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Examining coastal sense of place through community geography in Island County, Washington

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ABSTRACT

The world's coastlines are changing, partly the result of population growth and shoreline development (e.g., infrastructure). Coastal landscape changes are reflected and experienced at the local scale, where landscape modifications and their impacts take place. Island County, Washington (U.S.) is experiencing such changes. Island County's 349 kilometres of coastline are being impacted by the growing threat of coastal infrastructure, which hardens the shoreline and negatively impacts natural nearshore processes and habitats. Coastal changes also impact communities and their connections to the landscape. Through a community geography approach, this paper examines Island County residents' coastal sense of place. Respondents overall have a strong coastal sense of place, including shared place meanings. This strong sense of place is associated with shoreline visit frequency and feelings about change. The paper's findings demonstrate how residents feel and connect to the coastline, and why such local insights matter to coastal planning and recovery.

KEYWORDS

Sense of place; community geography; coastal landscape; Puget Sound

Introduction

The world's coastlines are changing. Coastal areas are experiencing population growth and development, that has produced demographic 'sea change,' and landscapes defined by 'concrete coasts,' (Gurran & Blakely, 2007; Keegan, 2020). This growth and coastal hardening are altering landscapes, ecosystems, and communities. This growth is represented in coastal population increases. For example, around 39% of the United States (U.S.) population now lives in coastal areas (counties) (National Oceanic & Atmospheric Administration, 2013). This growth is reflected on the coastal landscape. For example, 14% of the U.S. coastline is hardened with infrastructure or shoreline armour (Gittman et al., 2015).

Landscape changes, like coastal infrastructure installation, are reflected, if not heightened and experienced, at the local scale, where landscape modifications, planning actions, and their impacts take place (Taylor & Hurley, 2016). This study focuses on Island County, Washington (U.S.), primarily consisting of Whidbey and Camano Islands, Whidbey Island being the largest

island in WA (Terich, 1987). Island County's shoreline is approximately 349 kilometres, including the region's longest bluff at 151 kilometres (Ramirez, 2018). Island County is part of the 12-county Puget Sound region, an area with 4,023 kilometres of shoreline, approximately 30% of which is armoured (Ramirez, 2018). This armour is largely attributed (68%) to single-family property owners (Ramirez 2018). Island County's shoreline is integral to the region's ecosystem, particularly for forage fish and salmon (Island Local Integrating Organisation [ILIO], 2017). Island County, like the rest of the region, is experiencing population growth (OFM [Office of Financial Management], 2017), which has exacerbated the need to better understand and address coastal change.

This study addresses coastal change by examining residents' sense of place. Sense of place is an interdisciplinary construct broadly referring to people's place attachments and meanings (Masterson et al., 2017; Smith, 2018). Sense of place has expanded in applied usage, as sense of place is linked to behaviours, place change responses, and human wellbeing (Poe, Donatuto, & Satterfield, 2016; Simms, 2021; Trimbach, Fleming, & Biedenweg, 2022). In the Puget Sound region, sense of place is recognised as a human wellbeing measure of ecosystem health and recovery (Biedenweg & Trimbach, 2021). When places, including ecosystems and landscapes change or are faced with change, people's senses of place and wellbeing are also changed or threatened with change, often triggering varying responses (Devine-Wright, 2013; Marshall et al., 2019; Simms, 2021). For example, place change may trigger landscape solastalgia or place-based grief and distress (Simms, 2021). By gauging residents' sense of place, this study highlights what residents value, what residents may be compelled to preserve or protect, and what should be incorporated into coastal planning and recovery. This project intentionally gauged residents' sense of place in order to directly inform local watershed recovery plan adaptive management and recovery decision-making processes in Island County. The project design and research instrument were co-created with the Island County's local watershed group, referred to as the Island Local Integrating Organisation (ILIO). By gauging residents' sense of place, this project aimed to help better understand residents' coastal connections, observations, and potential responses to coastal change in a region recognised for its important shorelines and nearshore habitats. The project also aimed to better engage local residents within local management and recovery processes.

Using a community geography (CG) approach, 'a form of research praxis, one that involves academic and public scholars with the goal of co-produced and mutually-beneficial knowledge,' this paper examines residents' sense of place of the coastal landscape (Shannon et al., 2021, p. 1). Through a sense of place lens to gauge people-place relationships, this study illustrates the potential roles of sense of place and CG within coastal planning, including to help democratise landscape planning and enhance landscape citizenship (Bieling, 2013; Waterman, 2021). In this paper, we define sense of place, describe our context, outline our approach and methods, and then highlight our findings and implications for coastal planning and recovery.

Sense of place

Sense of place is a well-recognised construct within geography and other environmental fields (Masterson et al., 2017; Williams, Stewart, & Kruger, 2013). Sense of place has expanded within more applied fields, including coastal planning and management (Ryfield, Cabana, Brannigan, & Crowe, 2019; Sakurai, Ota, & Uehara, 2017). Sense of place entails diverse conceptualisations and applications (Williams, 2014); however, this study frames sense of place as people's place attachments and meanings (Masterson et al., 2017; Smith, 2018). As an encompassing construct, sense of place includes mutually constitutive components that include: place attachment, place-based connections, bonds, and senses of belonging, including those symbolic or emotional; place dependence, a reliance on place for need and goal achievement; and place identity, place-based

identification, including identities associated with nation-states, cities, landscapes, physical environment, and even islands (Bustos & Roman, 2019; Masterson et al., 2017; Smith, 2018; Trimbach, 2016, 2022; Williams, 2014).

Although often separately examined, place meaning is another key component of sense of place (Masterson et al., 2017). Place meaning is defined as the ‘various forms of knowledge and beliefs about a place (including scientific and traditional or local forms of knowledge), as well as deeper, more emotional, symbolic relationships between a person or group and a place,’ (Williams et al., 2013, p. 5). Place meaning includes both intangible and tangible meanings that have complex layers (Trimbach & Biedenweg, 2021; Williams, 2014). These layers include: identity-expressive meaning, defined as intangible, contextual, emotional, personal, highly subjective, and symbolic meanings that are derived from individual place-based experiences; socio-cultural meaning, defined as intangible meanings linked to the everyday cultural, geographical, historical, intangible, and social place-based contexts; inherent meaning, defined as the essential, material, and tangible aspects of a place; and instrumental meaning, characterised as the material aspects of a place that facilitate peoples’ goal or need fulfilment (Williams, 2014). Identity-expressive and socio-cultural meanings are identified as more socially constructed, contextual, subjective, intangible, and personal; while inherent and instrumental meanings are considered surface-level meanings that are also more objective, generalisable, tangible, and shared (Williams, 2014).

Sense of place has grown considerably in environmental and coastal applications (Marshall et al., 2019; Poe et al., 2016; Ryfield et al., 2019; Sakurai et al., 2017). This growth is partly grounded on two common understandings of sense of place, both of which have been illustrated within interdisciplinary social sciences and even neurobiology (Lengen & Kistemann, 2012; Masterson et al., 2017). First, sense of place is recognised as informing, if not predicting, behaviours and responses to change (Anton & Lawrence, 2016; Jorgensen & Stedman, 2001). For example, Marshall et al. (2019) found that place attachment and meaning informed people’s solastalgia associated with environmental (Great Barrier Reef) decline. Reilly, Adamowski, and John (2019) demonstrated how differing place meanings informed residents’ infrastructure (dam) removal responses. Devine-Wright (2013) found that intensities and varieties of place attachment should be considered when planning for energy infrastructure installation, as it impacts residents’ positions. Similarly, Shuhei (2016) found that infrastructure can impact communities’ interactions and connections to place. This research has helped demonstrate that “we become attached to a landscape as embodying a certain set of meanings, and it is those meanings we seek to preserve,” through our behaviours and responses to change (Masterson et al., 2017, p. 54).

Second, sense of place is an integral aspect of human wellbeing (Blenckner et al., 2021; Poe et al., 2016). For example, Frumkin (2003) observed that sense of place has health benefits, as place contributes to aesthetic, physical, social, psychological, and even spiritual outcomes. Similarly, Ellis and Albrecht (2017) found that sense of place can help understand climate change impacts, including increased mental health risks. Stemming from the Millennium Ecosystem Assessment (MA) (2005), sense of place has been identified as a human wellbeing measure of ecosystem health (Biedenweg & Trimbach, 2021; Blenckner et al., 2021). This has largely unfolded through an ecosystem services’ lens, which has framed sense of place as a benefit derived from the environment or landscape (Biedenweg & Trimbach, 2021; Marques, McIntosh, & Kershaw, 2021). Sense of place has been identified as a measure of ecosystem health for Puget Sound and Baltic Sea (Biedenweg, 2017; Blenckner et al., 2021). Additionally, Ryfield et al. (2019) demonstrated that sense of place is not just immaterial or intangible cultural ecosystem service or benefit, but rather a socially-produced, material, and highly pertinent service that should be better integrated into ecological research and assessment. This study recognises both understandings of sense of place, as sense of place informs responses to place change, and those responses likely are the result of threats to or potential declines in one’s place-rooted wellbeing.

Sense of place research has also highlighted how sense of place is often informed or mediated by demographic, geographic, or other variables (Marshall et al., 2019; Scyphers et al., 2019;

Trimbach & Biedenweg, 2021). Place of residence and length of residence have been shown to impact sense of place, including predicting the strength or intensity of place attachment (Anton & Lawrence, 2016). Scyphers et al. (2019) found that proximity and place of residence, like shoreline property ownership, influences people's grasp of shoreline problems and changes. Trimbach and Biedenweg (2021) found that place of residence, visit frequency, and property ownership informed coastal place meanings among Puget Sound residents. Such findings exemplify how 'people's direct and indirect interactions with a location give it meaning, and therefore, different modes of interaction can produce different meanings for the same setting,' (Reilly et al., 2019, p. 36). Thus, varying factors, like visit frequency, geographic proximity, or even feelings about change, contribute to people's sense of place. Building upon this research, this study examines residents' coastal sense of place in order to contribute to Island County coastal planning and recovery, including by integrating potentially mediating variables.

Island County, Washington

Island County is located in the 12-county Puget Sound region of Washington State (Figure 1). Island County primarily consists of Camano and Whidbey Islands. Whidbey Island is 437 square kilometres in area, 59 kilometres long, and has 230 kilometres of marine shoreline (Island Local

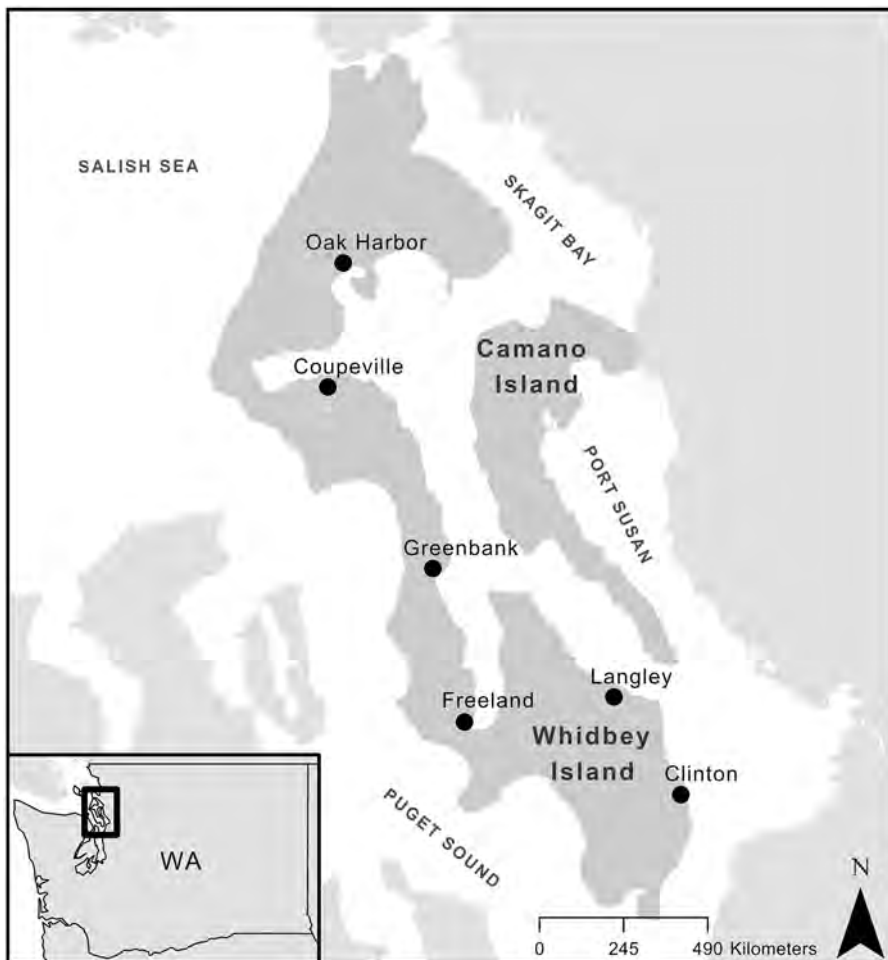


Figure 1. Map of Island County, WA.

Table 1. Island County, Washington profile (Island Local Integrating Organisation [ILIO] 2017; Ramirez, 2018; US Census Bureau, 2020).

Location	Island
Population (persons)	86,857
County shoreline (kilometres)	349.7 (marine and freshwater shorelines)
Total coastal infrastructure (kilometres, %)	85.6 (24.8%)
New coastal infrastructure (%)	12%
Removed coastal infrastructure (%)	10%

Integrating Organisation [ILIO] 2017). Camano Island is 103 square kilometres in area, 25 kilometres long, and has 83 kilometres of marine shoreline (Island Local Integrating Organisation [ILIO] 2017) (Table 1). Both islands are narrow and long. At no point are residents more than 4 kilometres from the coastline (Cline, Jones, Dion, Whiteman, & Sapik, 1982). Island County also includes 57 public beaches and 22 private beaches (Island Local Integrating Organisation [ILIO] 2017). Bluffs or sea cliffs are well-recognised features of Island County's shoreline (Figure 2) (Johannessen & Chase, 2005; Terich, 1987). Island County's coasts predominantly include bluff-backed beaches and barrier beaches (Island Local Integrating Organisation [ILIO] 2017). Island County's bluffs can reach up to 61 metres and vary due to hydrology, erosion rates, geologic composition, upland relief, and vegetation.

Prior to colonial settlement, what comprises Island County today was inhabited by Coast Salish peoples, including members of the Skagit, Snohomish, Clallam, and Kikiallus indigenous communities (Cummings, 2020; White, 1980). Island County remained predominantly indigenous until the 1850s (White, 1980). Through settler colonialism, a structure of enacted dispossession, elimination, and rebuilding (Wolfe, 2006), the area's indigenous peoples were replaced by white settlers, encouraged to migrate through government incentives and economic opportunities (Cummings, 2020; White, 1980). Today, Island County consists of 86,857 residents, the majority of which are white (85.2%) with a large share being older than 65 (25.2%) (US Census Bureau, 2020). Island County has also experienced population growth (OFM [Office of Financial Management], 2017), much of which has been linked to the military and retirees (Island County, 2016).

Population growth has increased coastal changes. These changes are reflected on the landscape through development, particularly the installation of coastal infrastructure, often referred to as hard shoreline armour (e.g. seawalls, bulwarks, and revetments) (Dethier et al., 2016). Around 34.4% (363 kilometres) of the 12-county region's feeder bluffs and 22.6% of Island County's feeder bluffs have been armoured, restricting natural nearshore processes (Ramirez, 2018). While such infrastructure is intended to limit hazards and reduce risks to property and persons, armour degrades nearshore habitats, disrupts natural processes, reduces beach access, impacts landscape visuals, and threatens ecosystem health (Gittman et al., 2015). In the Puget Sound region, armour is considered a cause of nearshore habitat decline, which impacts invertebrates, forage fish, terrestrial birds, and juvenile salmon (Dethier et al., 2016; Ramirez, 2018).

Coastal changes are also reflected in coastal planning and recovery. Puget Sound's coastal planning and recovery is managed by a complex environmental governance regime that includes institutes of higher education, public agencies, and nonprofits, among other groups (Trimbach & Biedenweg, 2021). Armour installation, removal, and renewal is monitored on a regional scale by the Puget Sound Partnership (Partnership), a WA public agency that coordinates ecosystem recovery and monitoring in the region (Biedenweg & Trimbach, 2021; Ramirez, 2018). The Partnership coordinates with ten local watershed groups, known as Local Integrating Organisations (LIOs), which vary in location, structure, and membership, but share local recovery roles.

The Island Local Integrating Organisation (ILIO) is Island County's local watershed group. ILIO is supported by the U.S. Environmental Protection Agency and Partnership, but situated within the County's Department of Natural Resources. The ILIO is one of multiple LIOs (local integrating



Figure 2. Photo of Island County Shoreline and Bluffs.

organisations or watershed planning groups) that participate and hold distinct roles within the Partnership's Puget Sound ecosystem recovery system or environmental governance regime (Koontz & Thomas, 2018). LIOs are a local recovery mechanism that also contribute and participate in regional (state and federal) recovery planning processes, like recovery strategy prioritisation. ILIO's focus area of recovery planning and coastal management coincides within Island County's jurisdictional boundaries. Comprised of a technical committee (TC) and executive committee (EC), that include tribal, non-profit, county, city, state, community, port, and military representatives (TC), and elected officials (EC), the ILIO helps coordinate recovery at the local scale, including through a local recovery plan. The ILIO recovery plan recognises the importance of the Island County's shoreline (Island Local Integrating Organisation [ILIO] 2017). According to the plan, around 80% of coastal properties are either developed or slated for development, including valuable nearshore habitats (Island Local Integrating Organisation [ILIO] 2017). Many of the identified recovery goals focus on shorelines, given that reducing or removing coastal infrastructure can help restore habitats (Island Local Integrating Organisation [ILIO] 2017). According to the ILIO (2017), Island County's shorelines include the largest documented spawning habitat area for forage fish (e.g. sand lance, surf smelt, and herring), which are an integral food source for salmonids, including endangered Chinook. Given the role Island County's shorelines play in the ecosystem and recovery, the ILIO working with the lead author co-created a survey to gauge residents' sense of place of the shoreline for coastal planning and recovery purposes.

This co-created survey was a direct extension of a 4-year collaborative project more broadly focussed on integrating the social sciences and human wellbeing within coastal planning and recovery. The larger project was collectively devised among an academic researcher, Partnership, and LIOs, with some LIOs, like ILIO, self-selecting and opting into the project. The lead author was the broader project's key manager and responsible for working with ILIO during the 4-year

period. The lead author was also an embedded researcher, whom while working for an academic institution was housed at the Partnership due to its proximity and linkages to the region, LIOs, and other key ecosystem recovery partners relevant to this project and others. The lead author worked closely with ILIO leadership and members over a 4-year process, including by attending and participating in approximately 48 meetings (e.g. ILIO EC or TC meetings, broader cross-LIO meetings, or other pertinent project planning meetings). This work included meeting attendance and group engagement, presentations or workshops, project co-creation and co-implementation, knowledge co-production, and project refinement and adjustment when deemed appropriate by ILIO. The survey project emerged as a tool and opportunity to address a key ILIO-identified gap within their planning and management efforts. This gap entailed a lack of broader community input and engagement among residents within local coastal and recovery planning. This gap demonstrated a lack of ILIO-community interaction and lack of understanding as to whether or not ILIO goals, values, or actions aligned with those of county residents. This gap was identified during the final year of the 4-year project, partly as a result of initial project outputs and barriers, and was determined to be a first step to address the noted gap. This survey project coincided with interest and linkages to the lead authors work on human wellbeing and sense of place within the Puget Sound region, including senses of place focussed on coastal or nearshore areas (Trimbach 2022; Trimbach & Biedenweg, 2021).

Community geography (CG) approach & methods

This study applies a CG approach. CG is an emerging subfield and considered 'a form of research praxis, one that involves academic and public scholars with the goal of co-produced and mutually-beneficial knowledge,' (Shannon et al., 2021, p. 1). CG is informed by black, feminist, participatory, and critical geographies, and pragmatic social enquiry, as it seeks to foster change and empower communities (Barrett & Bosse, 2021; Shannon et al., 2021). According to Shannon et al. (2021), CG is guided by five principles, that include: (1) emphasis on place and place-based issues; (2) multiple positionalities among project collaborators (e.g. researcher and community partners); (3) reciprocal and dedicated community collaborations; (4) diverse methods, theoretical frameworks, and epistemologies; and (5) publicly accessible scholarship and open research. This project integrated and reflected these five principles. For example, this project included an emphasis on place (Island County's coastal areas) and place-based issues like coastal pressures and the need to improve coastal management. This project also aligns with Fischer et al.'s (2021) CG guide, which outlines the who, why, and how of CG. For example, this project demonstrates a collaborative relationship between non-academic community partners, as represented by ILIO, and an academic researcher (who). This relationship was established in 2017 through the co-creation of a multi-year project that emerged into this specific coastal management project. Both ILIO and researcher identified shared interests and co-developed plans to examine and address these shared interests. ILIO was interested in better engaging residents around restoration planning, including its integral shorelines or nearshore habitats, and this aligned well with the researcher's experience and complementary coastal sense of place research (Trimbach 2022; Trimbach & Biedenweg, 2021). The project also entailed numerous benefits to the researcher and non-academic community partners (why). One benefit included addressing an ILIO-identified concern and issue associated with local coastal management and restoration, notably the lack of broader community input and engagement into their work, including as it related to coastal prioritisation and plan adaptive management. This also benefitted the researcher by directly engaging in community-engaged scholarship that would have an impact on their partners and build upon their sense of place research. This project also was designed, implemented, disseminated in a highly collaborative process (how). The project itself was co-created between the researcher and ILIO members. This co-creation process allowed the ILIO members to work closely with the researcher in all aspects of the research

process. This co-creation process is outlined further in the following paragraphs. The application and inclusion of CG has much to offer landscape and coastal work, particularly as research increasingly demonstrates the need and effectiveness of community-led conservation and landscape management (Bieling, 2013; Dawson et al., 2021). For the purpose of this study, CG is understood to be a mechanism to help democratise and enhance landscape citizenship and justice (Bieling, 2013; García, Ghislanzoni, & Trujillo Carmona, 2020; Waterman, 2021).

CG was applied through community-based participatory research (CBPR) and a survey (de Vos, Preiser, & Masterson, 2021; Fischer et al., 2021; Leavy, 2018). CBPR is a collaborative and problem-centred approach, informed by equity, cultural sensitivity, and justice considerations (Leavy, 2018). This specific study was an off shoot of a multi-year (2017-2021) CBPR project focussed on integrating the social sciences within coastal planning and recovery. This study emerged collaboratively, demonstrating the responsive design of CBPR, which allows for design or problem modification (de Vos et al., 2021; Leavy, 2018). In response to the project's trajectory, a survey was co-created with ILIO members. Although the lead author had initial ideas, some of which were fully integrated into the study and survey instrument, including questions supported by other sense of place research (Fleming & Biedenweg, 2019; Jorgensen & Stedman, 2001; Trimbach, 2022), the ILIO members had the opportunity to modify, question, and critique the instrument, including by integrating local knowledge. The primary sense of place questions, were borrowed from and supported by other regional sense of place research, including a regional subjective human wellbeing survey that includes a sense of place index (Fleming and Biedenweg, 2019). This index is used to gauge and measure sense of place as it relates to the natural environment and ecosystem health of the region (Fleming and Biedenweg, 2019; Trimbach et al., 2022) and has been adapted to study coastal or shoreline areas (Trimbach, 2022; Trimbach & Biedenweg, 2021). Some additional questions were borrowed from a longitudinal survey previously conducted by the State of Washington focussed on residents' knowledge and perceptions of coastal management (Canning, 2003). Questions are further outlined in the findings section. ILIO members were also instrumental in survey distribution. To ensure accessibility, project communication and engagement materials, including the survey, was translated into the Spanish.

The survey was implemented using snowball sampling methodology (SSM) during the fall of 2020. SSM is a common sampling technique, whose strengths include: helping elicit responses from underrepresented or excluded populations; building trust; and gauging perceptions (Bernard, 2006). SSM is also a convenient affordable approach to sampling (Trimbach, 2016). SSM does have recognised weaknesses, including sampling bias (Bernard, 2006). Through SSM, the survey was distributed electronically (e.g. email distribution lists and social media) and physically (e.g. flyers with QR codes posted along the shoreline) via co-created outreach materials.

The lead author conducted statistical analysis using Statistical Package for Social Sciences (IBM SPSS Statistics 26) to examine survey responses. For closed-ended agreement statements, statistical analysis was conducted, highlighting descriptive frequencies and associations. Given that categorical variables were primarily collected, analysis emphasised Pearson's chi-square (χ^2) and Cramer's V demonstrating significant associations (χ^2) between specific variables and their effect sizes (V) (Field, 2013). The open-ended place meaning question responses were analysed via NVivo qualitative software. These specific responses were analysed using an inductive coding approach using place meaning thematic layers produced by Williams (2014). Responses were coded with one or more meaning layer, given that responses ranged from one word (e.g. 'Home') to more than one sentence (e.g. 'It is a place where the water and land meet and share the same space with me. Going to the beach touches a place in my soul.'), often layering meanings. Thus, some responses were coded once, while others were coded more than once. As this study emphasised variable associations, place of residence (city/town), length of residence, shoreline property ownership, type of residence (part- vs. full-time), shoreline visit frequency, and feelings about shoreline change were the primary variables used in the analysis; however other demographic variables were also integrated and analysed, including: sex, age, and race/ethnicity.

Findings

Demographics

A total of 327 (*n*) Island County residents participated in the survey (Table 2). Survey respondents included a diverse range of residents; although the majority of respondents were over the age of 50 (91%). This pattern is likely linked to SSM and/or the County's growing retiree population (Island County, 2016). Respondents also included Asian (0.7%), Black and African American (.7%), American Indian and Alaska Native (2%), Other (2.7%), Two or more Races (3.7%), and White (90%) residents. This over- and underrepresentation, is likely the result of sampling; although standard survey sampling often faces similar issues (Laganà et al., 2013). Although intentional steps were taken to ensure greater Hispanic or Latino representation, including targeted translations and outreach, this community was not represented.

Respondents also included residents from Camano (20%), Coupeville (16%), Freeland (15%), Langley (14%), Oak Harbour (12%), Clinton (11%), Greenbank (5%), and other locations (3%) (non-responses (3%)) (Figure 1). Respondents reflected population growth trends in the region (OFM [Office of Financial Management], 2017; Trimbach et al., 2022), in that respondents included individuals who have resided in Island County for less than 1 year (5%), 1–5 years (26%), 6–10 years (18%), 11–20 years (21%), and more than 20 years (27%), along with some non-responses (3%). The majority of respondents also lived in the county full-time (90%) vs. part-time (7%) and did not own shoreline property (73%) rather than owning shoreline property (26%).

Coastal visits and change perspectives

Respondents predominantly visited the county's shoreline weekly (51%) (Figure 3). Respondents visited the county's shoreline for a diverse range of purposes, including (in frequency selection order): psychological wellbeing (21%), relaxation (20%), health reasons (16%), sense of escape (13%), recreation (11%), social reasons (7%), and other (6%). Other responses included a diverse range of explanations, including dog walking.

Respondents were also asked a series of questions associated with their experiences with local coastal change. Respondents were first asked whether or not they had observed change to the county's shoreline. The majority of respondents selected that yes (70%) they had observed change, while other survey participants shared that they didn't know (15%) or no (15%). Respondents were also asked to identify those observed changes. Based on a co-created list of potential coastal changes, respondents selected (in frequency selection order): coastal erosion (24%), development (24%), development (non-infrastructure) (16%), increased public access (9%), other (open response) (8%), decreased public access (8%), shoreline restoration (8%), coastal flooding (7%), shoreline armour installation (6%), sea level rise (6%), natural shoreline protection (5%), and economic activities (3%). The other response included a diverse range of changes, including loss of vegetation and increased noise pollution. When asked to evaluate these coastal changes, respondents had mixed feelings or perspectives. Of those who responded, more

Table 2. Age and gender distribution (age and/or gender not indicated: 12).

Age group	Female	Male	Other	Total
18–19	0	1	0	1
20–29	1	1	0	2
30–39	11	4	1	16
40–49	5	5	0	10
50–59	25	18	1	44
60–69	70	55	1	126
70–79	38	67	0	105
80 and older	5	6	0	11
Total	155	157	3	315

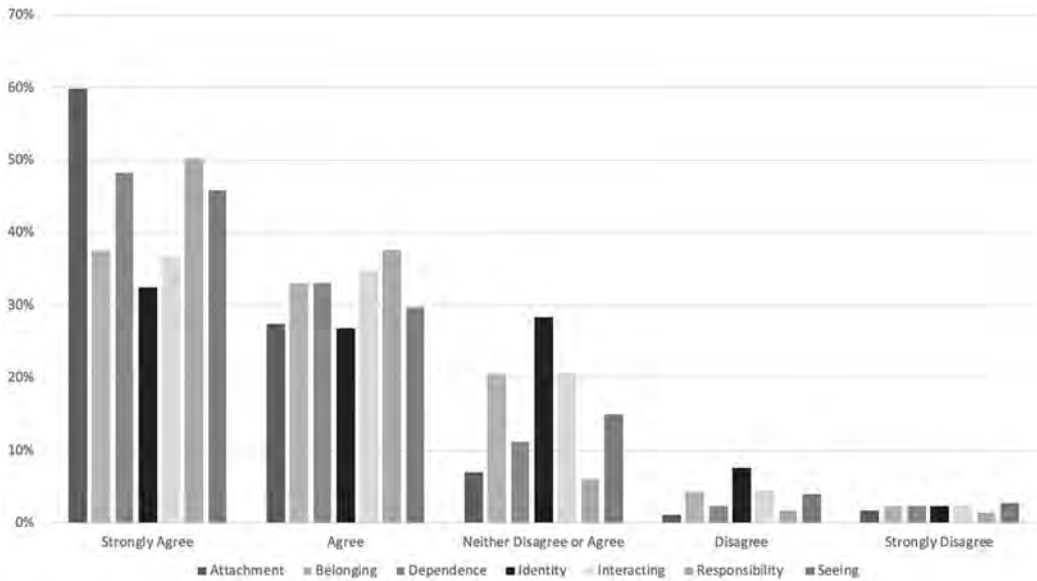


Figure 3. Sense of place survey responses (%) ($n = 327$).

respondents selected negative (44%) and neutral (30%) compared to positive (13%) and I don't know (13%).

Coastal sense of place

Based on the agreement statement responses, respondents demonstrated a strong coastal sense of place (Figure 3). Respondents strongly agreed that they felt attached ('I feel very attached to the county's shoreline') to the county's shoreline (60%) and felt responsible ('I feel responsible for taking care of the county's shoreline') for the county's shoreline (50%). Respondents also noted that they strongly agreed and agreed (combined) that they are dependant ('I feel dependant on the county's shoreline for recreation, work, community activities, and/or relaxation') on the county's shoreline (81%), associated their identity ('The county's shoreline is important to my identity') with the county's shoreline (59.3%), and felt a sense of belonging ('The county's shoreline provides me with a sense of belonging') with the county's shoreline (71%). Respondents also strongly agreed and agreed (combined) on the importance of seeing ('I feel that is it important to see the county's shoreline on a weekly basis') (76%) and interacting ('I feel that it is important to interact with the county's shoreline on a weekly basis') (71%) with the county's shoreline on a weekly basis. Such response frequencies demonstrated that not only does the coast matter greatly to respondents, but also that coastal interactions are integral, and likely contribute to this strong coastal sense of place.

A selection of respondents ($n = 195$) also responded to 'In your own words, what does the county's shoreline mean to you?' (Table 3). Using predefined thematic place meaning layers (Trimbach, 2022; Williams, 2014) as a lens to code responses, the respondents demonstrated that the county's shorelines largely represent instrumental (55%) and identity-expressive (55%) meanings. Respondents' place meanings were both tangible and intangible, linked to other sense of place components (e.g. attachment and identity), and shoreline interactions (e.g. recreation). Such meanings contribute to respondents' overall sense of place.

Additional analyses were implemented in order to understand demographic, geographic, and feelings about change linkages with responses. Among the demographics, self-identified sex was significantly associated with sense of place responses. For example, sex had a significant

Table 3. Place meaning thematic layers ($n = 195$).

Meaning layer	Frequency (%)	Example
Instrumental	55	'Recreation, economic and psychological wellbeing.'
Identity-expressive	55	'I feel the shorelines provide me with an important connection to my environment.'
Inherent	30	'To provide habitat for marine invertebrates, forage fish in a clean non-polluted and the interface they provide to marine estuaries and rivers.'
Sociocultural	25	'It is a large part of what makes Whidbey Island special.'
Other	3	'My dog loves the beaches.'

association with place dependence, $\chi^2(8, n = 327) = 24.00, p < .01, V 0.19$, place attachment, $\chi^2(8, n = 327) = 19.31, p < .05, V 0.17$, place belonging, $\chi^2(8, n = 327) = 18.15, p < .05, V 0.17$, and coastal interactions, $\chi^2(8, n = 327) = 19.31, p < .05, V 0.17$. While there was a significant association, most linkages had low-moderate effect sizes. Sex was the only demographic variable with sense of place response associations.

Visit frequency was the sole geographical variable associated with sense of place responses and only variable associated with all sense of place components. For example, visit frequency responses were significantly associated with place dependence, $\chi^2(20, n = 327) = 80.77, p < .001, V 0.25$, place attachment, $\chi^2(20, n = 327) = 74.44, p < .001, V 0.24$, place responsibility, $\chi^2(20, n = 327) = 56.26, p < .001, V 0.21$, place identity, $\chi^2(20, n = 327) = 60.75, p < .01, V 0.22$, place belonging, $\chi^2(20, n = 327) = 68.26, p < .001, V 0.23$, seeing the coastline, $\chi^2(8, n = 327) = 117.55, p < .001, V .30$, interacting with the coastline, $\chi^2(20, n = 327) = 109.98, p < .001, V 0.30$. All of these associations had low-moderate effect sizes. Overall, this consistent association has demonstrated that visit frequency, or coastal interactions contributes to coastal sense of place.

Respondents' feelings towards coastal change (e.g. positive, negative, neutral, and I don't know), also were significantly associated with all sense of place component responses. Feelings about coastal change were found to be significantly associated with place dependence, $\chi^2(16, n = 327) = 58.73, p < .001, V 0.22$, place attachment, $\chi^2(16, n = 327) = 30.75, p < .001, V 0.16$, place responsibility, $\chi^2(16, n = 327) = 39.33, p < .001, V 0.18$, place identity, $\chi^2(16, n = 327) = 43.44, p < .001, V 0.18$, place belonging, $\chi^2(16, n = 327) = 30.70, p < .05, V 0.16$, seeing the coastline, $\chi^2(16, n = 327) = 33.44, p < .01, V 0.16$, and coastal interactions, $\chi^2(16, n = 327) = 36.84, p < .01, V 0.17$. Additionally, these associations had low-moderate effect sizes, but illustrated that feelings about coastal change are linked to residents' sense of place. Overall, these findings demonstrated that different variables, notably visit frequency and feelings about coastal change partly contributes to residents' sense of place.

Discussion

Sense of place research suggests that people's sense of place is linked to place-based behaviours, responses to place change, and people's overall wellbeing (Masterson et al., 2017; Trimbach & Biedenweg, 2021). This study has illustrated that respondents have a strong sense of place of Island County's coastline, notably strong place attachment and sense of responsibility. This strong sense of place is supported by shared place meanings, notably instrumental and identity-expressive, both of which demonstrate how emplaced experiences, interactions, and meanings foster such strong attachments and senses of responsibility (Anton & Lawrence, 2016; Masterson et al., 2017). Such a strong sense of place was also associated with respondents' sex, visit frequency, and feelings about change.

Such findings have been observed elsewhere within sense of place and coastal research (Marshall et al., 2019; Scyphers et al., 2019; Trimbach, 2022). For example, Marshall et al. (2019)

found that female respondents often were more likely to experience solastalgia than males in response to environmental degradation. Similarly, Scyphers et al. (2019) found that geographic proximity, like shoreline property ownership, influences people's grasp of shoreline problems and changes. Additionally, Trimbach (2022) found that shoreline property ownership was associated with Puget Sound residents' coastal sense of place. This study furthers our understanding of these linkages.

This study also offers further confirmation that place-based experiences, as represented by visit frequencies or even instrumental uses, can foster a sense of place, as suggested by others (Poe et al., 2016; Trimbach et al., 2022; Vannini & Taggart, 2013). For example, Vannini and Taggart (2013) found that specific practises, like engaging in island-mainland travel, spending time at the beach, or engaging locals, can help foster a sense of 'islandness' and island sense of place. Similarly, Poe et al. (2016) found that engaging in shellfish harvesting practises can also help foster a sense of place. Trimbach et al. (2022) also found that a strong sense of place was linked to stewardship behaviour frequencies among residents.

This study also supports research that has illustrated that sense of place may inform place change responses (Cottrell, 2017; Cottrell & Cottrell, 2019; Devine-Wright, 2013; Quinn, Bousquet, Guerbois, Heider, & Brown, 2019). For example, Cottrell and Cottrell (2019) found that elements of sense of place helped predict peoples' responses to infrastructure installation (island-mainland bridge). Similarly, Quinn et al. (2019) demonstrated how sense of place and infrastructure interact and how those interactions can inform planning and management strategies. Given that respondents feel more negatively about observed coastal change and that these feelings were associated with sense of place, it appears that respondents may support coastal planning and recovery plans, decisions, and actions that seek to better protect and maintain current coastal features, accessibilities, amenities, uses, and meanings.

Such findings further support the integration and use of sense of place as a measurable indicator of marine or coastal ecosystem health. Given that sense of place has been identified in numerous coastal and marine ecosystem health monitoring contexts (Blenckner et al., 2021), often through expert elicitation or collaboration processes (Biedenweg, 2017), this study provides an example of community validation that sense of place is integral to people-place relationships and how we should approach landscape planning and recovery. This also furthers other regional findings that have demonstrated a strong sense of place among Puget Sound residents (Poe et al., 2016; Trimbach et al., 2022). While sampling technique varied, this study slightly varies from a parallel project focussed on coastal sense of place in the larger region (Trimbach, 2022; Trimbach & Biedenweg, 2021). In comparison, Island County respondents appear to have a much stronger coastal sense of place and differing place meanings, with Puget Sound residents sharing more instrumental and inherent meanings compared to more instrumental and identity-expressive meanings among Island County respondents. This stronger sense of place may be linked to the unique landscape, dominance of shoreline features, easily visible coastline, accessible public beaches or parks, and/or residents' motivations to live in Island County. This is supported by island and landscape research focussed on 'islandness,' or distinct island identities, which vary from mainland identities (Bustos & Roman, 2019; Cottrell, 2017; Cottrell & Cottrell, 2019; Vannini & Taggart, 2013).

Local residents' sense of place, place change responses, and CG can be fruitful for local coastal planning and ecosystem recovery. Such approaches, tools, and findings can help with monitoring and enhance planning by better including community values and local insights. As emphasised elsewhere 'local perceptions of change as well as specific community identities need to be considered in landscape management and policy,' (Bieling, 2013, p. 36). This can be effectively achieved through a CG approach that emphasises close collaboration, knowledge co-creation, and equitable inclusive engagement with local partners. In the case of Island County, the results of this study have been integrated into local planning and decision-making. For example, sense of place, as a component of ecosystem recovery and health, will be included in their

adaptively managed ecosystem recovery plan. Currently their recovery plan includes very limited human or social components of ecosystem health and recovery. This inclusion will assist ILIO at better aligning their plan with regional ecosystem monitoring and planning efforts, notably those conducted by the Partnership, which uses sense of place as a regional measure of ecosystem health and recovery as gauged by a regional subjective human wellbeing survey (Fleming & Biedenweg, 2019). By better understanding coastal sense of place and shoreline changes, ILIO can also better prioritise coastal areas or nearshore habitat restoration projects within their plan-based strategies, goals, and even actions for funding purposes. The findings are also being actively used to enhance communications and outreach regarding biophysical ecosystem indicators, as sense of place responses help reflect how residents feel, connect, interact, and identify with the natural environment, notably shoreline areas, like the region's extensive beaches. Additionally, through the survey process, ILIO recognised the need for more inclusive engagement with the county's non-white communities, leading to a push for greater support for local landscape justice efforts in recovery. This latter impact has helped ILIO better understand their constituent residents and even has led to outreach to new potential community partner organisations. Overall, this study has contributed much to local Island County efforts, illustrating the potential benefits for other landscapes or contexts.

Conclusion

This study suggests that coastal landscapes matter to local communities and should be reflected in coastal planning and recovery. This landscape-community relationship can be incorporated through the application of sense of place and CG, both of which seek to better gauge and engage communities and their place-based relationships (Fischer et al., 2021; Shannon et al., 2021; Van Putten et al., 2018; Wartmann & Purves, 2018). Sense of place can help understand people's place-based behaviours, responses to place change, and wellbeing (Masterson et al., 2017; Trimbach et al., 2022). This study finds that Island County respondents have a strong coastal sense of place, notably place attachment and sense of responsibility. Respondents' sense of place is likely grounded in their shared place meanings and informed by their experiences and feelings about place change. These meanings help highlight what constitutes places for residents and what might need to be protected or restored for residents, while their experiences and feelings about change demonstrate that potential disruptions or threats to residents' coastal interactions may cause solastalgia and oppositional responses, as observed elsewhere (Devine-Wright, 2013; Marshall et al., 2019). This sense of place project emerged and was co-created through a CG approach between a researcher (lead author) and ILIO following multiple years of close collaboration and project co-leadership focussed more broadly on better integrating the social sciences and human wellbeing into local coastal planning and management. This CG approach emphasised place and place-based issues (e.g. Island County's coastal areas and coastal management/recovery), multiple positionalities among collaborators (e.g. researcher, ILIO coordinator, and ILIO members), reciprocal and dedicated community collaborations (e.g. project built upon multi-year project and previous collaboration), CBPR framework and diverse epistemologies (e.g. stemming from the natural sciences, environmental planning, environmental education, fisheries management, public health, and social sciences), and publicly accessible scholarship and open research (e.g. publicly accessible report and public presentations on project results, including for key local decision-makers). Such emphasises demonstrate the intentional application of CG (Fischer et al., 2021; Shannon et al., 2021) and illustrate its potential to greatly benefit coastal landscapes and their management or decision-making, that necessitates local knowledge and input, including local residents' sense of place (Loch & Riechers, 2021; Trimbach, 2022; Van Putten et al., 2018). With this understanding, coastal planning and recovery, if not landscape research more broadly, can better include sense of place and local insights within their work,

notably through CG. By better recognising sense of place, coastal landscapes can be better understood and potentially restored or protected from increasing coastal infrastructure and the negative impacts of human-driven change.

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