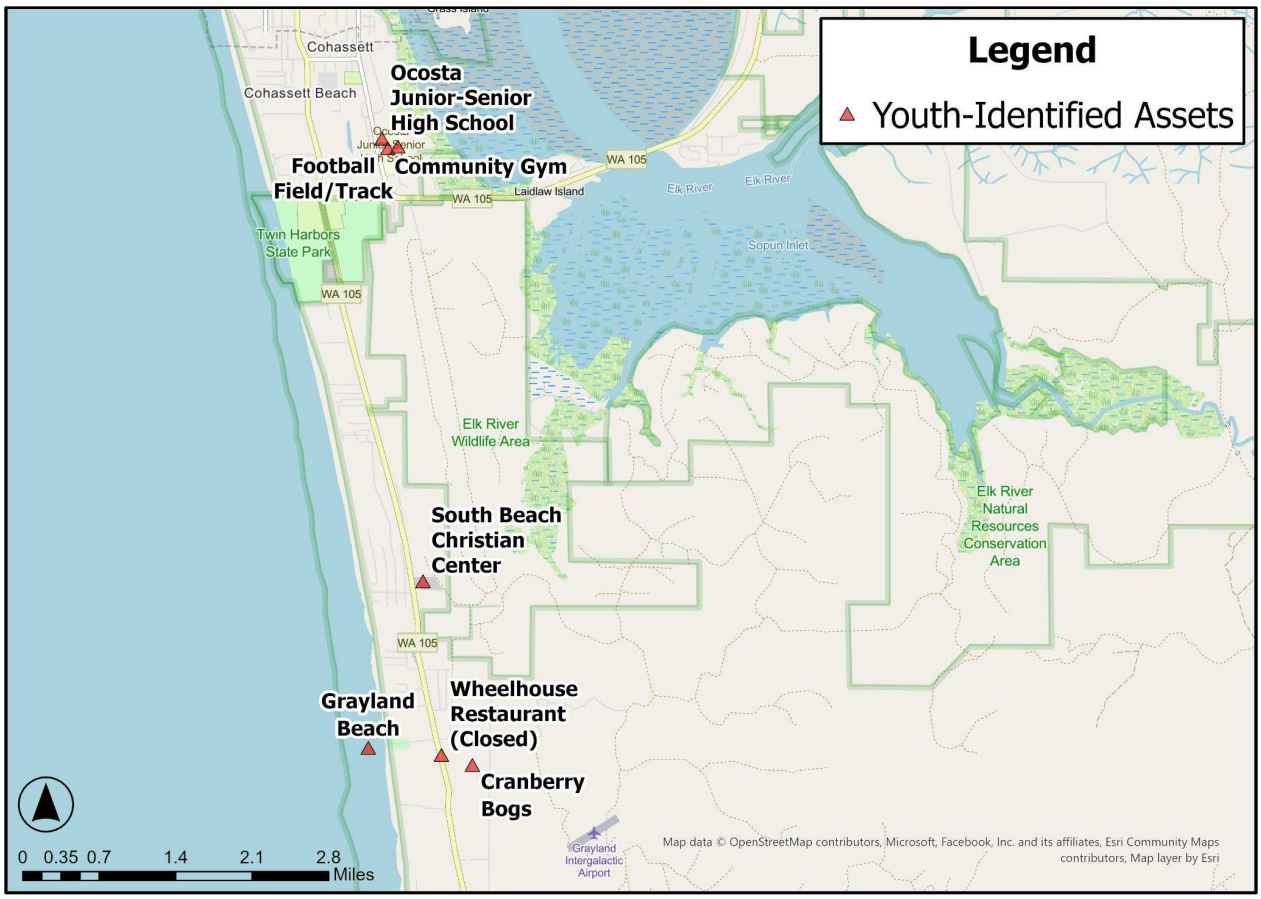


Figure 7: Map of Documented Assets in Cohasset Beach and Grayland

Focus group discussion

Overview

Focus group participants elected to discuss three assets: the Docks **(Figure 8)**, the cranberry bogs **(Figure 9)**, and the school **(Figure 10)**. Since two of these assets are nested assets, participants also discussed several of the assets clustered underneath them. In addition to discussing the importance of each asset and its potential hazard exposure, participants also provided important historical and social context for the assets and identified gaps that stopped them from utilizing these assets. Roughly two-thirds of the discussion was spent on the community assets; participants spent the rest of the time sharing their experiences with the DBP methodology and collectively identifying the potential applications of their perspectives and the collected imagery.

Figure 8: Isometric view of the Docks, December 2023

Figure 9: Isometric view of the Cranberry Bogs, February 2024

Figure 10: Isometric view of the Ocosta School District Campus, February 2024

Process Evaluation (Aim 1)

In evaluating the usefulness of drone footage and imagery for documenting community assets, participants were consistently positive about the advantages offered by the aerial perspective over ground-level photography. While one participant initially expressed that they felt aerial images and video artificially enlarged the scale of the asset, the group eventually came to the consensus that the aerial video actually improved their understanding of asset scale because it allowed the asset to be compared with its surroundings and observed from multiple perspectives at once. As one participant summarized, *"it isn't a trick from the camera. It's just a lack of knowledge from the ground."* In addition to sense of scale, participants also noted that the aerial perspective revealed the totality of an asset's features, some of which (such as backyards not visible from the street) surprised even those most familiar with the assets. This was especially true when capturing all the features of large-scale assets such as the Docks, which could not be detailed in a single ground perspective. The aerial perspective, which avoided line-of-sight obstacles and captured the area around each asset, also helped students recognize spatial relationships between assets and other features of the environment that they could not from the ground. Participants remarked on being surprised by how close their school was to the water, which gave them context for childhood warnings about the marshiness and hazard of the forest between the school and the water. They also noted how the aerial perspective was beneficial for

showing the density or clustering of assets, with one participant suggesting that *"A lot of people don't realize that there is a sort of community that you don't get with the regular everyday perspective. Seeing that grand shot of the Docks was pretty cool to see the full bigger picture instead of just looking down Main Street and barely seeing the front of shops."* Finally, several participants felt that being able to visualize a whole site from above also helped them recall how an asset changed over time.

When asked to consider how the broader community might use the imagery they collected, participants quickly suggested that the aerial perspective would be useful in advertising, particularly that of the Docks and the cranberry bogs. Drone flyovers provided images of Westport *"as it really is"* from a local perspective, per participants, allowing them to show off the everyday parts of their town they were proud of beyond the events (e.g., Pirate Days) frequently used in advertising. Participants also suggested that the images could be shared with peers to create a sense of community pride, with one commenting that *"I don't think [my friends] realize how nice of a place they live in, even though it might seem kind of like depressive and gray."* Similarly, some participants felt that the images could also be used as tools for future whole-community engagement. Finally, one participant's comments suggested that repeated collection at the same sites could help visualize community change over time, as the footage of the school prompted them to note which buildings had changed, been removed, or been built during their time attending the school.

Considering the data collection process as a whole, participants were positive about the fun of flying drones, the research and drone flying skills they built, and the connections to the research and academic community they began to develop. Commonly reported motivations for participating included getting hands-on time flying drones outdoors, spending time with friends (especially after the loss of the school's after-school program), helping the community, and improving their future outcomes. Notably, all participants reported the importance of the project for their future development, both in skill-building and in helping them access higher education in the future. Some participants expressed reservations about how many of their peers would be likely to participate in a similar project in the future; notably, they perceived many of their peers to be uninterested in programs without an explicit connection to maritime careers, unmotivated to take on any additional activities, and/or uninformed about the potential benefits of participation. Finally, some participants expressed a degree of confusion about the specifics of how the results of the research would be used by the community, a concern addressed during the group discussion and later discussions in designing the geonarrative.

Assets Important to Youth Place Attachment (Aim 2)

Throughout their discussions of the important places, spaces and structures that made them feel at home, context that shaped several key functions that contributed to the identified assets' importance. Notably, Westport's small size and rural setting meant that participants often relied on Aberdeen, the area's largest city, for essential goods and services. As one participant put it, *"Everyone here basically lives in Aberdeen because we have to pass through it kind of at least once a week."* This familiarity contributed to students frequently using Aberdeen as a point of comparison to Westport. Aberdeen was frequently described as *"rundown", "gray", "sad",* and

"depressing"; while participants sometimes used similar language for Westport, they took ownership over the local conditions, expressing sentiments like *"it's disappointing, yeah, but it's my disappointing."* This was followed up by a note that in contrast with Aberdeen, Westport "hadn't lost its charm" and, unlike Aberdeen, a place where participants could see living long-term. Participants framed Westport's maritime history as "the original beach town" in the region as central to the community's identity. During discussions of each asset participants made specific mentions of coastal features (e.g., beaches, tides, jetties, and coastal weather) and activities (e.g., wildlife education, fishing and remote controlled boat operation) that shaped the ways they engaged with place.

Participants were aware of past periods of prosperity through historical images of the town and the number of historical buildings remaining at the Docks, referring to the midcentury as Westport's *"glory days."* They attributed present day conditions to a combination of overfishing, a loss of industry, and the economic woes of Aberdeen. Participants observed that Aberdeen's economic condition strongly influenced Westport because of the importance of Aberdeen as a regional hub. Yet, participants were optimistic that Westport's continued maritime strength, successful tourism, and attractive natural features provided strong foundations to return to its perceived former prosperity. As one participant put it, *"I like to compare the contrast of just how big [Westport] was compared to what it is now. A lot of stuff that I think could be fixed is just growth and having stuff."*

Taken with this contextual framing, participant comments suggested how several key functions contributed to the identified assets' importance. **Table 3** summarizes the functional role of assets for youth in place attachment captured in the codebook, alongside a qualitative assessment of how prominently these functions featured in the group discussion (assigned based on number of code applications and amount of coded text).

Table 3: Summary of Asset Functions by Level of Discussion

Asset Function	Level of Discussion
Group/Community-Level	
Economic	High
Cultural	High
Social Cohesion/Belonging	Medium
Social Network Development	Low
Symbolic	Low
Individual Level	
Self-Growth/Independence	High
Independence/Autonomy	Medium
Sense of Self-Esteem	Low
Safety/Security	None

At the group and community level, participants primarily discussed the economic and cultural contributions of the community assets, while also commenting on the way that the assets contributed to a sense of social cohesion and belonging within their peer groups. On the other hand, participants scarcely discussed both the role that assets played in promoting the development of their social networks and the explicit symbolism of the assets.

Economic concerns were at the forefront of participants' perceptions of place. Limited affordable housing, high costs of essential goods that forced community members to travel far for everyday needs, the loss of popular programs at the school district, and the limited number of amenities available in a small community were described as particularly important. Against the background of these concerns, participants frequently framed the community importance of the discussed assets in economic terms. For instance, the Docks were initially introduced by one participant as the number one source of income for the town due to the presence of both industry and tourism, a sentiment echoed by others. Participants saw the number and diversity of businesses as a consistent attraction for both locals and visitors and noted that local events (such as the local Pirate Days and Crab Feed) played a critical role in attracting both tourist crowds and outside vendors. Furthermore, the importance of the Docks is linked to the school; participants felt that if the Docks were to lose its status as an economic anchor, there would be nothing to support a robust student body, leading to sharp decline in school funding and potentially the collapse of communities served by the school. The cranberry bogs were also framed as an economic

"backbone" of the community, with several participants echoing the sentiment *"if we don't have crabbing, we have cranberry bogs."* Even participants who did not consume cranberry products acknowledged the economic importance of the fields for the community.

Participants also frequently mentioned the cultural functions the assets provided. Several participants resonated with Westport's "original beach town" identity, and noted how the Docks, as well as the nearby wharf and beaches, shaped their connection to place through the coastal activities they engaged with there. These included visiting the aquarium and maritime museum, watching King Tides and sunsets from the rocks along the beach, fishing, and reading on the beach. Having fun with friends was described as the most important part of these activities. The importance of fun to building affinity with community identity was also noted in the context of events held at the Docks, such as Pirate Days, which participants described as the cultural highlight of each year. Event scale also reportedly contributed to participants' reports of feeling connected to the area; one participant expressed that *"you see all those people and-- it's nice. It feels like an actual city and town,*" a sentiment others voiced agreement with. Participants noted that while there is a Cranberry Festival held near the fields, it lacked the scale and perceived fun that would cause them and their peers to attend. Instead, the fields reinforced that *"we don't just have fishing";* participants shared that they sometimes found the maritime identity overly restrictive, and appreciated having assets that represented other segments of the community. Programs at the school are one way to tap into these other segments, which participants saw as a critical function not provided in many other places in the community. The school also plays another important cultural role in hosting small or medium-scale community events (e.g. family fun nights, open gyms, bingo, etc.) since the campus has what participants identified as the area's largest communal indoor spaces. Because *"everyone has a kid",* participants reported that these events were a rare opportunity for the community and others in the area to gather in one place.

Shared experiences of community assets also contributed to a sense of social cohesion and belonging expressed by participants. Extracurricular programs and the social events hosted at the school were reported to help make and maintain social bonds and friendships. Furthermore, while participants did not explicitly discuss the creation or expansion of social support networks, they did note that school events that brought in the whole area were the best opportunity to form new connections that bridged the geographic distance present in the school district. Several participants noted that such connections were important because they valued living in a tightly-knit, highly-connected community. To support a sense of belonging, participants unanimously reported the Docks as the main place to meet up with friends and peers outside of school and private residences, largely due to the concentration of businesses that appealed to a youth demographic (such as ice cream shops). Several participants noted that they and their friends worked for some of the businesses, and others reported yearly traditions with friends involving the businesses (such as celebrating the end of the school year). For participants who lived further outside the city, the draw of meeting up with friends set the Docks apart from everywhere else in Westport. In fact, for many the Docks was the only place they reported frequenting in the city proper. While the cranberry bogs were not used as a meet up spot, they were still linked to social bonds, as some participants noted that because of the number of residential areas surrounding the fields, they associated the fields with their friends.

Community assets also provided individual-level functions; participants consistently highlighted the role that the assets played in their self-growth and development, while also discussing the importance of the assets for contributing to their sense of independence and autonomy. Notably, participants did not substantively discuss how assets built a sense of self-esteem or contributed to a sense of safety.

Self-growth and development were heavily featured in conversations about both the school and the Docks. Participants suggested that given the prevalence of maritime and fishing careers in the community, many of their peers had narrow worldviews about the kinds of opportunities that were worth engaging in. While participants saw the maritime program offered by the school as a culturally-relevant development program for many in the community, those seeking other life paths had to go outside the school and community to find such resources, which frustrated some of the participants. Although participants excitedly discussed a number of extracurricular and after-school programs that provided them with opportunities to explore alternative interests, they noted that those programs were becoming increasingly limited due to lack of funding. Multiple participants shared their disappointment with the cut programs, which were some of the few personal development opportunities they saw as easily accessible. One participant went as far as to suggest that a lack of access to and exposure to these programs might lead to maladaptive behaviors among their peers (e.g. increased drug use and dropout rates). The local library was suggested as an alternative provider, as participants had seen community members and college students using the library for research in the past. The Docks also reportedly provided participants with opportunities to exert control over their development, both through the presence of employment opportunities and the educational resources in the marina (e.g. the wildlife education programming at the aquarium).

Exercising one's autonomy and independence was another frequent refrain in discussions of assets. Getting out of the house and being able to engage in activities and opportunities away from parental supervision was a major draw for participants to visit the Docks and participate in extracurricular activities at the school. Asset accessibility played a major role in being able to develop a sense of independence, according to participants. Two youth cohort members with driver's licenses reported feelings of freedom and satisfaction accompanying their ability to explore and visit more places in the community than they had been able to previously. However, most of the participants could not drive or did not have access to a vehicle, which they reported significantly limited how often they were able to engage with assets. Several asserted that they often would not attend local events because they lacked adequate transportation and did not want to involve their parents. While a recently-cut after-school program had provided free after-school transit in the evenings, encouraging students to remain at school and around Westport after the school day, the program's absence reportedly left a transportation gap and created a participation barrier for many students. Participants also bemoaned the lack of outdoor lunch areas, expressing that between a lack of student amenities in recent construction and the cut programs, the school district was not receptive to student perspectives, which was discouraging. Many reported their belief that the school had potential to foster student autonomy and growth, but this potential was held back by a lack of funding and poor decision-making by the school district.

Youth Perspectives in a Planning Context (Aim 3)

When asked to discuss the potential hazards facing their community assets, participants were quick to call out extreme weather events as their main concern. Participants felt that all the assets could be severely impacted by extreme weather events, though they did not elaborate on which kinds of weather were of greatest concern. Coastal hazards, such as tsunamis and flooding (particularly King Tide flooding) were also a high priority for participants. Participants saw the Docks as the most exposed to coastal hazards, though anticipated that they would "*bounce back*"; in contrast, the cranberry bogs were seen as likely to be "*wiped out*" by a tsunami. Earthquakes were mentioned as a potential concern, though mainly as the context of tsunamis. Although participants mentioned the 2022 John's River fire, they did not perceive wildfires to be a serious threat to any of the identified assets or to the community as a whole.

Participants also commented on how some assets contributed to pre-disaster resilience. Notably, the group expressed a sense of pride for the proactive approach the community has taken with tsunami planning, such as constructing a vertical evacuation structure at the school. While reviewing the drone imagery, two participants commented that similar footage could be captured to help visualize evacuation or emergency response routes. Participants also described coastal flooding, especially during King Tides, not just as a hazard, but also as a potential asset. Multiple participants mentioned that they enjoyed watching the high water and feeling the spray of the waves from the Docks, and viewed King Tides as a tourism draw; one participant reported seeing an advertisement for Westport that featured a King Tide wave at Seattle-Tacoma International Airport. As such, participants were encouraging of engineering solutions to flood control at The Docks (some suggestions included improving moving sidewalk drains to the streets, improving barriers to direct the water away from businesses, and creating additional levees or rocks to slow the water), but not at the expense of measures that would disrupt their ability to view the King Tides. Participants also perceived that resilience measures that could potentially interfere with fishing access (such as a sea wall) would not be politically feasible in the community. In contrast to coastal hazards, however, one participant expressed that *"we can't really do anything about earthquakes"*, with others agreeing and focusing more on water-based hazards.

Recovery from a disaster was a less well-developed aspect of the conversation, though still important. Of all the assets reviewed, the participants felt that the school would be the only post-disaster "refuge" to those who lost their home, using the large communal spaces of the gyms and lunchrooms as temporary housing. Although the Docks were viewed as the most hazard-exposed of the document assets, participants also noted that, if quickly rebuilt after a major disaster, the Docks would be the main tool for revitalizing the area. As one participant put it, *"The Docks, I think, will survive even if Grayland and [other communities] fall off. I think the Docks will survive because it's a huge industry and tourism [source]. So if a tsunami does hit and it is rebuilt, I don't think [Westport] will have much problem surviving in the long run."* Participants also agreed that as the economic hub of the area, restoring Westport's ability to generate income was the highest priority in a post-disaster setting.

Discussion

Overview of Key Results

Overall, the results of this study indicate that DBP can provide several benefits both for photovoice projects and for community asset mapping as a whole. As a photovoice input, drone footage was demonstrably helpful when discussing assets at a structure scale and larger because of the ability to view the totality of the asset. The aerial perspective also promoted discussion about spatial relationships to other assets and environmental features, as well as in promoting new insights about clusters of assets when discussed as a single unit. Using video to view the site without obstructions also prompted discussion about affective aspects of the environment (such as the weather or general atmosphere of an area). In addition to disaster planning, participants identified that the outputs of the project could be used for advertisement, whole-community engagement, and fostering a sense of community pride with their peers. Finally, the fun of flying drones and seeing friends, the connections with an established research institution that could support their future growth, and the skills built through participation all motivated youth to participate in the project.

With respect to the important community assets youth identified as contributing to their attachment to place, findings suggest that youth participants valued community assets for the economic, cultural, and social cohesion functions they serve for the community. On the other hand, they spent relatively little time discussing the role those assets played in encouraging the development of social networks and the explicit symbolic function of assets. Furthermore, students consistently assigned importance to assets that contributed to their self-development and sense of autonomy; in contrast, they spent relatively little time discussing how assets built their self-esteem or imparted a sense of safety or security.

In considering how youth perspectives viewed these contexts in a disaster planning context, participants were very aware of coastal and weather-related hazards, and described their perspective that engineering solutions would be effective against these hazards so long as they did not interfere with local industry or access to the natural environment (such as viewing King Tides). At the same time, they noted the importance of the Docks and the school inpost-disaster recovery roles, despite the high hazard exposure of the Docks. Students also expressed that the cranberry bogs would likely be completely destroyed by a significant disaster.

Effectiveness and Potential Applications of DBP

Given the strengths of both drone imagery and the overall process highlighted by participants, DBP may find its best use in future projects documenting environmental context in a community, especially those projects for which spatial relationships are a key research question. While some fine-grained detail about individual assets may be lost, this method is appropriate when objects of interest exceed a structure scale or where whole-site properties are important. DBP may also be useful to document change to a site over time or under different conditions when sampled repeatedly with the same perspectives or flight paths. This longitudinal perspective could

contribute to a "community archive" that increases community awareness of environmental change. Hazard-exposed communities may also find the temporal comparison important in comparing the community archive to new observations of post-disaster conditions. DBP may also benefit projects trying to capture assets that have barriers (e.g. obstructions or access issues) to documentation. Imagery and video generated by the process provides a noteworthy new perspective that many in the community are likely to be unfamiliar with, which means that outputs could facilitate broader community engagement; this frames DBP as a potential project for community collaborations interested in expanding their coalition or building new relationships.

There are, however, some constraints that may hinder the widespread adoption of DBP for community-engaged research. First and foremost, regulations for drone operation and image collection are an evolving field; federal, state, and local laws may limit airspace, flight paths, and take-off and landing sites that can complicate flying drones over points of interest . Even in this project, radio frequency (RF) signal barriers around some assets impeded data collection by restricting flightpaths. Getting licensed to operate a drone for non-recreational purposes also may be a barrier for some researchers, and the necessity for a licensed operator to be present during research may introduce logistical issues. Even when operating within the bounds of the law, community members may be wary of having important places in the community documented, which necessitates the development of clear outreach and community trust (such as through a local champion). Finally, it is important to note that while drones are not particularly difficult to operate, they can be expensive; there is always the possibility that something goes awry, which may impose financial constraints on a research team.

Field-testing the DBP protocol also offered several lessons for improvement. Student participants initially struggled to visualize the impact of their research during the data collection process, which is a challenge when they play a role co-creating the visualization. While several participants later reported a better understanding during follow-up meetings, a clearer initial description of the research process and protocol as well as providing some scaffolding frameworks early in the process may help alleviate these concerns in future projects. Given the project's focus on the roles that community assets play in building place attachment, more explicitly centering community and personal values during the initial site selection and brainstorming process may have prompted additional asset identifications or more well-developed narrative descriptions of assets. Another potential revision would be to conduct a "ride-along" through the community after the mental mapping and site selection survey. Participants initially struggled to identify community assets or to spatially locate others, and the data collection process revealed additional assets that participants realized they had overlooked and were unable to sample due to time constraints. Doing a ride-along might help call attention to assets that may have gone unnoticed. Researcher MK used these lessons to develop a community guide depicting a replicable DBP workflow for communities and researchers; the guide is included as **Supplemental Materials 1**.

Understanding Connections Between Place Attachment, Community Assets and Youth

Considering both the assets documented by the cohort and the assets selected for discussion, Westport's coastal identity featured prominently in how participants perceived place identity and their attachments to place. Participating youth consistently described how coastal environments, activities (e.g., commercial fishing and walking on beaches), and hazards, as well as the "original beach town" atmosphere contributed to their use and attachment to place. Interestingly, some coastal hazards played a role in contributing to participants' enjoyment of community assets; while King Tide flooding was seen as a detriment to local businesses, viewing the waves was a fondly-recalled leisure activity for youth, who also perceived that advertisements featuring the waves draw tourists. There was, however, a tension within how participants perceived the maritime industry: while participants recognized its economic importance and how its role in the community's identity would necessarily shape community engagement and acceptable hazard mitigation measures, they described how it sometimes dominated the opportunities available. This suggests that while assets that invoke the community's coastal identity may encourage place attachment, it is important to have community assets that reflect the priorities and needs of those outside; there is an inherent value to the diversity of assets. It is also important to recognize that despite the stated importance of the area's natural environment for contributing to place attachments, participants did not discuss natural environment assets like beaches, forests, or the cranberry bog in a post-disaster recovery context. Understanding the role that the nature-based assets play for youth across the disaster cycle warrants further exploration in future studies.

Westport's rural setting may also have played a role in how participants perceived community assets. Interestingly, participants frequently used a neighboring city, Aberdeen, as a point of contrast; their familiarity and stated distaste for Aberdeen appeared to have contributed to attachments in Westport or helped them identify specific features they like about Westport. Again, Westport's natural coastal features, maritime aesthetic, and small-town atmosphere set it apart from Aberdeen; participants viewed Aberdeen purely in functional terms, not as a place they would want to live in. This implies that the affective dimension of place plays a significant role beyond solely functionality, reinforcing Hester's comments on the weight of symbolism and other intangible factors in the importance of place (33). In addition, since several participants lived outside Westport yet still described feeling an attachment to the city that they did not for Aberdeen (despite having to frequent Aberdeen to the point that some described feeling like residents "basically lived there"), there may limits to the distance that one can form place attachments in everyday life. Finally, the rural settings' diffusion of assets led the density and clustering of some assets to be an important feature in and of itself; the scale of assets in contrast to the rest of the region may also play a role in facilitating place-based bonds.

The focus group discussion also revealed several barriers to using assets and fostering place attachment. While participants frequently noted how site accessibility, programming, and connectivity to other assets contributed to feeling connected to various assets, the area is lacking in all of these domains. The lack of public transit, in particular, was frequently cited as the largest barrier to participating in events and visiting the identified community assets; while there

is a public transit line, it does not reach all the outlying communities, which can cut those youth out from participation. Addressing transportation gaps is especially important with the loss of programming and opportunities reported by participants, who noted that they would have to travel to access skill-building or recreational opportunities outside of the maritime industry. Identifying ways to bring in additional programming at places youth are likely to frequent, such as the Docks and the school, is another way to close this gap and improve place attachments. Despite the description of the Docks as the cultural and economic heart of the community, there are no community gathering spaces at scale; while the school, which has such spaces, is central to other communities in the area, it is spatially isolated from other assets. Given the importance of clustered assets previously noted, this may also inhibit a sense of connectivity to place and community. Yet while a community gathering space in the Docks may improve connectivity, there is a tension with hazard exposure; participants perceived the Docks to be the most hazard-exposed of all community assets. This provides support for community planning for an additional vertical evacuation structure that serves a dual purpose as a community gathering space.

Many of the assets participants discussed and documented were perceived to play an important role in their own personal development, which was the most significantly discussed individual-level function of the assets. Given that many participants reported that the opportunities afforded by engaging with a large research university and the potential to build marketable skills were strong contributors to their motivation to participate, this focus on future development may also have colored the assets they deemed important. That the study's data collection sessions took place outside of a structured school program also suggests the possibility that those students who attended were highly autonomous, which also may have contributed to why they frequently highlighted the role of assets in building (or inhibiting) their independence.

On the other hand, safety and security were scarcely discussed as asset functions, even though the literature suggests that this is a key component for many youth in forming place attachments (3–5,7,8,15,16,72). Participants focus on the economic and cultural importance of the assets was also surprising, as these mechanisms for place attachment in youth are not well represented in the existing literature on youth place attachments (5,21). They do, however, align with broader work assessing community adaptive capacities; this suggests that the cohort has reached a developmental stage where they are able to conceptualize the potential wellbeing of the whole community (24,29–31). The recent economic struggles of the region, the recent COVID-19 pandemic, and the age of the cohort (15-16 years of age) may also contribute to the prominence of these factors, as participants may have become aware of how economic growth and cultural identity contribute to the presence or absence of other programs, activities, and assets they find important. This finding is thus important because it suggests that an important factor in place attachment has yet to be explored with youth, particularly in a post-pandemic setting.

Compared to the 2018 workshops held with adults in the community, the youth cohort reflected several shared values, including the importance of the local character, access to the natural environment, the importance of forming social bonds, and the presence of opportunities for economic development (69). Likewise, all of the assets the cohort discussed (and several of those

documented) were captured in the workshops, though specific businesses important to the youth (like ice cream shops and the aquarium) were not represented. However, one major difference is that opportunities for youth development and growth were not referenced at all in the 2018 workshops. While the value of having a place for youth to gather was noted, it was not discussed more significantly in the reporting. Furthermore, the workshops did not explicitly mention the importance of spatial clustering of assets having a value in itself, which youth in the focus group discussion emphasized. Another difference is that transportation issues were only discussed under hazard scenarios, not everyday conditions that may present barriers to youth accessing asset sites. Lastly, the workshop did not address how Westport's small size restricts the kinds of opportunities and activities that youth might value, forcing them to travel outside the community. In general, the workshop focused heavily on maritime opportunities, which reinforces the frustration that youth expressed in the lack of non-maritime activities and career paths (69).

Recommendations for Incorporating Youth Perspectives into Disaster Planning

Based on the discussion of community assets in hazards contexts, there are several ways that youth perspectives might provide actionable information in a disaster planning context. DBP and other community-engaged asset mapping approaches can help identify community assets that local planners may not view as high priorities, while also providing a framework for youth to provide additional context for the importance of assets that planners are already aware of. The use of imagery and video itself helped contextualize the importance of images and draw out additional comments about features not shown from the ground. The plan-view and isometric perspectives also helped from an asset mapping approach in improving participants' understanding of the local geography, helping participants identify new or previously unknown features of an asset (especially those that cannot be viewed from ground level), and visualizing change over time. For instance, the "community archive" discussed earlier may be a boon for planners seeking to understand how a community's development priorities shift over time, which functional roles of assets might be gained, lost, or replaced; as well as to serve as a reference for the historical identity of the community. The shared perspective with plans, maps, or other top-down visualizations (such as digital models), may also help align collected footage and accompanying comments to provide additional qualitative context that adds richness to the description of assets. Combining these comments with imagery could then serve as a powerful communication tool and provide decisionmaking and plan-making support.

Using products from this research, participants now have the ability to present to the local planning commission and other decisionmaking bodies with a guiding framework. One such format to accomplish this is a geonarrative, which adds a spatial dimension that may facilitate the integration of these discussions into more formal planning. The geonarrative approach also allows students to supplement their own lived experiences with data they helped to collect, which may help lend authenticity to their presentations. Furthermore, the research process unifies local youth perspectives with peer-reviewed research that supports youth claims, which may lend their perspectives additional legitimacy. Through presentations on project materials,

decisionmakers should gain a more complete understanding of how assets in the community can both contribute to pre-disaster resilience to negative psychosocial health impacts and post-disaster psychosocial recovery. Much like how Hester's work on the community's "Sacred Structure" helped translate vague discussions around community values and identities into specific debate about site features and future development, the documented and mapped assets form the basis of both a community archive and a "youth structure" that serves a similar function with respect to youth values and needs (33).

DBP also provides a platform for additional youth and whole-community engagement. Drone footage of important assets may be useful as a hook to get community members interested in hazard-related topics; providing examples of hazard impacts and preventative measures alongside the footage may be a way to contextualize and improve both spatial literacy and hazard awareness. Considering participant reflections that the drone perspective contributed to awareness of how documented assets spatially related to the surrounding geography, using drone footage as a bridge between high-level aerial imagery and maps and ground experience may help make elements of disaster planning more relevant to the community's everyday life. For instance, drone footage of evacuation routes to high ground or evacuation structures from various high-traffic areas around the community may provide essential spatial understanding for community members, especially for those who may have trouble reading maps; building a community's spatial literacy could very well save lives during a disaster. Understanding youth hazard perceptions around key assets may also be useful for planners attempting to assess the level of knowledge among youth and frame future education. For instance, while youth in Westport were acutely aware of coastal and weather hazards, their uncertainty around earthquake mitigation and dismissal of wildfires as a topic of concern suggest that these are topics for continued future outreach. Ongoing outreach through long-term engagement opportunities, education and events may offer insights into how youth view gaps in the built environment (such as the lack of transportation), providing an opportunity to align disaster planning with youth needs and desires to produce co-benefits.

The youth cohort's suggestions for additional uses of drone footage demonstrate that having a trained segment of the population can produce innovative ideas and provide additional capacity to undertake new disaster-related projects. For instance, if youth are supported in becoming licensed to operate drones, planners or emergency managers may be able to leverage the cohort's skillset to document evacuation routes as mentioned earlier (and one route has already been documented in Westport as part of outreach being conducted by Washington SeaGrant's), capture footage for advertising or public education campaigns, or to conduct asset mapping and/or condition assessment (78). The stated importance of personal development suggests that framing these activities as opportunities to build skills and connections may help draw a consistently motivated youth corps that provide additional community capacity.

Directions for Future Research

The outcomes of this project present several directions for future research. As a pilot study, we hope that our initial findings serve as a call to action to incorporate the DBP method into more community asset mapping and photovoice projects. Drone technology is likely to become more accessible and widespread in the coming years; while this may reduce the barrier to incorporating drones into social science research, it is imperative that we develop research principles and frameworks in order to use this powerful tool to effectively and responsibly engage in CBPR. As such, there remains a need to refine the DBP method and test it in other contexts, particularly those communities that do not have significant exposure to drone technologies or hazards education. Conducting a more stringent evaluation process of DBP against other forms of community mapping exercises (such as traditional photovoice, in-situ surveys, or workshop discussions around existing maps or satellite/aerial imagery) could provide additional evidence that validates the time and resources involved in the research process. We also encourage the use of DBP for other projects with a planning focus, such as a long-term study developing a community archive in order to visualize change over time. Such a study could provide insights into how a community's assets respond to (or fail to respond to) demographic changes and significant events within the community. If conducted in a hazard-prone area, it may also provide insights into how communities adapt to the loss or damage of assets due to hazards.

It would also be interesting to further explore how drone footage can contribute to a community's spatial literacy, given that initial impressions from working with the summer school students revealed that at least some segments of the youth population (if not more of the whole community) have limited literacy with maps and findings from this study that drone footage helped youth develop better understanding of spatial relationships between assets. Evacuation route mapping may be a particularly useful subject for this future research, as seeing a drone-flown perspective of an evacuation route might provide more relatable spatial context than an evacuation map alone would. Findings from such a study could have wide-ranging applications for community disaster preparedness in similar communities with high-impact, low frequency hazards.

Connections seen between participant motivations and the importance they drew from community assets suggest that there is more to explore about how segmentation within a community's youth population may influence how and where they form attachments to place. Exploring how rural and coastal settings might influence youth perspectives on important assets may also provide interesting insights on how a community's geographic and socioeconomic contexts influence what youth view as important. For instance, given that the clustering of assets was important in the rural context, it would be interesting to see if similar clusters are also important to cohorts in settings with greater built-environment density. In addition, given that youth frequently mentioned the importance of the natural environment (from the weather to the beaches) across assets, it may be interesting to draw out how youth or the full community might rely on these places in post-disaster settings; connecting this to the pre-disaster importance would help provide a more complete understanding of those assets' value to the community.

Limitations

Given the small size of the single focus group discussion (n = 5) and cohort as a whole (n = 8), as well as the limited geographic sampling frame (a single community that has had prior hazard-related research engagement) it is important to qualify that findings are not meant to be definitive statements on the functional roles that community assets serve for all youth in all contexts; rather, as a pilot project, this study presents suggestions for future research directions. Furthermore, since the cohort self-selected to participate in the project, their views may not be representative of all perspectives in the community, a fact that the group members acknowledged. This again highlights the importance of leveraging this initial project for future whole-community engagement to understand which assets may have been left out of the initial discussion. During the focus group discussions, there may have been some level of response bias in evaluating the DBP protocol, as participants might have found it difficult to express misgivings about the process in the presence of researchers. Lastly, research activities took place over five months with a revolving group of participants at cohort meetings. This may have contributed to recall bias or to a lack of deeper engagement with the project that excluded potential insights and perspectives from being shared by youth who had missed data collection or discussion opportunities.

Conclusion

This study's novel drone-based approach to photovoice demonstrated the added value of drones in observing previously hidden or under-appreciated aspects of community assets, prompting discussion about spatial relationships, and capturing the importance of clustered or nested assets. By using DBP to explore the places, spaces, and structure that youth in a hazards-exposed community find important, this study provides insights into what community assets contribute to aspects of place attachment relevant to planning for disaster resilience. Notably, youth in our cohort found assets that provided the community with economic power, cultural services, and promoted cohesion to be especially important. They relied on these assets for both developing their personal growth and sense of autonomy, though were frustrated by barriers to accessing or fully utilizing these assets. Using the imagery captured through DBP for whole-community outreach, aligning insights documented through the process with existing disaster planning, and mobilizing this new community capacity (i.e., trained youth) for drone flight in future disaster-related projects all may help leverage youth perspectives to improve disaster planning. Future research should explore the use of DBP in other community contexts, more explicitly compare DBP with other community asset mapping approaches and investigate how geographic and socioeconomic factors influence the way in which youth form attachments to place.

Funding and Acknowledgements

Funding for this project was provided by the Population Health Initiative's Tier 1 Pilot Grant, which supported investigator data collection and analysis costs, and the Cascadia CoPes Hazards Research Hub (NSF Award **#2103713**). Additional funding from the following sources compensated the ONN club members and the Ocosta After School and Extended Learning program director, Andrea Mirante, for their time to participate in the project: New York University C2SMARTER UTC Award #69A3551747124 for "K-12 STEAM Club: Drone Tech for Hazards Resilience and Transportation Workforce Development in Rural, Isolated, Tribal and Indigenous Communities"; a Cascadia CoPes Hazards Research Hub Pilot Project Grant award for "Inclusive Community-based STEAM Identity-building in Coastal Hazards Research: Pilot Activities for Cascadia TEACH with the Ocosta School District, WA" (NSF Award #: **#2103713**); and University of Washington Pacific NW Transportation Consortium Success Stories award for "Community-embedded Drone Technology for Rural Hazards and Infrastructural Safety Awareness: Engaging Youth at the Ocosta School, South Beach, Washington."

Overall Conclusions

This research demonstrates the potential usefulness of an innovative adaptation to traditional photovoice methods by using drone footage and imagery for participatory community asset mapping. By engaging youth in a coastal, rural community with high exposure to coastal hazards, we gained insights into the important places, spaces, and structures that contributed to the development of place attachments among youth. These perspectives are vital for understanding what community assets may contribute to youth resilience to negative psychosocial health outcomes after an environmental disruption. We then combined these youth perspectives with the collected imagery and footage in order to communicate with local decisionmakers in the disaster planning space. As a result of piloting this novel participatory research approach, we also produced a replicable guide that can be used to further refine the DBP method in other community contexts.

DBP's strengths were clearly apparent from the feedback provided by the youth cohort during a focus group discussion. The drone footage and imagery spurred discussions about the assets and the values attached to them by revealing spatial relationships to other assets, capturing the full details and scale of the asset site, as well as conveying the importance of environmental factors like the weather. Participants described how the data collected could be used for advertising the community, building a sense of community pride among their peers, serving as a reference for envisioning community change over time, and as a basis for additional whole-community engagement. Our findings suggest that continuing to document community assets using drones could create a "community archive" that would help planners observe and address changes to the assets and surrounding sites over time. The DBP process also encouraged engagement through skill-building for participants, the enjoyment and social activity of flying drones, and connections with an esteemed research university that could improve their future outcomes; these stood out to students given the local context of cut programs and limited opportunities for personal development outside of maritime industries.

Participants were drawn to assets that they viewed as contributing to the community's economic potential, cultural identity or activities, and sense of belonging or social cohesion. Notably, while these align with values identified by adults in prior community workshops, they are not well represented in prior research on youth place attachment. Students also put heavy importance on the ability to direct their self-growth and exercise their independence while interacting with assets, which supports prior findings suggesting these are key for developing place bonds. Furthermore, youth identified the presence of clustered assets, interactions with the natural environment, and the ability to access assets as important to continuing to build bonds with their surroundings.

In addition to identifying important assets, youth also demonstrated that they were aware of the hazards facing them, especially coastal and weather hazards, and some of the mitigation measures available to the community. They viewed engineering solutions as important to protecting hazard-exposed assets, but not at the expense of interference with local industry or the ability to engage with the natural environment. Participants also highlighted the potential importance of documented assets in post-disaster contexts and how they might be used to benefit

the community. Incorporating these findings into local disaster planning can be done through combining the narrative, visual, and spatial outputs of the work for use in presentations to local decisionmaking bodies (such as a planning council), facilitating additional whole-community engagement, and creating new hazard awareness materials by leveraging the new skills that youth have built (such as drone flying).

We recommend future research that continues to explore use of DBP in other community contexts, draws direct comparisons between DBP and other community asset mapping approaches, and conducts comparisons between geographic contexts to study how environmental and socioeconomic conditions themselves influence the way that youth form bonds to important places. In this way, we can continue to improve disaster planning processes that understand and incorporate youth perspectives and needs. Although youth may be at high risk of developing negative psychosocial health outcomes in the wake of an environmental disruptions, they need not be passive actors; providing clear pathways for their perspectives to inform planning decisions is an important step in building youth capacity to improve the post-disaster outcomes of their community as a whole.

Appendix A: Westport Tsunami Walk Time Map

Westport Tsunami Evacuation Walk Times

WASHINGTON GEOLOGICAL SURVEY
SEPTEMBER 2019

WASHINGTON STATE DEPT OF NATURAL RESOURCES — WASHINGTON GEOLOGICAL SURVEY

Washington Military Department Emergency Management Division

NOAA

National Tsunami Hazard Mitigation Program

City of Westport

WASHINGTON STATE PARKS

N

ESTIMATED WAVE ARRIVAL TIME: 25 MIN

ESTIMATED WAVE ARRIVAL TIME: 35 MIN

ESTIMATED WAVE ARRIVAL TIME: 15 MIN

ESTIMATED WAVE ARRIVAL TIME: 35 MIN

ESTIMATED WAVE ARRIVAL TIME: 50 MIN

SCALE 1:9,000

Walk times along jetty are >120 minutes beyond map extent

Westport Jetty

POINT CHEHALIS

HALF MOON BAY

Westport Light State Park

Westport Light Trail

Westhaven Cove

Port of Westport

USCG Station Grays Harbor

Westport Airport

North Water Tower high ground

City Park

Westport

Grays Harbor Lighthouse

Cohassett

South Water Tower high ground

Ocosta School

Twin Harbors State Park

Grass Island

Laidlaw Island

Grays Harbor

PACIFIC OCEAN

South Bay

wetland

Map Symbols

OUTSIDE OF MODELED TSUNAMI INUNDATION ZONE

SLOW WALK TIMES

Approximate tsunami evacuation slow walk times (~24 minute/mile)

TSUNAMI INUNDATION ZONE

15	0–15 minutes
30	16–30 minutes
45	31–45 minutes
60	46–60 minutes
75	61–75 minutes
90	76–90 minutes
120	91–120 minutes

ocean — trail, staircase, or bike path — road — tsunami evacuation route — edge of inundation zone

- lake or pond
- impassable wetland
- impassable slope
- bridge inaccessible in model
- tsunami siren
- police station
- fire station
- E vertical evacuation structure
- A post-tsunami assembly area

This item was funded by the National Oceanic and Atmospheric Administration (NOAA) Award #NA18NWS4670080. This does not constitute an endorsement by NOAA.

In some places a slow walk may not be fast enough to evacuate before waves arrive. In these cases a faster evacuation pace will be necessary. Some areas may require vertical evacuation structures for successful evacuation.

FAST WALK — RUN — VERTICAL EVACUATION

This map is a planning and preparation tool. Learn the evacuation routes for you and your family where you live, work, and play—evacuation maps may not be on hand during an actual emergency.

This evacuation walk time map for the city of Westport provides an estimate of the amount of time it would take to evacuate from within the modeled inundation zone of a Cascadia-sourced subduction zone earthquake. This map provides the inundation extent for a magnitude 9 earthquake, the L1 event. Time estimates on this map are modeled assuming a slow walking pace of 2.46 mph (~24 minute/mile), equivalent to the pace used for the timing of cross walks. Estimated wave arrival times shown on the map indicate the time between the beginning of the earthquake and modeled wave arrival at that location.

- Evacuation should begin as soon as earthquake shaking stops and it is safe to move from your drop, cover, and hold position or as directed by a tsunami warning siren, NOAA weather radio, or other official announcements.
- You should make your way uphill to high ground and follow the designated evacuation routes shown on this map. These routes were selected for pedestrian evacuation, but may be affected by post-earthquake hazards, such as collapsed bridges, landslides, and downed power lines. Use situational awareness when evacuating and be prepared to take alternate paths if necessary.
- Assembly areas are places of high ground for displaced people. These rally points are typically in open outdoor spaces or in large structures just beyond the tsunami inundation zones and likely will not have immediate services or shelter.
- Do not re-enter or cross back into the inundation zone until instructed to do so by local officials. Tsunamis are multi-wave events. The first wave may not be the highest, and danger of tsunami inundation may persist for many hours after the initial wave has subsided.

Tsunami inundation data from:
Eungard, D. W., Forson, Corina, Walsh, T. J., Gica, Edison, Arcas, Diego, 2018, Tsunami hazard maps of southwest Washington—Model results from a ~2,500-year Cascadia subduction zone earthquake scenario: Washington Geological Survey Map Series 2018-01, originally published March 2018, 6 sheets, scale 1:48,000, 11 p. text. [http://www.dnr.wa.gov/publications/ger_ms2018-01_tsunami_hazard_southwest_washington.zip]

Appendix B: Westport Zoning Map, 2018

City of Westport
Comprehensive Land Use, Shoreline, & Zoning Map

This is to certify that this map was adopted as the Official Zoning Map of the City of Westport on July 9, 2013 by Ordinance Number 1538 of the City of Westport, State of Washington.

ATTEST:

City Clerk _____

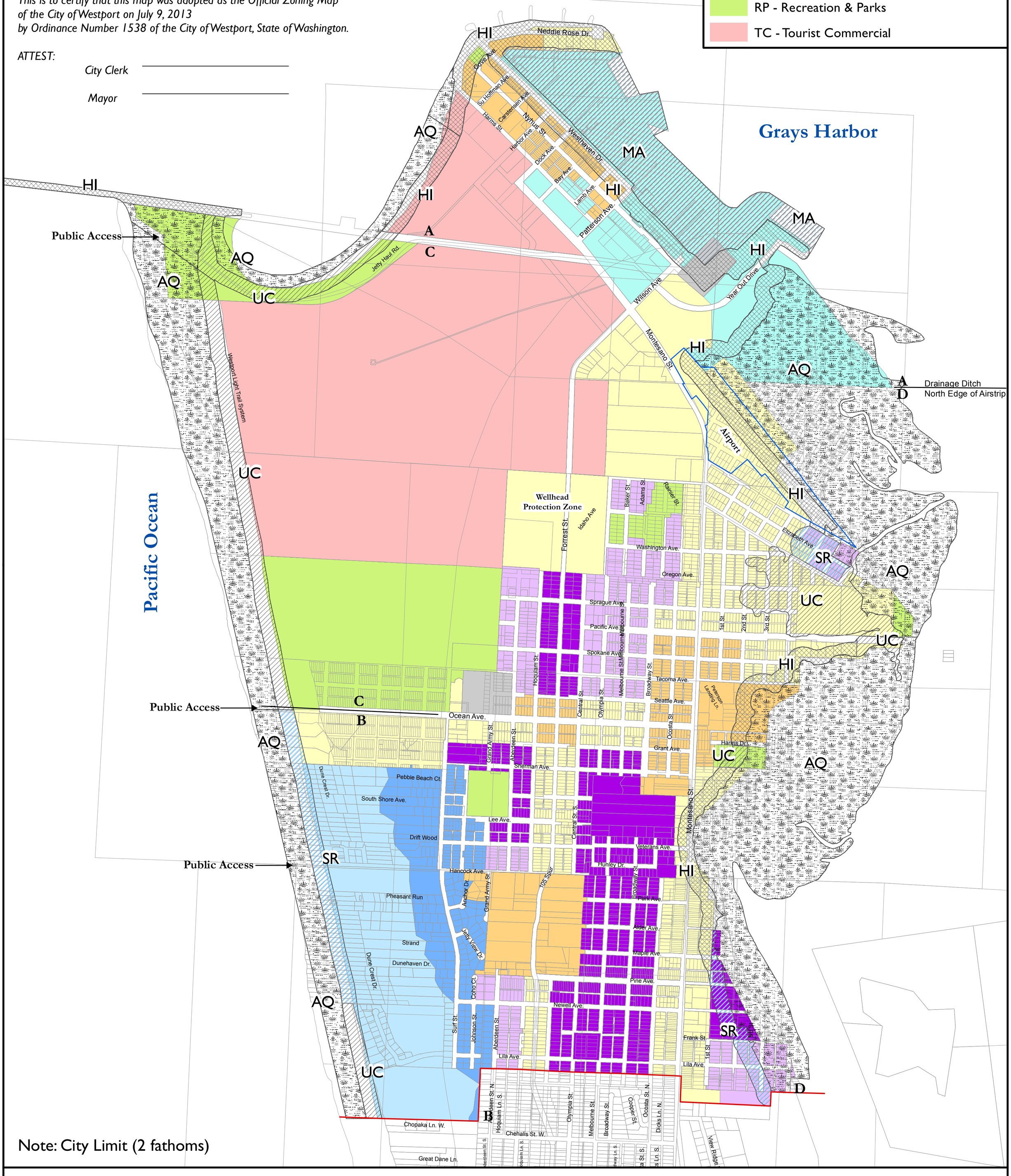
Mayor _____

Shoreline Designation

- High Intensity - HI
- Shoreline Residential - SR
- Urban Conservancy - UC
- Aquatic - AQ
- Marina Aquatic - MA

Zoning

- GOV - Government
- MI - Marine Industrial
- MUTC1 - Mixed-Use Tourist Commercial 1
- MUTC2 - Mixed-Use Tourist Commercial 2
- OBR1 - Ocean Beach Residential 1
- OBR2 - Ocean Beach Residential 2
- R1 - Residential 1
- R2 - Residential 2
- RP - Recreation & Parks
- TC - Tourist Commercial



Note: City Limit (2 fathoms)

Amendments to Zoning Text/Map

Remarks	Ordinance No.	Date Adopted
Marine Industrial	1615	7/19/2018
Residential	1609	12/21/2017
Marine Industrial	1579	8/10/2015
Text of Title 17 Westport Municial Code	1561	9/8/2014
Map	1538	7/9/2013
Shoreline Designation		

N

0 1,000 2,000 3,000 Feet

GHCOG COUNCIL OF GOVERNMENTS

Disclaimer:

This map is for planning purposes only. The Grays Harbor Council of Governments makes no representations as to the accuracy or fitness of the information for a particular purpose.

The accuracy of this map may be subject to zoning changes, please check with the City of Westport for actual zoning decisions and accuracy.

Westport_Zoning June2017.mxd 11/2018tj

Appendix C: Youth Mental Mapping Exercise and Site Selection Survey

Ocosta-UW Drone Youth Photovoice: Brainstorming Exercise

Participant ID Number: _____

This worksheet is designed as a space for you to brainstorm and record some of your thoughts about what community means to you and what is important to you in the area you live. Please record your thoughts as we go through the slide deck together.

Part I: Defining Community

What does "**community**" mean to you? What are some communities or groups that you belong to?

Part II: Brainstorming Community Assets

Here, we'll be brainstorming some of the resources that help make your community **resilient**. We'll be referring to these as **community assets**. While there are many ways to think about community assets, we're going to use some broad categories below to make sure we cover as many types as possible. These categories are based on findings from both research and practice, and we have provided some general examples to help get you started. Depending on how different people use it, one community asset may fit into multiple categories—that's fine! Our goal here is to be inclusive as we come up with as many assets as possible. For that reason, there is also an "other" category for you to record any community assets that you feel don't fit neatly into any category we have provided.

People and their "Gifts"

(skills, knowledge, qualifications, passions, leadership positions, relationships, social networks, etc.)

Organizations

(school, clubs, city gov't, nonprofits, employers, volunteer organizations, healthcare, religious centers, etc.)

Built Environment

(parks, sport fields, playgrounds, industrial areas, marina, water tower, paths/trails, etc.)

Natural Environment

(natural resources, forests, beaches, birds, oyster beds, fisheries, etc.)

Cultural Events and Activities

(fairs, markets, festivals, traditions, historical memory, media and sources of information, etc.)

Other

(Anything that doesn't fit the other categories)

Part III: Mental Mapping

Use the space below to draw a map of your community as best as you can from memory.

Part IV: Putting It All Together

Now it's time to pull in everything we've talked about so far. Think about the community assets you brainstormed in Part II. Can you think about where those assets are located? For some, that's easy—it's a physical asset you can visit. Others, like groups or events or networks, might be trickier. But think about the places, structures or spaces they commonly use—that can help! Even after thinking about these assets for a while, you might find that some really have no real location. That's fine, too—we've given you space to record them.

With our remaining time, use the following symbols on the mental map you drew to mark some of the community assets you've identified:

 **< People and their "Gifts"**

 **< Organizations**

 **< Built Environment**

 **< Natural Environment**

 **< Cultural Events and Activities**

 **< Other**

Use to box below to list assets that really have no location:

Ocosta-UW Drone Youth Photovoice Site Selection Survey

Participant ID Number: _____

Thank you for agreeing to participate in the Ocosta-UW Drone Youth Photovoice research project! Now that you've learned a little bit about asset mapping and have had some time to think about what community means to you, we're ready to begin our data collection. Our first research activity is this **short survey to identify places, structures and spaces that are important to you and your community**. The goal of this survey is to learn about the places you like in your town and how disasters might impact them. We will use the results of this survey to plan our drone flights and to categorize the community assets you list, so please try to be as accurate and thorough as possible when describing the places below.

Our survey has **four parts**: describing a place that makes you feel at home **("My Place"),** a place that you feel is important to a group that you belong to **("Our Place")**, and a place that you believe is important to all or most people who live in the area **("The Public's Place")**. When answering the questions below, try to be specific as possible about the place or space you have identified. If the place is bigger than a single property, that is ok—but please try to describe what makes the broad area important, as well as any specific places within it that are important to you. Try **NOT** to select places in your community that are used mostly for living or working (e.g. your home, another private residence, or a large employer in town) **UNLESS** they serve an additional important function (if so, please describe). Instead, consider assets that you or others in your community could use as a resource to address specific needs you might have (e.g., a park, church, community center, store, trail, beach, etc.).

This survey typically takes about **15-20 minutes to finish**. All your answers are private. The survey does not include questions that could identify you. You can skip any question you don't want to answer, and you can stop taking the survey at any time. I will be around to answer any questions you have; just raise your hand!

I. MY PLACE

The following questions are about a place or space that is important to you and makes you feel connected to your community.

1. When you think about your coastal community, what ***place*** makes ***you*** feel most at home/like you belong?

   Place Name and Location (*please be as specific as possible*):_____

   _____

2. **How important** are the following reasons to why this place makes you feel at home/like you belong?

	Not at all	Slightly	Moderately	Very	Extremely
Provides essential needs/services – Food/water, information, education, healthcare, child/elder care	1	2	3	4	5
Personal preferences –This place supports my or my family's specific needs	1	2	3	4	5
Supports community gatherings or sense of community - Cultural/community/sports events or farmers' or art markets, or other key spaces that make your community unique	1	2	3	4	5
Supports my personal wellbeing - I feel comfortable in this space, like I belong, I feel safe, and/or less stressed here	1	2	3	4	5
Opportunities for civic engagement – This space provides opportunities to participate in decision-making in my community (e.g., planning commission, tribal council, neighborhood associations)	1	2	3	4	5
Supports personal connections – This place allows me to connect with family or friends	1	2	3	4	5
Supports my interests —This place allows me to explore my interests (e.g., sports club, service clubs, support groups), and/or engage in religious or spiritual activities	1	2	3	4	5
Exposure to nature – This place provides access to natural landscapes, the ocean, and/or coastal areas.	1	2	3	4	5
Other reasons (please describe):	1	2	3	4	5

3. Please describe how you use this place or space. If you see others using it similarly or differently, you are encouraged to comment on that as well.

4. **How important** is it to protect the place you listed in question #1 from major disasters (e.g., earthquake/tsunami, flood, forest fire) before they happen?

Not at all Important	Slightly Important	Moderately	Very Important	Extremely Important
1	**2**	**3**	**4**	**5**

5. Would you go to this place during the **first two weeks after** a major disaster (e.g., earthquake/tsunami, flood, forest fire)?

□ **YES,** **I would go here because:** (*select all that apply*) □ Critical resources (shelter, first aid, food, information) would be available here □ Friends/family would come here □ I would feel safe here □ This place is likely to be accessible and not damaged (to the best of my knowledge) □ Other reasons:_____	□ **NO, I would not go here. I would prefer to go (name or place description):** _____ _ **I would go to this place because** (*select all that apply*): □ Critical resources (shelter, first aid, food, information) would be available here □ Friends/family would come here □ I would feel safe here □ This place is likely to be accessible and not damaged (to the best of my knowledge) □ Other reasons:_____

6. Is there anything else you want to tell us about this place?

II. OUR PLACE

The following questions are about a place or space that helps you feel connected to some group in your area.

1. When you think about your coastal community, what ***place*** makes ***you*** feel like part of a group? What is the group?

   Group, Place Name and Location (*please be as specific as possible*):_____

   _____

2. **How important** are the following reasons to why this place makes you feel connected to this group?

	Not at all	Slightly	Moderately	Very	Extremely
Provides essential needs/services – Food/water, information, education, healthcare, child/elder care	1	2	3	4	5
Personal preferences –This place supports my or my family's specific needs	1	2	3	4	5
Supports community gatherings or sense of community - Cultural/community/sports events or farmers' or art markets, or other key spaces that make your community unique	1	2	3	4	5
Supports my personal wellbeing - I feel comfortable in this space, like I belong, I feel safe, and/or less stressed here	1	2	3	4	5
Opportunities for civic engagement – This space provides opportunities to participate in decision-making in my community (e.g., planning commission, tribal council, neighborhood associations)	1	2	3	4	5
Supports personal connections – This place allows me to connect with family or friends	1	2	3	4	5
Supports my interests —This place allows me to explore my interests (e.g., sports club, service clubs, support groups), and/or engage in religious or spiritual activities	1	2	3	4	5
Exposure to nature – This place provides access to natural landscapes, the ocean, and/or coastal areas.	1	2	3	4	5
Other reasons (please describe):	1	2	3	4	5

3. Please describe how you and/or the group you belong to use this place or space. If you see others using it similarly or differently, you are encouraged to comment on that as well.

4. **How important** is it to protect the place you listed in question #1 from major disasters (e.g., earthquake/tsunami, flood, forest fire) before they happen?

Not at all Important	Slightly Important	Moderately	Very Important	Extremely Important
1	**2**	**3**	**4**	**5**

5. Would you go to this place during the **first two weeks after** a major disaster (e.g., earthquake/tsunami, flood, forest fire)?

□ **YES,**
I would go here because: (*select all that apply*)

- □ Critical resources (shelter, first aid, food, information) would be available here
- □ Friends/family would come here
- □ I would feel safe here
- □ This place is likely to be accessible and not damaged (to the best of my knowledge)
- □ Other reasons:_____

□ **NO, I would not go here. I would prefer to go (name or place description):**
_____
_

I would go to this place because (*select all that apply*):

- □ Critical resources (shelter, first aid, food, information) would be available here
- □ Friends/family would come here
- □ I would feel safe here
- □ This place is likely to be accessible and not damaged (to the best of my knowledge)
- □ Other reasons:_____

6. Is there anything else you want to tell us about this place?

III. THE PUBLIC'S PLACE

The following questions are about a place or space that is important to many people living in your area.

1. When you think about your coastal community, what ***place*** is important for many people in the area?

   Place Name and Location (*please be as specific as possible*):_____

   _____

2. **How important** are the following reasons to why this place is important for people in your area?

	Not at all	Slightly	Moderately	Very	Extremely
Provides essential needs/services – Food/water, information, education, healthcare, child/elder care	1	2	3	4	5
Personal preferences –This place supports my or my family's specific needs	1	2	3	4	5
Supports community gatherings or sense of community - Cultural/community/sports events or farmers' or art markets, or other key spaces that make your community unique	1	2	3	4	5
Supports my personal wellbeing - I feel comfortable in this space, like I belong, I feel safe, and/or less stressed here	1	2	3	4	5
Opportunities for civic engagement – This space provides opportunities to participate in decision-making in my community (e.g., planning commission, tribal council, neighborhood associations)	1	2	3	4	5
Supports personal connections – This place allows me to connect with family or friends	1	2	3	4	5
Supports my interests —This place allows me to explore my interests (e.g., sports club, service clubs, support groups), and/or engage in religious or spiritual activities	1	2	3	4	5
Exposure to nature – This place provides access to natural landscapes, the ocean, and/or coastal areas.	1	2	3	4	5
Other reasons (please describe):	1	2	3	4	5

3. Please describe how you use this place or space. If you see others using it similarly or differently, you are encouraged to comment on that as well.

4. **How important** is it to protect the place you listed in question #1 from major disasters (e.g., earthquake/tsunami, flood, forest fire) before they happen?

Not at all Important	Slightly Important	Moderately	Very Important	Extremely Important
1	**2**	**3**	**4**	**5**

5. Would you go to this place during the **first two weeks after** a major disaster (e.g., earthquake/tsunami, flood, forest fire)?

□ **YES,**
I would go here because: (*select all that apply*)

- □ Critical resources (shelter, first aid, food, information) would be available here
- □ Friends/family would come here
- □ I would feel safe here
- □ This place is likely to be accessible and not damaged (to the best of my knowledge)
- □ Other reasons:_____

□ **NO, I would not go here. I would prefer to go (name or place description):**
_____
_

I would go to this place because (*select all that apply*):

- □ Critical resources (shelter, first aid, food, information) would be available here
- □ Friends/family would come here
- □ I would feel safe here
- □ This place is likely to be accessible and not damaged (to the best of my knowledge)
- □ Other reasons:_____

6. Is there anything else you want to tell us about this place?

IV. DEMOGRAPHICS

Congratulations on making it to the last section! These questions will help us understand a little bit about you and this group of participants, as well as to compare your answers to other coastal communities in the Pacific Northwest. As mentioned earlier, the information you include here will not be shared alongside anything that could identify you.

1. Name of the city or community where you live: _____

2. Does your family own or rent your primary home (circle one)? OWN RENT

   Other arrangement (please describe):_____

3. How long have you lived in this community? _____

4. Total years living in any coastal community in Washington, Oregon, California, or British Columbia:_____

5. Including you, how many adults and children currently live at your primary home? ____adults ____children

6. What is your age?_____

7. Place(s) of employment:_____ Not employed_____

8. What race/ethnicity group(s) do you identify as?
   Please describe:_____

9. How would you describe your gender identity? (Circle one)

   Female Male Non-Binary Prefer not to say Other (please describe)

10. How would you describe your sexual orientation? (Please note: this question is entirely voluntary)

    Straight/Heterosexual Gay/Lesbian Bisexual Prefer not to say Other (please describe)

11. To the best of your knowledge, what is your total household income (*estimated total income for all members of household*)?

Below 10K	10-25K	25-50K	50-75K	75-100K	100-125K	Above 125K	Do not know	Prefer not to answer
☐	☐	☐	☐	☐	☐	☐	☐	☐

If you have time, please add any additional thoughts about your community and disaster impacts here:

Appendix D: Data Collection Protocol for Drone-Based Photovoice

Drone Photovoice Data Collection Protocol

Pre-Flight Planning

- Ensure at least one member of the data collection team has their FAA Part 107 Small US license on them, and that the license is valid.
- Double check that the drone is in proper working order.
    - Charge the drone's batteries, and clear the memory card ahead of the flight.
- Review local weather conditions, regulations related to flying drones, and no-fly (or restricted flight areas)
- Before going out in the field, make a plan with the participants about which assets you will sample and what order you will sample them in. Use the results of the site selection survey, the interest of the participants, and local conditions to inform your planning.
    - Make sure that your plan complies with local regulations. If necessary, submit the relevant flight plans.
    - If you are planning to document private property, such as a business, encourage the participants to talk with someone associated with the property.
- Check that all participants attending the data collection session are familiar with operating a drone. If they are not, it is recommended that you give them a brief safety talk about drone operation based on FAA regulations (there are many online guides about drone safety that can be used as future reference). For this exercise, participants will need to be familiar with the drone's flight controls, photo and video settings, and pre-programmed flight paths (if any).
- For this exercise, it is helpful to have a small group of participants (roughly 3-5). At minimum, 2 participants should be present alongside a certified drone operator (usually a project team member): one to pilot the drone, and an extra visual observer. Having multiple observers is a significant benefit, especially when operating in reduced visibility or in populated areas.
    - Alternate between which participants are flying the drone and which are serving as visual observers.
    - Encourage any participants not currently flying the drone or serving as a visual observer to take notes in the field; these will be helpful for the focus group discussion(s)

Collecting Drone Footage

- Before documenting the asset, do a safety check of the surroundings to ensure an area clear of obstructions for takeoff and landing. Mark this spot with a physical marker if possible as a reminder of where the drone's "home point" is.

The team should collect different types of drone shots based on the scale of the asset.

For assets that are a structure size (or sit on a single parcel), collect the following:

- **A top down, "plan view" photo**. Rotate the camera angle to 90 degrees. Position the drone directly over the center of the asset and rise to an elevation at which the entire site is visible.
- **360-degree fly around.** Rotate the camera angle to between 30 and 60 degrees. Pick a center point on the asset and ascend to an elevation where the entire site is visible. Steadily circle the asset at the same elevation and keeping the center point in the middle of the field of view.
    - The purpose of this shot is to show the asset in its entirety; it should end up looking like a 3D model.
    - Some drones have this flight path pre-programmed; this may help participants who are less confident in their flying abilities or on windier days.
- **A "Dronie".** Rotate the camera angle to sit between 30 and 60 degrees. Position the drone so the entire front (or the most interesting) side of the asset is visible as a default. Slowly ascend while also pulling away from the asset, keeping it in view.
    - The goal of this shot is to reveal the local context around the asset; you may want to collect multiple iterations of this shot based on what surrounds the asset. Encourage the operator to pick the perspectives that make the most sense to them.
    - Some drones have this flight path pre-programmed; this may help participants who are less confident in their flying abilities or on windier days.
- **Operator's Choice.** Encourage the participant to take another photo or video that they think would be interesting, aesthetically appealing, or reveal something new about the asset.

For assets that are larger than can be captured at the desired detail in their entirety from a single vantage point (e.g. multi-building assets, large structures, or those taking up multiple parcels), especially those that might contain several smaller-scale assets "nested" under them (e.g. a market district or school campus), collect the following:

- **An isometric photo**. Rotate the camera angle to 30 to 45 degrees. Position the drone in a location and elevation where as much of the asset is visible as possible.
- **Cinematic Flyover.** Rotate the camera angle to sit between 30 and 60 degrees. Pick a flight path that will take you across the entirety of the asset. Flying steadily along this flight path, document the entire asset, then turn around and follow the flight path in reverse.
    - In order to fly the length of an asset, you may need to proceed on foot to maintain visual contact. In this case, try to match the speed of the drone with the speed of the group so there are not significant periods where the drone is sitting still. The visual observer or another participant may also want to observe ground conditions to make sure that the team is safe from hazards (e.g. traffic or uneven terrain).
- **Operator's Choice.** Encourage the participant to take another photo or video that they think would be interesting, aesthetically appealing, or reveal something new about the asset.

Collecting Ground Photos.

Collect a set of still photos from the ground—this is used in traditional photovoice.

- Have one participant take 1-3 photos of the asset (highlighting its most important features) with your phone. Instruct them to use their best judgment about the kind of shot they want to take--- what do they want their photo to show about the asset the team is documenting?
    - After collecting images, have the participants share the ground images with the research team. Using a shared drive can be helpful to ensure that both you and the participants have access to the data they collect.

Post-flight Wrap-Up

- Briefly debrief with the team. Take notes if possible and consider using them to inform follow-ups or prompts during the focus group discussion.
    - Sample debrief questions: What did they enjoy about the day's activities? What did they dislike? Did they learn or discover anything new? Was anything surprising to them? Do they have any questions or concerns about the research process?
    - Ask if the day's activities had prompted them to identify any other assets they may want to sample.
        - Alternatively, this can be done while in the field if there is an asset in the area that would be appropriate to sample.
- If participants took notes, encourage them to share them with the research team or else to keep them in a safe place to refer to ahead of the focus group discussion.
- Upload all drone footage to a shared drive that both you and participants have access to.

Appendix E: Focus Group Facilitation Guide

Protocol for Drone-Based Photovoice Focus Group Facilitation

Estimated duration: 100 minutes (with a 10-minute break after 60 minutes)

Location: [redacted]

Welcome

- Thank you for agreeing to participate in our focus group today. My name is Matias Korfmacher, I am a graduate student at the University of Washington. As you know by now, I am part of a University of Washington team working to understand how to improve Westport's disaster resilience, and we've been doing a number of research activities with you over the past few months. Today, we are going to be holding a group discussion to reflect on the drone-flown footage and images.
- The purpose of this discussion is to help us understand the places, spaces, and buildings—what we have been calling community assets-- that make you feel connected to your environment and community. This is important because studies have shown that feeling a connection to your surroundings—sometimes called place attachment—can have important impacts on your mental health after a disaster or other big change, especially for people your age. Our research as a whole has three goals:
    - 1: Identify which community assets help for building place attachment among youths.
    - 2: Figure out ways to incorporate perspectives into disaster planning.
    - 3: Assess how useful a discussion of using drone video and imagery is to learning more about community assets.

Explanation of the process

- We are using a small group discussion format, sometimes called a focus group, to encourage an in-depth discussion between you all. We hope to hear from you the ways in which the places we've documented are important to making you feel at home, as well as your thoughts on the whole research process. There are no wrong answers. We're not trying to achieve consensus; we're gathering information.
- The session will last roughly 1 1/2 hours with a short break in the middle.
- We will be taking notes and recording so that we can refer to the discussion later.
- We may write up our findings in a report or for publication in a peer-reviewed journal. We will not refer to you by name in any report or publication without your prior explicit permission.
- Your participation is voluntary. You can refuse to answer any question, and you can leave the discussion at any time. You will not be penalized for not answering any question or for leaving the session.
- If at any point you have additional questions about the study, our team is available to answer any questions you may have, even about things that are not in this focus group. It is our responsibility to give you the information you need to make a decision and to give you time to think about whether or not you want to participate. If you feel you have been

have been harmed by participating, you can contact us about that too. My number is [redacted], and the faculty advisor's number is [redacted]

- If you want to talk about the study with someone who is not part of the study team, talk about your rights as a research subject, or to report problems or complaints about the study, contact the UW Human Subjects Division at: hsdinfo@uw.edu or 206.543.0098

Ground Rules

- We do have a few ground rules. We hope everyone will participate and chime-in during the discussion. Information provided in the discussion must be kept confidential. Please do not share what was said or who was here. Please stay with the group and avoid distractions.

Questions and consent

- Does anyone have any questions before we begin?
- Do you consent to participate in this focus group and to this discussion being recorded? [Ask everyone to provide a verbal "yes"]
- Turn on recording apps.
- One more time, do you consent to participate in this focus group and to this discussion being recorded? [Ask everyone to provide a verbal "yes"]
- Before we begin, can you please share your participant ID number?

Community Assets (Based on SHOWeD methodology):

- I will now be showing you a presentation of the footage you have all been collecting over the past few months. These have been grouped together by each individual site and general location. As we watch through this, pay attention to any that really grab your attention as important places for making you feel at home or as a part of the community, and feel free to take notes on the provided paper. When we finish, I will ask you what those places are, and we will go through a guided discussion about the ones that you select.

[Play through footage]

- Having seen the footage, what places do you want to talk about?

[For questions 1-6, when an asset is selected, return to it and replay before proceeding through the questions]

1. What do you see in this aerial imagery and footage?

a. Can you describe the scene?
b. What about these images are appealing to you? What do you not like about them?

2. What can you tell us about this place beyond what you see in the images?

3. How do you use or interact with this place?

a. Who else uses this place?

b. How do they use it?

4. Why is this place important to you, your social groups and/or your community?

5. How could your community use these images and footage?

a. Could these be used for educational purposes?

6. What hazards could impact this place? And how do you think those impacts could be lessened?

a. If protected, how could these places be utilized after a disaster to help the community?"

Photovoice Process:

7. What were some of the benefits and drawbacks of using aerial imagery compared to photos from the ground to describe what these places mean to you and your community?

a. Did anything about the aerial images and photography surprise you?

8. What motivated you to participate in this project?

a. How much of a role, if any, did getting to fly drones or learning about flying drones play in to your decisions/motivation to participate during these weekend sessions?

9. How would you improve this drone data collection process in the future?

a. What was your favorite part about this project?

b. What was your least favorite part about this project?

10. Would you recommend that your friends participate in a project like this in the future? Why or why not?

11. Is there anything that you would like to tell us that we have not already discussed?

Appendix F: Codebook

Category	Code	Description [Short]	Category
Imagery	imagery	Parent code for explicit discussions of the imagery (not the assets themselves).	Aim 1
Image Strengths	imagery/img_strngth	Perceieved strengths of the drone-based images.	Aim 1
Image Weaknesses	imagery/img_weaks	Perceieved weaknesses of the drone-based images.	Aim 1
Scene Description	imagery/scn_descrip	Descriptions of the scenes captured by drone-based imagery, including emotional responses to what is shown.	Aim 1
Participation	particip	Parent code related to participation in the research process itself	Aim 1
Process Strengths	particip/proc_strngth	Perceieved strengths of the drone-based photovoice process.	Aim 1
Process Weaknesses	particip/proc_weaks	Perceieved weaknesses of the drone-based photovoice process.	Aim 1
Participant Motivation	particip/motiv	Self-identified motivations for participating in the research process.	Aim 1
Process Recommendations	particip/recs	Identified recommendations for improving the drone-based photovoice process.	Aim 1
Place Elements	place	Parent code for place-sided aspects of place attachment.	Aim 2
Physical Environment	place/phys	Parent code for descriptions of the asset related to physical properties of the asset.	Aim 2
Natural Environment Elements	place/phys/natl	Descriptions of natural environment characteristics of assets.	Aim 2
Built Environment Elements	place/phys/buil	Descriptions of the built environment aspects of assets	Aim 2
Social Arena	place/social	Parent code for descriptions of the asset related to social or otherwise intagible properties of the asset.	Aim 2
Site Context	place/social/site	Parent code for context of the site, such as history, community-level significance, or events/programming at the asset.	Aim 2
Person Elements	person	Parent code for person-sided aspects of place attachment.	Aim 2
Group Significance	person/group	Parent code for discussions of social group or community significance of assets.	Aim 2
Symbolic	place/group/symbol	Perceived symbolic functions served by assets	Aim 2
Economic	place/group/econ	Perceived economic or communal welfare functions served by assets	Aim 2
Cultural	place/group/cultur	Perceived cultural functions served by assets.	Aim 2
Social Support Networks	place/group/support	Descriptions of the way that asssets build social support networks (bridging social capital)	Aim 2
Social Cohesion/Belonging	place/group/belong	Descriptions of the way that assets promote social cohesion or a sense of belonging (bonding social capital)	Aim 2
Individual Significance (Youth)	person/youth	Parent code for discussions of personal significance of assets.	Aim 2
Affect/Aesthetics	person/youth/affect	Discussions of affective or aesthetic contributions of place	Aim 2
Self-Esteem	place/youth/self_est	Discussions of contribution of assets to self-esteem or confidence in oneself.	Aim 2
Self-Growth/Development	place/youth/develop	Discussions of contribution of assets to past or future development or growth	Aim 2
Autonomy/Independence	place/youth/autonom	Discussions of perceived autonomy or independence related to assets.	Aim 2
Safety/Security/Shelter	place/youth/safety	Discussions of a senses of safety, security, or shelter.	Aim 2
Community Assets	assets	Parent code for explicit discussions of community assets.	Aim 3
Perceived Gaps	assets/gaps	Gaps identified by youth in the presence or utilization of community assets.	Aim 2/Aim 3
Perceived Pre-Disaster Resilience Functions	assets/resilience	Perceived role or usefulness for pre-disaster resilience described by youth.	Aim 3
Perceived Pre-Disaster Recovery Function	assets/recovery	Perceived role or usefulness for post-disaster recovery or response described by youth.	Aim 3
Perceived Hazard Exposure	assets/haz_exposure	Describes the hazards that youth perceive assets or the community to be exposed to.	Aim 3
Perceived Usefulness of Imagery	assets/future_use	Describes perceived future community-level usefulness of the drone-flown imagery.	Aim 3

Appendix G: Community Asset Data

Site	My Place	Our Place	Public's Place	Total (Surveys)	Notes	Type	Location	Sampled?
"Bear Forest"	0	0	0	**0**	Included in brainstorming, submitter could not identify location	n/a	n/a	**N**
"Koa House"	0	0	0	**0**	Included in brainstorming, submitter could not identify location	n/a	n/a	**N**
"Lost City of Nome Hiking"/ "Bajillion Miles" (Crashed Boa	0	0	1	**1**	Safety/legality concerns	n/a	n/a	**N**
"The Blue Church Place"	0	1	0	**1**	Submitter could not identify location	n/a	n/a	**N**
"The Docks"	3	2	2	**7**		Business	North Westport/Westhaven	**Y**
"The Reading Tower" (Old Coast Guard Tower)	1	0	0	**1**		Landmark	North Westport/Westhaven	**Y**
Aquarium	0	0	0	**0**	Included in brainstorming	Museum	North Westport/Westhaven	**Y**
Bennett's Fish Shack	0	0	0	**0**	Included in brainstorming	Business	North Westport/Westhaven	**Y**
Bottle Beach	0	0	0	**0**	Included in brainstorming, deemed too far outside study area	n/a	n/a	**N**
Brady's Oysters	0	0	0	**0**	Included in brainstorming, deemed too far outside study area	n/a	n/a	**N**
Community Gym	0	1	0	**1**	Nested (sampled as part of the school campus)	Parks/Recreation	Cohasset Beach/Grayland	**Y**
Cranberry Fields	0	0	0	**0**	Included in brainstorming	Natural Resource Industry	Cohasset Beach/Grayland	**Y**
Elementary School Playground	0	0	0	**0**	Included in brainstorming, nested (sampled as part of school campus)	Parks/Recreation	Cohasset Beach/Grayland	**Y**
Fisherman's Wharf	0	0	0	**0**	Included in brainstorming	Natural Resource Industry	North Westport/Westhaven	**Y**
Football Field/Track	0	0	0	**0**	Included in brainstorming, nested (sampled as part of school campus)	Parks/Recreation	Cohasset Beach/Grayland	**Y**
Gar Park	0	0	0	**0**	Included in brainstorming	Parks/Recreation	Central Westport/Downtown	**Y**
Grayland Beach	0	0	0	**0**	Included in brainstorming	Beach	Cohasset Beach/Grayland	**Y**
Grays Harbor Lighthouse	0	1	0	**1**		Landmark	Central Westport/Downtown	**Y**
Half Moon Beach/Dune Trail	0	0	0	**0**	Included in brainstorming	Beach	North Westport/Westhaven	**Y**
Harriet Dorland Municipal Park	0	0	0	**0**	Included in brainstorming	Parks/Recreation	Central Westport/Downtown	**Y**
Jetty	0	0	0	**0**	Included in brainstorming, team elected not to sample	n/a	n/a	**N**
McCauseland Hall	0	1	0	**1**	Nested (sampled as part of the The Docks)	Museum	North Westport/Westhaven	**Y**
Neighborhood [Redacted Streets]	1	0	0	**1**	Disqualified	n/a	n/a	**N**
Ocosta Junior-Senior High School and Campus	2	2	0	**4**		Educational Facility	Cohasset Beach/Grayland	**Y**
Richmond Soccer Field	0	0	0	**0**	Included in brainstorming, team elected not to sample	n/a	n/a	**N**
Shop n' Kart	0	0	0	**0**	Included in brainstorming, team elected not to sample	n/a	n/a	**N**
South Beach Christian Center	0	0	0	**0**	Included in brainstorming	Religious Institution	Cohasset Beach/Grayland	**Y**
Subway	0	0	1	**1**	Team elected not to sample	n/a	n/a	**N**
Surfer Beach	0	0	0	**0**	Included in brainstorming, team elected not to sample	n/a	n/a	**N**
Surfer Girl	0	0	0	**0**	Included in brainstorming	Business	North Westport/Westhaven	**Y**
Tres Figgies	0	0	0	**0**	Included in brainstorming, nested (sampled as part of the The Docks)	Business	North Westport/Westhaven	**Y**
Washaway Beach	0	0	0	**0**	Included in brainstorming, deemed too far outside study area	n/a	n/a	**N**
Westport Viewing Tower	1	0	0	**1**		Landmark	North Westport/Westhaven	**Y**
Whale of a Cone	0	0	0	**0**	Included in brainstorming, nested (sampled as part of the The Docks)	Business	North Westport/Westhaven	**Y**
Wheelhouse Restaurant	0	0	0	**0**	Included in brainstorming	Business	Cohasset Beach/Grayland	**Y**
Whitecap Espresso	0	0	0	**0**	Included in brainstorming, team elected not to sample	n/a	n/a	**N**

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