Enhancing sustainability through aesthetic values: Exploring the role of aesthetic values in the management and planning of marine social-ecological systems in Nova Scotia

By

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First, I would like to express my deepest gratitude to my supervisors, Dr. Jenny Weitzman and Leah Lewis-McCrea, for their unwavering support, invaluable guidance, and continuous encouragement throughout the entire process of this project. Their time, patience, and kindness have been indispensable both in the development of this project and in my personal growth as an individual and as a researcher. I would also like to thank everyone who took the time to participate in the survey. Furthermore, I am profoundly grateful to my family, friends, and partner for their unwavering support, understanding, and encouragement during this journey. I would also like to thank the Marine Affairs program faculty, particularly Dr. Ramon Filgueira, whose encouragement and enthusiasm initially guided me toward this journey. Finally, I would like to thank my second reader, Dr. Lucia Fanning. Her expertise and time are greatly appreciated.

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Marine and coastal areas offer crucial Cultural Ecosystem Services (CES) like enjoyment, inspiration, and aesthetic experiences, which are essential for human well-being. Recognizing and evaluating these CES is vital for identifying potential conflicts and enhancing social sustainability within holistic marine management frameworks such as Marine Spatial Planning (MSP). Despite the growing acknowledgment of social factors in modern sustainability frameworks, gaps remain in understanding CES of complex marine Social-Ecological Systems (SES), particularly in assessing people's aesthetic values and preferences. Using Nova Scotia as a case study, this research employed a multi-method approach to explore the role of aesthetic values in the sustainable management and planning of marine SES. It involved both a content analysis to explore how the language around CES and aesthetics are integrated into MSP documents and a public survey to understand the factors that influence Nova Scotians' visual preferences towards marine seascapes. This research found wide recognition of CES terminology in marine spatial plans, although its inclusion is uneven and inconsistent, with often superficial integration of aesthetics. The analysis identified enabling conditions for effectively integrating aesthetic values, including smaller-scale plans, bottom-up engagement, and top-down directives. The survey findings show that the ocean's aesthetic value was generally considered important but visual appeal differed across seascape types. Furthermore, visual appeal preferences were found to be intertwined with values related to place attachment as well as moral judgements about the impacts of developments. The study's synthesis proposes a framework that combines institutional and research pathways to effectively integrate aesthetics into marine spatial planning, thereby supporting more comprehensive and socially sustainable management of marine environments.

Keywords: Aesthetic values, Cultural Ecosystem Services, Social Sustainability, Marine Planning, Social-Ecological Systems

Abbreviations Used

AONB	Areas of Outstanding Natural Beauty
CES	Cultural Ecosystem Services
CM-SES	Coastal and Marine Social-Ecological Systems
ES	Ecosystem Services
ES MP	East Inshore and East Offshore Marine Plans
ICZM	Integrated Coastal Zone Management
INMPF	Project Ireland 2040 National Marine Planning Framework
InVEST	Integrated Valuation of Ecosystem Services and Trade-offs
LMMA	Locally Managed Marine Areas
MaPP	Marine Plan Partnership
MEBM	Marine Ecosystem-Based Management
MSP	Marine Spatial Planning
NCMP	MaPP – North Coast Marine Plan
SCA	Seascape Character Assessment
SES	Social-Ecological System
UK	United Kingdom
WNMP	Welsh National Marine Plan
WPC MSP	Washington's Pacific Coast Marine Spatial Plan

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Chapter 1. Introduction

1.1 Management Problem

Coastal and ocean spaces are intrinsic parts of the lives of Nova Scotians and renowned for their breathtaking natural beauty (O'Grady & Moody, 2023). The appreciation of natural beauty plays a crucial role in how people form connections with the environment. Research indicates that aesthetically pleasing landscapes and seascapes significantly enhance multiple aspects of well-being. They offer recreational opportunities, enrich cultural experiences, and contribute to a sense of place, belonging, and personal and cultural identity (Larson et al., 2013; Marshall et al., 2019; Tribot et al., 2016). Like many coastal areas around the world, Nova Scotia has experienced heightened interest in fostering a blue economy, which can lead to increasingly crowded spaces and diverse pressures on both the environment and coastal societies. However, the rapid development and expansion of ocean development in recent decades has led to substantial visual changes in seascapes, potentially altering people's experiences and the values they associate with these spaces. This shift has resulted in coastal developments often becoming significant sources of conflict (Devine-Wright & Howes, 2010; Manning et al., 2023). For instance, conflicts may emerge when community values clash, such as between those who wish to keep the seascape unchanged and those who value marine economic activities as a source of income and livelihood (Devine-Wright & Howes, 2010; Manning et al., 2023). Within the framework of sustainable development, there is a growing recognition of the value of cultural aspects such as aesthetics, highlighting the need for a comprehensive approach to marine management that acknowledges the intricate interplay between economic development, ecological preservation, and social well-being (Berkes, 2015; Ferrol-Schulte et al., 2013; Marshall et al., 2019; Stephenson et al., 2021; UNESCO, 2012). Around the world, jurisdictions are actively pursuing and implementing holistic frameworks and approaches, including Marine Spatial Planning (MSP), which are essential for prioritizing human well-being factors, such as aesthetics, amidst the myriad of demands confronting coastal and marine spaces (Douvere, 2008; Ehler, 2020; Stephenson et al., 2021). Despite the widespread interest in holistic management approaches, they have struggled to adequately integrate the social dimension of sustainability, including social, cultural, and

human well-being factors (Cornu et al., 2014; McKinley et al., 2019; Naidoo et al., 2006; Pennino et al., 2021; Stephenson & Mascia, 2009). Key challenges include significant research gaps regarding the social benefits and values of coastal spaces and an insufficient understanding of how to assess and incorporate socio-cultural factors into management practices (Cornu et al., 2014; Pennino et al., 2021; Santos et al., 2021). In particular, the intricate and multifaceted nature of people's aesthetic values remains poorly understood, leaving little guidance to assist environmental managers and policy-makers in integrating aesthetic values into decision-making processes (Marshall et al., 2019).

Bridging these knowledge gaps and enhancing our understanding of how people perceive and value the aesthetics of coastal and ocean seascapes are fundamental steps toward adequately integrating and considering these values in sustainable marine management practices. This deeper comprehension is essential to align management strategies with the community's aesthetic preferences and socio-cultural needs. By effectively and meaningfully integrating aesthetic values, it becomes possible to design and implement policies that support strategic, culturally sensitive MSP that balances economic growth goals with the preservation of aesthetically valuable seascapes, thereby supporting the holistic well-being of the communities that depend on coastal and ocean spaces.

1.2 Research Objectives & Goals

Comprehending and incorporating the aesthetic values individuals derive from coastal and ocean settings and the factors influencing these values holds significant potential for bolstering a more inclusive and holistically sustainable approach to marine planning globally and within Nova Scotia. Since there remain significant knowledge gaps regarding the characterization, evaluation, and integration of socio-cultural factors, including aesthetics, into marine planning and management, this research acts as a preliminary exploration of the potential role of aesthetic values in the sustainable management and planning of marine Social-Ecological Systems, with Nova Scotia serving as a case study. To do so, this interdisciplinary graduate research employs a multi-methods approach (Figure 1) to address two research goals:

(1) Examine the extent to which aesthetic values are defined, prioritized, and incorporated into existing MSP frameworks.

(2) Explore how Nova Scotians appreciate the aesthetic qualities of marine Social-Ecological Systems.

The study aims to address the first goal via a broad document analysis to explore the extent to which aesthetic values are included in existing Marine Spatial Planning (MSP) frameworks, identify patterns in the attributes of plans that exhibit notable levels of aesthetic and socio-cultural integration, and compare integration in plans to that in literature. To address the second goal, an exploratory survey was developed and conducted to investigate how Nova Scotians value and interact with coastal and ocean spaces and how factors like socio-demographics, experiences, and values influence the visual preferences of Nova Scotians towards marine seascapes. This novel study seeks to enhance our understanding of the intricate cultural values associated with marine spaces. The synthesis of the research findings provides recommendations for future studies and identifies opportunities and challenges to demonstrate the potential role of aesthetic values in promoting sustainable MSP in Nova Scotia and abroad.

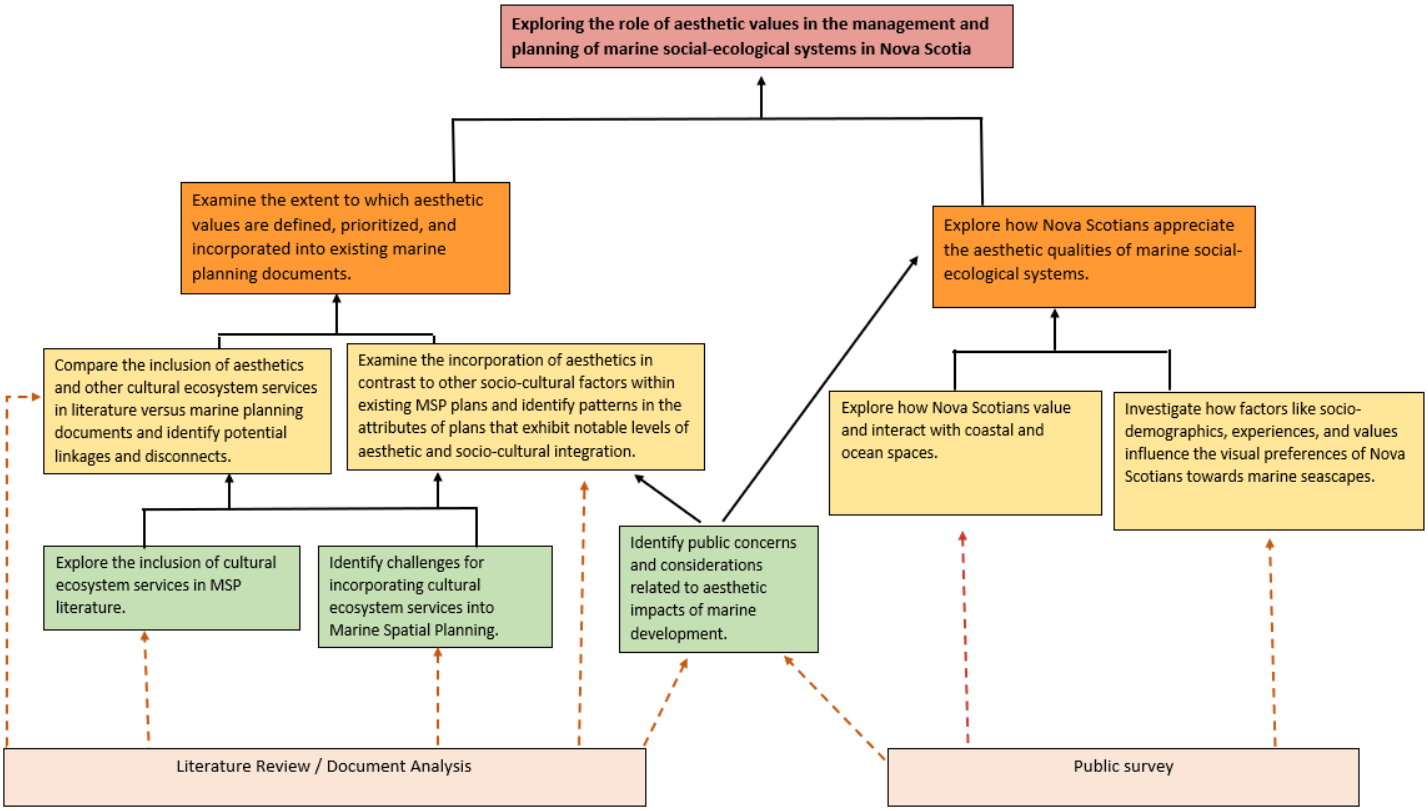

Figure 1. Means and objectives diagram depicting project goals and methodologies.

1.3 Paper Structure

This report is divided into five chapters. This first chapter introduces the management problem and the research study, as well as provides the research objectives and goals motivating the following sections. Chapter 2 offers a literature review of the key concepts and management challenges related to this project. Chapter 3 presents the findings from a document analysis of the incorporation of aesthetic terms across key MSP plans around the world. Chapter 4 details the findings from an exploratory public survey exploring Nova Scotian's aesthetic values and preferences for coastal and ocean seascapes. Chapter 5 synthesizes this study's findings, offers a critical discussion of the key barriers to the effective incorporation of aesthetics in MSP and provides recommendations to support future research and sustainable marine planning in Nova Scotia.

Chapter 2: Background and Context

2.1 Need for Holistic Marine Management

2.1.1 Conflicts in Marine Spaces

Coastal and marine spaces are socially, economically, and environmentally essential to our society. These areas are the foundation for the livelihoods of numerous coastal communities and provide vital ecosystem services such as food and coastal protection (Ayyam et al., 2019; Fudge et al., 2023; Jouffray et al., 2020). As the world's population grows and economic demands rise, coastal regions are becoming increasingly vital, providing living space, resource harvesting opportunities, enabling food security, offering recreational activities, and driving economic development (Schubel & Hirschberg, 1978; Weinstein et al., 2007). Consequently, coastal areas have emerged as central locations for various human activities, encompassing tourism, oil and gas exploration, fisheries, aquaculture, and several other sectors (Jouffray et al., 2020). Additionally, advances in research, technology, and innovation are enabling these activities to broaden in scope and intensity(Berkes et al., 2006; Douvere, 2008; IPOL, 2015; Schupp et al., 2019). Beyond traditional sectors such as shipping, fishing, and resource extraction, emerging sectors like marine renewable energies and offshore aquaculture are striving to establish their place within an ocean that is becoming progressively crowded and 'urbanized' (Buck et al., 2018; Froehlich et al., 2017b; Perez-Collazo et al., 2015; SAPEA, 2017; Schupp et al., 2019). This expansion is poised to accelerate in the future, driven by factors like global population growth, trade, growing consumer demands, and increasing technological capabilities (Jouffray et al., 2020; Schupp et al., 2019; Smith, 2011).

Challenges such as competition for limited resources, regulatory gaps, environmental stressors, economic pressures, the impacts of climate change, and different social and cultural values can exacerbate multi-use conflicts in marine and coastal areas. These challenges can lead to disputes over access and utilization of marine and coastal spaces (Fudge et al., 2023; Schupp et al., 2019; Tuda et al., 2014). While coastal and ocean spaces offer valuable opportunities to provide a wide range of benefits to society, comprehensive and holistic marine management and planning are crucial to avoid an overcrowded and dysfunctional seascape, which could result in severe environmental

consequences and significant social conflicts (Douvere, 2008; Lester et al., 2018; Tuda et al., 2014).

2.1.2 Social-Ecological Systems

It has become widely acknowledged that coastal ecosystems consist of intricately interconnected biophysical and human subsystems that encompass economic, political, social, and cultural aspects, as well as management and governance, collectively referred to as 'Social-Ecological Systems (SES)' (Figure 2) (Berkes, 2015; Cochrane & Garcia, 2009; Folke et al., 2011; Hilborn & Walters, 1992; Kooiman et al., 2005). The SES concept is a theoretical framework that integrates ecosystems, human systems, and governance systems to conceptualize the environment as a complex, open system comprised of ecological and social processes (Virapongse et al., 2016). Internal interactions, such as management practices, adaptation, and resource use, integrate the ecological and social processes and systems across both governance and spatial scales (Virapongse et al., 2016). External influences, like political, economic, and biogeochemical conditions, also shape these processes and interactions (Chapin et al., 2009; Virapongse et al., 2016). As such, within a Social-Ecological System, components engage in a dynamic, interconnected network, forming dependencies and feedback cycles influenced by a range of direct and indirect factors over diverse temporal and spatial scales.

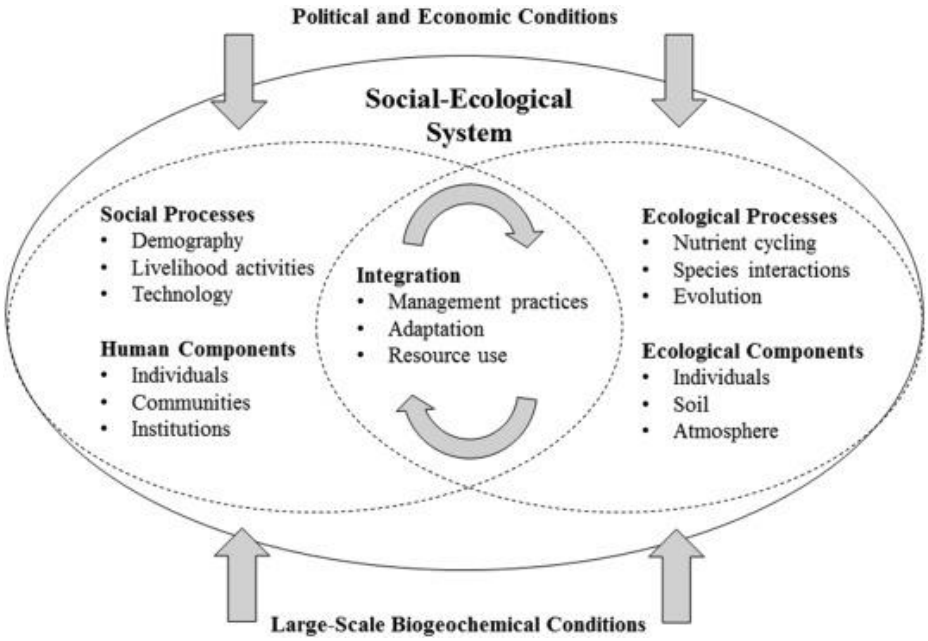

Figure 2. Depiction of the interaction between external and internal components within a Social-Ecological System (Virapongse et al., 2016).

The importance of the SES perspective can be particularly relevant for coastal and marine areas. Coastal and Marine Social-Ecological Systems (CM-SES) present unique challenges compared to their terrestrial counterparts, making effective governance more challenging (Ferrol-Schulte et al., 2013). For example, CM-SES are highly dynamic due to water movement, species migration, and the mobility of resource users, making it challenging to define spatial boundaries between ecological and social-political aspects in CM-SESs (Dietz et al., 2003; Ferrol-Schulte et al., 2013). Unlike terrestrial systems, ownership of coastal and marine natural resources is often unclear and contested, often variably involving governments, private sectors, and local communities. (Ferrol-Schulte et al., 2013; Mascia & Claus, 2009; Petrosillo et al., 2013). This lack of clarity in resource ownership can result in conflicts over rights and responsibilities among different interest holders, hindering effective and sustainable management of CM-SES (Ferrol-Schulte et al., 2013; Petrosillo et al., 2013). Due to these factors, CM-SESs face higher risk levels and uncertainty than their terrestrial counterparts (Ferrol-Schulte et al., 2013). Consequently, coastal communities can be more susceptible to changes, instability, and dysfunction, potentially negatively impacting their livelihoods (Ferrol-Schulte et al., 2013).

The inherent complexities within CM-SESs can lead to numerous 'wicked problems'. These problems are difficult to define and delineate from other problems (i.e., it is not always clear what they are and what they are caused by) (Ferrol-Schulte et al., 2013; Jentoft & Chuenpagdee, 2009). CM-SESs encompass an intricate web of interconnected natural, economic, and social goals that often clash, making coastal governance itself a complex and 'wicked' problem (Ferrol-Schulte et al., 2013; Glaser & Glaeser, 2014; Jentoft & Chuenpagdee, 2009; McKinley et al., 2019). As these issues are often intertwined, addressing any issues that arise unavoidably entails addressing others, thereby compounding the situation's complexity (Jentoft & Chuenpagdee, 2009). As such, in the realm of coastal governance, achieving a favourable balance between the ecosystem and the social system poses an enduring challenge, demanding tough yet nuanced decisions, often involves equally desirable but conflicting objectives (Jentoft & Chuenpagdee, 2009; Kooiman et al., 2005). Consequently, the comprehensive and holistic approaches associated with the social-ecological-systems theory prove particularly indispensable in marine environments (Aswani, 2011; Ferrol-Schulte et al., 2013; Glaeser & Glaser, 2010; Weinstein et al., 2007)

2.1.3 Holistic Management Frameworks

Historically, fragmented governance approaches have proven inadequate in managing the complex and intricate socio-ecological systems of coastal and ocean environments (Kelly et al., 2019). The segmentation of governance along sectoral lines has given rise to issues such as over-exploitation, ecological degradation, and persistent multi-user conflicts (Kelly et al., 2019; Stephenson et al., 2021; Stephenson et al., 2019). Moreover, the disconnect between sectors poses substantial challenges for assessing the cumulative impacts of human activities in marine and coastal environments and effectively managing conflicts (Stephenson et al., 2021; Stephenson et al., 2019). As such, it is evident that marine and coastal governance must evolve beyond historical fragmented approaches and transition toward integrated management practices for improved social and ecological well-being.

Over the past few decades, there has been a growing acknowledgment among scientists, governments, and decision-makers regarding the need for holistic and

sustainable approaches to managing human activities within marine and coastal systems (Stephenson et al., 2021). With widespread adoption by numerous countries and a growing body of scientific literature, holistic marine management frameworks, such as Integrated Coastal Zone Management (ICZM), Marine Ecosystem-Based Management (MEBM), and Marine Spatial Planning (MSP), are at the forefront of sustainable marine management, governance, planning, and development (Douvere & Ehler, 2009; Elliot, 2013; Kelly et al., 2019; Stephenson et al., 2021). These frameworks are rooted in principles that underscore the interconnection between humans and marine ecosystems (i.e., SES), offering a vital step toward realizing the tenets of sustainable, successful, and integrated marine management (Gari et al., 2015; O'Higgins & O'Dwyer, 2019; Pennino et al., 2021; Stephenson et al., 2021; UN Environment, 2018). These tenets emphasize marine management's need to be ecologically sustainable, technologically feasible, economically viable, socially desirable/tolerable, legally permissible, administratively achievable, politically expedient, ethically defensible, culturally inclusive, and effectively communicable (Elliot, 2013).

2.2. Marine Spatial Planning

As governments, academics, and the marine planning community have grown more aware of the need for integrated spatial governance in ocean and coastal spaces, the concept of MSP has emerged (Douvere, 2008; Ehler, 2021; Santos et al., 2021; Schupp et al., 2019). MSP provides a valuable framework to recognize the uniquely spatial dynamics and intricacies of management in coastal and marine ecosystems. While definitions of MSP vary, it is defined here as “a public process aimed at analyzing and allocating the use of the sea areas to minimize conflicts between human activities and maximize benefits while ensuring the resilience of marine ecosystems” (Iglesias-Campos et al., 2021). Discussions around MSP began in Europe in the 1970s but gained significant momentum in the early 2000s after the first international MSP workshop in 2006 (Grip & Blomqvist, 2021). Today, MSP stands as a pivotal approach for realizing holistic, integrated, multi-sectoral, and ecosystem-based marine planning and management worldwide (Douvere, 2008; Douvere & Ehler, 2009; Grip & Blomqvist, 2021; Santos et al., 2019). MSP initiatives are now established in approximately 100 countries, ranging from early stages to fully executed plans (UNESCO-IOC/European Commission, 2023).

Marine governance often focuses on individual sectors like maritime transport, fishing, and tourism, leading to a segmented approach in planning that can cause adverse environmental impacts, missed opportunities for synergies, and conflicts between uses, hindering sustainable development (Holm et al., 2017; Schafer, 2009; Schupp et al., 2019). MSP provides a comprehensive and transdisciplinary framework encompassing multiple objectives and sectors, facilitating sustainable and holistic decision-making within marine planning processes (Douvere, 2008; Ehler, 2017; Santos et al., 2019). This approach contributes to effectively managing conflicts among marine uses while encouraging a more efficient and sustainable utilization of marine and coastal spaces and resources (Foley et al., 2010; Schupp et al., 2019). Nevertheless, both in concept and practice, MSP offers valuable tools to mitigate and address such conflicts among different actors and sectors (Schupp et al., 2019; Tuda et al., 2014). This conflict management can be achieved through strategies like single-use zoning or, where societal benefit dictates, through promoting multi-use ocean space and facilitating synergies among users and their respective uses (Schupp et al., 2019). MSP offers a versatile tool to help advance Blue Growth initiatives, aid in nature conservation and restoration, resolve multi-use conflicts, and enhance governance coordination (Douvere, 2008; Santos et al., 2019; Zuercher et al., 2022b). It can also aid in rectifying inequities and shortcomings inherent in current sectoral coastal and marine governance approaches and foster positive outcomes for human well-being and quality of life (Douvere, 2008; Zuercher et al., 2022b). Consequently, MSP presents a promising avenue for navigating the intricate challenge of harmonizing diverse human uses of marine ecosystems while pursuing equitable and efficient spatial allocation to support a range of ocean-provided ecosystem services (Gilek et al., 2021; Grip & Blomqvist, 2021; Saunders et al., 2020).

However, MSP has faced several criticisms. One of the primary critiques revolves around the apparent ambiguity arising from its dual role in ensuring both conservation and development, hinting at a potential discrepancy between the theoretical ideals and practical implementation of MSP (Trouillet, 2020). This critique is bolstered by a prevalent observation that most MSP cases prioritize economic objectives over environmental ones, possibly undermining the sustainability aims of MSP and leading to either environmental degradation or insufficient safeguarding of marine ecosystems (Kirkfeldt & Frazão Santos,

2021). Moreover, the effectiveness of MSP in achieving its stated social, ecological, and economic goals for the benefit of coastal environments and human communities has also been called into question (Carneiro, 2013). This uncertainty emphasizes the need for more robust and comprehensive evaluation frameworks to assess the impact and success of MSP initiatives (Carneiro, 2013; Santos et al., 2021).

Additionally, there is a notable concern that planners and decision-makers might lack awareness of available technological solutions essential for developing and implementing marine spatial plans, potentially leading to inadequate or ineffective planning and management endeavours (Schwartz-Belkin & Portman, 2023). Furthermore, MSP has been critiqued for being asocial and atheoretical, indicating a lack of engagement with social theories and real-world political challenges involved in implementing MSP (Flannery & Ellis, 2016; Flannery et al., 2020; Santos et al., 2021). The criticism accentuates a perceived failure in dealing with the 'realpolitik' (i.e., politics based on practical objectives rather than on ideals) of executing MSP, suggesting a gap between the theoretical discussions and the pragmatic challenges encountered on the ground (Flannery et al., 2020; Santos et al., 2021).

These criticisms largely reflect the multifaceted challenges spanning governance, data availability and accuracy, interest holder engagement, monitoring and evaluation, and changing global conditions that MSP faces (Santos et al., 2021; Schwartz-Belkin & Portman, 2023). Governance hurdles often center on a need for robust political and institutional frameworks (Santos et al., 2021). The absence of supportive legislative and regulatory policies can derail even well-organized planning initiatives. For example, these challenges were cited as a key barrier to effective plan development and implementation in both the Portuguese MSP initiative, Plano de Ordenamento do Espaço Marítimo (POEM), and the integrated management plan for the Eastern Scotian Shelf in Canada (Olsen et al., 2014; Santos et al., 2021). Data availability and quality present another set of challenges. The essence of MSP lies in its trans-disciplinary approach, necessitating a seamless integration and sharing of data across diverse domains. Limited marine environmental data and the high mobility of marine fauna and humans significantly challenge plan enforcement and compliance, mirroring broader issues of data quality and

availability (Santos et al., 2021; Schwartz-Belkin & Portman, 2023). Effective interest holder engagement is also crucial for the acceptance and adoption of MSP. However, interest holder engagement in MSP often faces challenges related to poor communication, lack of transparency, delayed involvement, perceived bias in decision-making, and fragmented governance (Flannery et al., 2019; Flannery et al., 2018; Santos et al., 2021). Furthermore, performance monitoring and evaluation, vital for adapting MSP initiatives, face challenges like inconsistent terminology and crafting comprehensive indicators covering ecological, socioeconomic, and governance dimensions, often with inadequate resources (Ehler, 2014; Santos et al., 2021).

2.2.1 The Role of Ecosystem Services in Marine Planning

One central challenge for translating MSP tenets from concept to practice is developing rigorous and straightforward approaches for balancing diverse human uses of ecosystems (Lester et al., 2013; Lester et al., 2010). The Ecosystem Services (ES) framework has evolved into a significant scientific, managerial, and policy paradigm for understanding and quantifying the benefits and uses humans derive from ecosystems and is often integrated into MSP (Galparsoro et al., 2021; Gee & Burkhard, 2010; Lester et al., 2013). Broadly, ES are considered the final benefits that people obtain from ecosystems, but transformed into benefits through human activities or interactions, whether material, like harvesting crops or non-material, like enjoying nature's spiritual significance (Burkhard & Maes, 2017; Potschin-Young et al., 2018). According to the Millennium Ecosystem Assessment (MEA, 2005), ES can be categorized into four main groups: provisioning services, regulating services, cultural services, and supporting services (Figure 3). These diverse ES span from the tangible, such as food production, to the intangible, like aesthetic value (Costanza et al., 1997; Fletcher et al., 2014; Lester et al., 2013). Acknowledging that human well-being extends beyond basic needs, modern sustainability frameworks increasingly recognize the broader role of ecosystem goods and services in holistically sustainable development (Galparsoro et al., 2021; Granek et al., 2010; Lester et al., 2013).

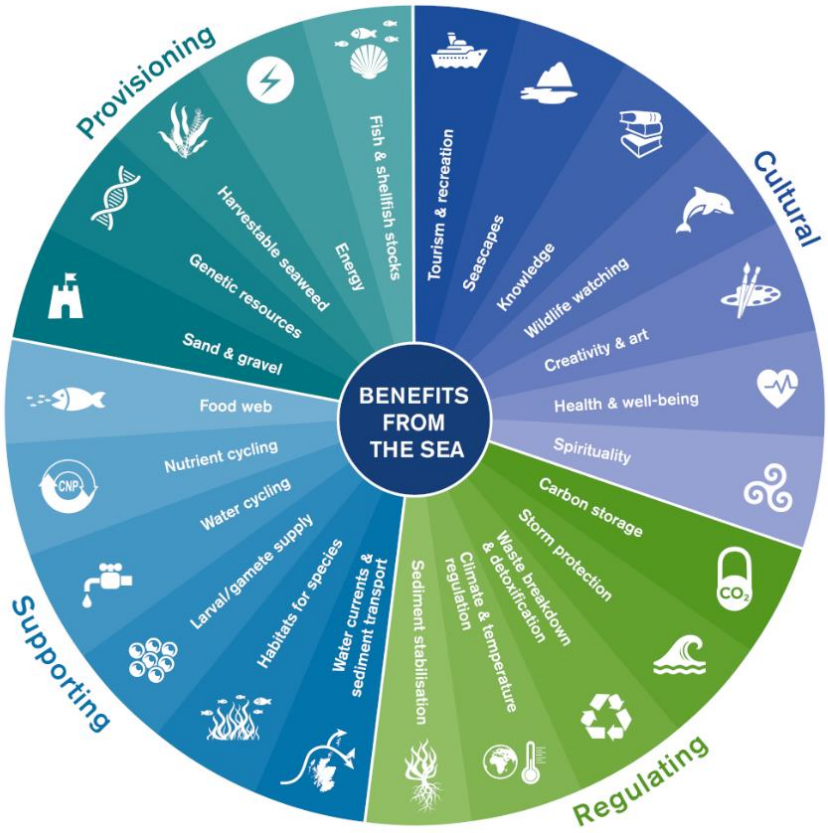

Figure 3. Examples of ecosystem services in CM-SES (Marine Scotland, 2020).

The application of the Ecosystem Services (ES) framework in Marine Spatial Planning (MSP) involves extensive efforts in quantifying and mapping ES (Burkhard & Maes, 2017; Guerry et al., 2012; Outeiro et al., 2015). The goal of ES mapping ranges from understanding and establishing current ES provision as a baseline for future management to creating Marine Spatial Plans that facilitate balancing various uses and users, promoting sustainable and balanced utilization of coastal and marine environments for national and global human benefit (Burkhard & Maes, 2017; Outeiro et al., 2015). Regardless of the objective, ES mapping yields valuable insights for holistic, sustainable development and conservation. Quantifying ES can also occur through biophysical, economic, or social valuation approaches, which seek to quantify the benefits of ecosystems or services (Burkhard & Maes, 2017). However, many studies on ES valuation restrict the concept of 'value' to monetary measures, overlooking the broader impact of ecosystems and biodiversity on society in areas like culture, spirituality, or aesthetics (Burkhard & Maes, 2017). Nonetheless, there is an increasing effort to integrate biophysical and socio-cultural

valuation methods, often considered vital for aiding decision-making and ensuring sustainable management of coasts, seas, oceans, and natural resources (Burkhard & Maes, 2017; European Marine Board, 2019).

Tools such as the Integrated Valuation of Ecosystem Services and Tradeoffs (InVEST) models have been developed for mapping and valuing ecosystem services in various landscapes, including terrestrial, freshwater, and marine ecosystems (Guerry et al., 2012; Neugarten et al., 2018; Outeiro et al., 2015). These tools can be valuable for decision-makers in natural resource management, helping to balance environmental and economic objectives by quantifying and visualizing the impacts of different management choices on ecosystem services (Burkhard & Maes, 2017). Regardless, some ESs, specifically those categorized under Cultural Ecosystem Services (CESs), such as aesthetics, are frequently undervalued and underrepresented within MSP (Gee & Burkhard, 2010; McKinley et al., 2019). Therefore, to realize the full potential of the ecosystem services framework, there is a need to cultivate a thorough understanding and establish efficient methods for valuing and integrating all ecosystem services, especially CESs (McKinley et al., 2019; Pennino et al., 2021).

2.2.2 The Social Gap

Despite the increasingly acknowledged importance of social sustainability, a 'social gap' exists where MSP and other holistic marine management frameworks tend to fall short of adequately valuing and integrating social data and social-ecological linkages (Cornu et al., 2014; Naidoo et al., 2006; Stephenson & Mascia, 2009). The current approaches to understanding human dimensions in CM-SES remain fragmented and often limited in scope, predominantly focusing on economic data. Furthermore, the gathering and incorporation of social data in marine planning and decision-making frequently receive insufficient attention and funding (Cornu et al., 2014; Gilek et al., 2021; Santos et al., 2021). As such, governments and MSP practitioners often grapple with challenges and barriers regarding integrating social data, with data quality and availability emerging as a significant obstacle (Pennino et al., 2021; Santos et al., 2021). Furthermore, there is a shortage of valuation methods and mapping tools for non-material benefits and values, further contributing to the social research gap (Börger et al., 2020; McKinley et al., 2019;

Santos et al., 2021; Saunders et al., 2019). As every coastal and ocean planning initiative relies fundamentally on a profound understanding of the planning region, encompassing both the biophysical and social dimensions, addressing the undeniable 'social gap' in the marine sector is essential for fostering comprehensive and sustainable marine management and planning (Cornu et al., 2014; McKinley et al., 2019).

2.2.3 Aesthetics

Aesthetic appreciation is one of the most fundamental ways people connect with their environment (Marshall et al., 2019). Within the framework of sustainable development, there is a growing recognition of the value of aesthetics and the importance of preserving natural beauty (Marshall et al., 2019; UNESCO, 2012). While the broader field of aesthetics originates from classical philosophy, the term 'aesthetics' was coined by Alexander Baumgarten in 1735, who defined it as the 'science of sensory cognition' (Brady & Prior, 2020). Today, the field of aesthetics has expanded to encompass a broader spectrum that now includes environments, landscapes, and everyday experiences (Brady & Prior, 2020; Marshall et al., 2019; Summers et al., 2012). The importance of landscape aesthetics has deep roots, supported by the 'Savanna hypothesis,' which suggests a genetic basis for human preference for visually pleasing landscapes, driven by our perception that aesthetics aligns with attributes essential for basic needs like sustenance and shelter (Bauske & Waltz, 2013; Lohr & Pearson-Mims, 2006; Marshall et al., 2019).

In the contemporary context, aesthetically appealing or 'beautiful' landscapes and seascapes have been directly linked to enhancing multiple facets of well-being. They provide recreation opportunities, enrich cultural experiences, facilitate cognitive growth, encourage introspection, foster a sense of place and belonging, and contribute to personal and cultural identity (Marshall et al., 2018; Rosley et al., 2014; Tribot et al., 2016). The aesthetic qualities of landscapes can also inspire individuals to protect and preserve natural settings for both current and future generations to cherish (Brady, 2006; Marshall et al., 2019). Notably, aesthetic experiences can evoke positive and negative emotions (Brady & Prior, 2020; Ghermandi et al., 2011; McCartney, 2006). For example, a decline in the aesthetic quality of natural landscapes through the loss of natural beauty or green spaces has been found to elicit adverse emotional responses and diminished well-being

consequences (Cox & Perry, 2011; Silver & Grek-Martin, 2015). Additionally, aesthetic values of landscapes and seascapes hold economic importance, especially for recreation and tourism (Haas et al., 2015; Marshall et al., 2016).

The numerous societal benefits associated with aesthetics emphasizes a clear need for marine and coastal planners to include considerations of seascape aesthetics, including visual amenities and impacts, in policy discussions and planning endeavours (Larson et al., 2013; Outeiro & Villasante, 2013; Tribot et al., 2016). However, despite their significance, seascape aesthetics are often omitted from marine management decision-making processes (Fletcher et al., 2014; Marshall et al., 2019). Consequently, there are significant gaps in understanding how to evaluate and integrate aesthetic values into marine management, planning, and policy decision-making processes.

Efforts have been made to incorporate aesthetics into marine management and planning, such as seascape character assessments (Hill et al., 2001; Jay & Acott, 2023) and the aesthetic impact of offshore wind farms (Gkeka-Serpetsidaki et al., 2022; Molnarova et al., 2012; Westerberga et al., 2015). However, the marine sector has generally fallen short in recognizing and systematically integrating aesthetic values into its planning and management decision-making processes and adequately developing tools for practically assessing seascape aesthetics (Fletcher et al., 2014; Lee, 2017; Marshall et al., 2019). Despite the undeniable natural beauty of coastal and ocean seascapes and their profound influence on the identity and culture of maritime nations, aesthetic and other socio-cultural considerations have often been overshadowed by more tangible and market-value services (Fletcher et al., 2014; Hill et al., 2001). Therefore, a significant barrier to integrating aesthetics is the absence of adequate methods for measuring the aesthetic value of landscapes/seascapes (Lee, 2017; Marshall et al., 2019).

As Canada and other nations advance their Marine Spatial Planning initiatives in an era of heightened pressures, conflicts, crowding, and urbanization in marine and coastal regions, it becomes imperative to acknowledge and understand the aesthetic values and preferences associated with marine and coastal environments and the factors that shape them (Berkes et al., 2006; Douvere, 2008; Schupp et al., 2019; United Nations, n.d.).

2.3 The Nova Scotian Context

Nova Scotia, a coastal Canadian province bordering the Atlantic Ocean, is renowned for its captivating coastal seascapes (O'Grady & Moody, 2023). Often referred to as 'Canada's Ocean Playground,' Nova Scotia's extensive coastline, stretching over 13,000 kilometres, constitutes a diverse array of natural wonders (Great Canadian Trails, 2022; Leet, 2023). The rugged shorelines and picturesque fishing villages are not just scenic treasures; they are home to many Nova Scotians. Nova Scotia's iconic and beautiful coastal and ocean seascapes are invaluable to the province's maritime heritage, geographic diversity, recreation and tourism sectors, and cultural identity (O'Grady & Moody, 2023; Quigley et al., 2019; Tourism Nova Scotia, n.d.). The ocean is pivotal in Nova Scotia's culture and history (Nova Scotia, n.d.; Nova Scotia Archives, 2023). The province's deep maritime heritage, tracing back to the initial settlement in 1605, has shaped its art, literature, and architecture (Beck et al., 2023; DeWolf, 2018; Nova Scotia, n.d.; Nova Scotia Archives, 2023). In addition, the coastal and marine environments offer essential spaces for Nova Scotians to live, work, and play. In 2016, 81% of Nova Scotia's population (over 700,000 individuals) resided within 10 km of the coast (Ganter et al., 2021) — additionally, many Nova Scotians work in marine and coastal sectors. In 2018, marine sectors comprised 13.3% of employment and 13.5% of Nova Scotia's Gross Domestic Product (GDP) (Storring, 2021). A substantial proportion of marine and coastal employment originates from the seafood industry, with Nova Scotia's seafood industry supplying 12,435 jobs in 2021 (Pisces Consulting, 2022).

Furthermore, leisure activities closely tied to the sea, such as sailing, kayaking, coastal hiking, and whale watching, have gained growing importance in the province for recreation and tourism. Suggesting many Nova Scotians interact with and derive value from the aesthetic qualities of the ocean and the coast, even if they do not live in a coastal community (Nova Scotia, 2023b, 2023c). Furthermore, tourism and recreation are integral to Nova Scotia's economic landscape (Quigley et al., 2019). In 2019, these industries generated $2.6 billion in revenue, with Nova Scotians contributing approximately 35-45% of overall tourism revenues for the province (Tourism Nova Scotia, n.d.). Although 2020 and 2021 saw a decline in annual tourism revenues, estimated at around $1 billion, there is optimism for a rebound post-pandemic, with tourism in Nova Scotia aiming to achieve $4

billion in annual revenues by 2024 (Quigley et al., 2019; Tourism Nova Scotia, n.d.). These sectors heavily rely on aesthetically pleasing landscapes to draw in tourists, emphasizing the need to prioritize the preservation of coastal and ocean seascapes with aesthetic value, which attract not only non-resident visitors but also Nova Scotians (Marshall et al., 2019; Tourism Nova Scotia, n.d.). As the blue economy in Nova Scotia continues to develop and expand, it becomes increasingly important to emphasize preserving aesthetically appealing seascapes. Achieving this goal demands a thorough comprehension of the public's perceptions, values, and preferences concerning seascapes and an understanding of the factors influencing these sentiments.

Although still a relatively new concept in Canada, MSP is steadily advancing (Government of Canada, 2023b). Canada has committed to developing four 'first generation' Marine Spatial Plans by 2024, focusing on five distinct geographic planning regions (Government of Canada, 2023a, 2023b; United Nations, n.d.). While the MSP process in Canada originates from a federal initiative, it relies heavily on knowledge sharing through collaborative governance structures involving federal, provincial, territorial, and Indigenous governments alongside other interest holders (Government of Canada, 2023a; United Nations, n.d.). Notably, Nova Scotia plays a pivotal role, encompassing two of the planning regions: the ‘Scotian Shelf and Bay of Fundy’, and the ‘Estuary and Gulf of St. Lawrence’ (Government of Canada, 2023b). Currently, Nova Scotia lacks a regional-level MSP plan; however, ongoing efforts are underway to explore MSP initiatives on a sectoral basis (Nova Scotia, 2023a), reflecting a growing interest in strategically managing marine spaces across diverse sectors and interests within the province’s maritime domain.

Chapter 3. Exploring the Integration of Cultural Ecosystem Services in Marine Spatial Planning

3.1 Introduction

3.1.1 Marine Spatial Planning

Over the past two decades, Marine Spatial Planning (MSP) has evolved from a conceptual idea into a practical approach for advancing sustainable development within marine environments (Calado et al., 2021; Ehler et al., 2019; Zuercher et al., 2022b). This momentum is poised to continue over the next decade as more nations consider the implementation of MSP within their jurisdictions and conversations about MSP initiatives in international waters become increasingly prevalent (Calado et al., 2021; Zuercher et al., 2022b). A key driving force behind the idea that Marine Spatial Planning (MSP) will propel sustainable development stems from its integrated, multi-objective, and spatially focused approach (Santos et al., 2014; Zuercher et al., 2022b). This approach offers superior advantages for marine ecosystems and coastal communities compared to sectoral management methods (Santos et al., 2014; Zuercher et al., 2022b). Crucially, these benefits rely on the successful and effective implementation of MSP, translating the multi-dimensional and holistic sustainability principles inherent to MSP theory into practical reality (Crowder et al., 2006; Douvere & Ehler, 2009; Frazão Santos et al., 2020).

Implementing Marine Spatial Planning (MSP) reflects a continuous, iterative process that dynamically evolves and adapts over time (Ehler & Douvere, 2009). The approved plan is the culmination of multiple steps, including a detailed interest holder engagement process, characterization of existing conditions and assessment of planning priorities (Figure 4) (Ehler & Douvere, 2009). The plan thus sets the roadmap and priorities, presenting an integrated management framework that serves as a comprehensive guide for marine spatial governance, helping position specific sectoral plans within a broader context and potentially facilitating more informed and harmonized decision-making across diverse marine uses and interest holders (Ehler & Douvere, 2009).

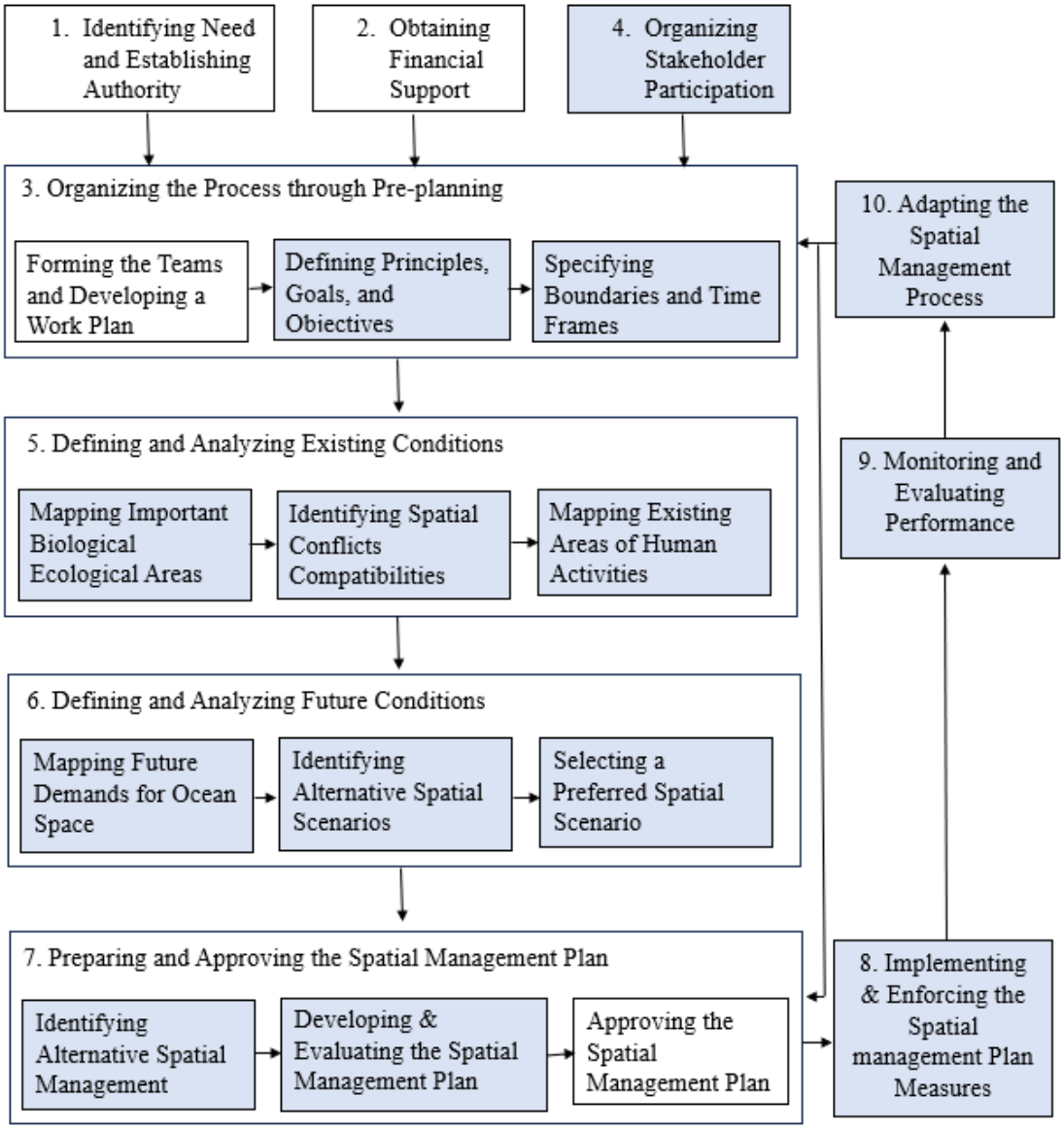

Figure 4. Step-by-Step guide to Marine Spatial Planning adapted from Ehler and Douvere (2009). Blue boxes represent steps involving interest holder participation.

3.1.2 Bridging the Social Gap: A Crucial Step in Effective MSP Implementation

The potential effectiveness of MSP is anchored in its transdisciplinary, multi-objective, and integrated approach, which is fundamental for achieving holistic sustainability in marine spatial governance (Fletcher et al., 2014; Gilek et al., 2018; Ingram et al., 2018; Stephenson et al., 2021). However, a significant criticism and challenge of MSP has been integrating social and cultural factors. MSP tends to prioritize economic and

environmental objectives, frequently sidelining socio-cultural aspects. MSP has been criticized for neglecting social data (Gilek et al., 2021; Santos et al., 2021; Saunders et al., 2019). As a result, MSP implementation often falls short of the broad and multi-dimensional sustainability promises of MSP theory (Gilek et al., 2021; Gilek et al., 2018; Saunders et al., 2019). Progress is needed, in theory and practice, to integrate socio-cultural factors in MSP effectively (Santos et al., 2021). This progress includes transitioning from perceiving "people as impacts" to "people as beneficiaries" via marine ecosystem services assessments and improving the identification, collection, valuation, and application of spatial, social data in decision-support tools (Gilek et al., 2021; Santos et al., 2021; Saunders et al., 2019).

The intrinsic connections people have with marine and coastal environments yield substantial socio-cultural benefits. However, inequities in access, resource allocation, and the undervaluation of oceanic and coastal knowledge and rights can arise in MSP planning and implementation. Management choices, including those made within MSP implementation, can exacerbate these issues if the social gap is left unaccounted for (Gilek et al., 2021; Saunders et al., 2020). Such oversight can potentially inflict adverse impacts on the well-being of individuals and communities, thereby diminishing the social sustainability of MSP initiatives. The ripple effects of these adversities could extend to fostering discontent and opposition among local communities, which, in turn, may impede the effective implementation of MSP strategies (Bennett, 2019; Gilek et al., 2021). Moreover, undervaluing local knowledge and socio-cultural values could lead to a misalignment between management strategies and community needs or priorities, further detracting from the social sustainability goals of MSP and potentially worsening conflicts (Gilek et al., 2021). Conflict resolution or minimization is another key goal of MSP, further emphasizing the role of bridging the social gap in achieving effective translation of MSP theory into reality.

Understanding and addressing the social context as enabling or disabling conditions can create a conducive environment for the successful implementation of MSP strategies, enhancing their effectiveness (Zuercher et al., 2022a). Addressing social gaps can help ensure that MSP initiatives are equitable and beneficial to a broad range of interest holders,

thereby enhancing social license to operate (i.e., "the acceptance and approval of society to conduct and implement planning" (Zuercher et al., 2022a)), a crucial enabling condition for successful implementation and long-term sustainability (Saunders et al., 2020; Zuercher et al., 2022a; Zuercher et al., 2022b). However, evidence supporting the effectiveness of MSP in achieving social goals is limited. Yet, addressing social data gaps can contribute to building a more robust evidence base, supporting more effective and legitimate planning processes and implementation strategies (Gilek et al., 2021; Zuercher et al., 2022a; Zuercher et al., 2022b). Therefore, to achieve the intended results/outcomes relating to holistic and sustainable marine planning, recognizing and addressing the current criticism and challenges in the field of MSP is essential (Johnson & Ferreira, 2019).

3.1.3 CES Integration in Marine Spatial Plans

Examining the integration and contextualization of Cultural Ecosystem Services (CES) as a proxy for socio-cultural factors within MSP can help unveil the extent of the social gap within plans. This examination can also shed light on the congruence or disparity between the portrayal of CES, including aesthetics, in academic literature and their application in practical planning scenarios. For example, Gee et al. (2017) emphasized the significance of CES in identifying culturally significant areas. A scrutiny of how MSP plans engage with CES enables the determination of whether they are employed similarly in practical planning contexts. If divergences in CES utilization are found, it could highlight research areas that have yet to translate effectively into practical applications.

Delving into the specifics of CES and aesthetics language could further help identify discipline-specific language barriers, paving the way for recommendations to enhance the accessibility of academic literature. Additionally, trends in plans with higher CES and aesthetic incorporation can be identified by investigating the integration of CES and aesthetics, unveiling potential enabling factors. Uncovering knowledge gaps, barriers, and successful integration approaches through examining CES in MSP plans is instrumental in forming recommendations to bridge these gaps via practice and policy modifications. Such analytical endeavours are poised to support a more comprehensive integration of CES and, by extension, socio-cultural factors into MSP.

This exploration, in turn, can inform more enlightened and inclusive marine spatial planning efforts, fostering a balanced interplay among ecological, economic, and socio-cultural dimensions within marine and coastal regions. This enriched understanding can equip policymakers and practitioners to adeptly navigate the nuanced challenges associated with integrating socio-cultural values within MSP, promoting a more holistic and equitable approach to marine resource management and conservation. Through this lens, exploring CES integration and language within MSP becomes a significant stepping stone toward a more sustainable and inclusive marine spatial planning paradigm.

3.2 Research Objectives

To better understand the social gap in marine spatial planning implementation, this study conducted a document analysis to explore the inclusion of established CES terminology across a range of MSP documents.

This analysis was driven by the following research questions:

1) To what extent is aesthetic terminology integrated into MSP plans?
2) How does the integration of aesthetics compare with the integration of other Cultural Ecosystem Services (CES) in the identified plans and documents?
3) How do different MSP initiatives incorporate CES and aesthetics?

3.3 Methods

Document analysis is a valuable and well-established research method that systematically examines textual and visual materials to uncover meaning, gain insights, and develop empirical knowledge by scrutinizing and interpreting data within documents (Bowen, 2009; Corbin & Strauss, 2008; Rapley, 2007). Document analysis methods have been widely employed in various research domains, including resource and coastal management (e.g., Frohlich et al., 2022; Quevedo et al., 2021), and have been previously used to evaluate MSP initiatives (Carneiro, 2013). Document analysis can help equip researchers with systematic tools to analyze and interpret a range of documents (Bowen, 2009; Carneiro, 2013; Frohlich et al., 2022), helping contribute to the generation of evidence-based knowledge and facilitate informed decision-making (Bowen, 2009; Morgan, 2021; Stemler, 2001; Wilson, 2016).

The procedure for document analysis includes identifying, selecting, appraising, and synthesizing data from documents, which is then organized into major themes and categories, primarily through qualitative or quantitative content analysis (Bowen, 2009; Labuschagne, 2003; Wilson, 2016). This research project utilizes a quantitative content analysis approach, which includes coding predefined terms and labels to draw inferences from trends and patterns that emerge from the coding process (Stemler, 2001; Wilson, 2016).

In the context of this project, document analysis can illuminate the degree to which established CES terminology and, by proxy, socio-cultural factors are integrated into marine planning. These investigations can identify shortcomings (i.e., under-represented CES classes) and successes (i.e., plans with high levels of CES integration or well-represented CES classes) across MSP jurisdictions. Moreover, this analysis can facilitate the identification of connections and disparities between academic research and practical implementation by comparing MSP plans with current literature on CES integration.

3.3.2 Data Collection

A purposive sample of marine planning documents from various coastal and marine regions worldwide was selected. This analysis selected a variety of marine spatial plans, aiming to collect between 30-40 documents to encompass diverse geographical locations, governance structures, and marine environments to explore how these contexts influence the integration of CES and aesthetics. Different regions and countries exhibit varied MSP outcomes and processes, actively shaped by their diverse goals, processes, and capacities to affect and implement policy and regulations (Reimer et al., 2023). Recognizing overlaps between MSP and other marine management paradigms (Trouillet, 2020), the documents selected did not need to be exclusively categorized as ‘marine spatial plans.’ However, plans were required to incorporate at least some spatial elements (i.e., the integration of spatial data, zoning, spatially defined policies, etc.) and a predominant marine or coastal focus (i.e., plans focussing on inland waters, such as lakes, rivers, and watershed management plans, were excluded). For example, the Belize Integrated Coastal Zone Management Plan does not refer to ‘MSP’ but instead uses a term like ‘Integrated Coastal Zone Management’ and incorporates many of the same foundation principles of MSP

(Reimer et al., 2023). As such, plans were selected to reflect multiple geographic locations around the world. In addition, the analysis aimed to explore MSP initiatives across various governance levels/jurisdictions, and thus, plans were selected to encompass a representative sample of local, regional, or national level plans. Since the process, implementation, and outcomes of MSP differ depending on the scale of the plan, incorporating a range of scales ensures a comprehensive understanding of different planning approaches at various governance levels and their unique implications for integrating CES and aesthetics (Bates, 2017).

Documents were retrieved from governmental websites and academic databases and limited to publicly accessible plans published by government agencies, indigenous organizations, or academic institutions in relevant jurisdictions. Only documents published in English were included in this analysis to avoid potential translation errors. Although it would have been ideal to include a more extensive set of plans, many plans from countries such as China, the United Arab Emirates, Ecuador, Croatia, and Mexico were either not publicly accessible or did not have English translations.

3.3.3 Data Analysis

A quantitative and deductive content analysis was used to examine the presence of content (terms) that manifested within the document text (Kondracki et al., 2002). To assess the representation of CES in marine plans and to provide a comparison with representation in literature, the key search terms/phrases were identified *a priori* (Stemler, 2001) based on the classification scheme that Rodrigues et al. (2017) identified. The Rodrigues et al. (2017) framework encompasses CES terminology from scientific literature, reflecting commonly attributed and accepted language within the scientific community. Applying the terminology/labels identified in the literature by Rodrigues et al. (2017) offers a valuable opportunity to explore potential connections and disconnects between CES in literature and practical applications.

Each plan was read carefully and comprehensively to record the frequency with which any of the 90 pre-established CES labels (Rodrigues, 2017) appeared within the text. When keywords/phrases were identified within a plan, the context in which they were referenced was explored to ensure relevancy and to allow for the removal of irrelevant uses

of said terms/phrases from word count frequencies. For example, the term 'home' is categorized under Cultural Ecosystem Services (CES) as representing 'Sense of Place' (Rodrigues, 2017). However, its use in the *Hawai'i Ocean Resource Management Plan* – "Department of Defense lands are home to a large number of endangered and threatened Hawaiian taxa" – does not align with the intended meaning of 'Sense of Place' (CZM Hawaii, 2020). Any terms/labels that appeared in multiple CES classes within the Rodrigues et al. (2017) classification were included only in their most relevant category within this research. Additionally, any terms/labels that could result in double counting (i.e., 'scientific' and 'scientific inspiration') were included as a singular term (i.e., 'scientific').

The identified terms were then categorized into one of 11 CES classes following a slightly modified Common International Classification for Ecosystem Services (CICES) typology defined within the Garcia Rodrigues et al. (2017) classification scheme (see Table 1 for search terms) (Haines-Young & Potschin, 2012). However, services of humans to ecosystems, a CES class proposed by Comberti et al. (2015) and included by Garcia Rodrigues et al. (2017), was excluded from this search to better align with established CES classes. This categorization allowed for a structured assessment of the prevalence of these CES classes across plans and a comparison between various types of CES, including aesthetics. In the comparative analysis of marine spatial plans based on their region of origin and geographical scales, CES classes were only counted as represented if 50% or more of the plans from that region or scale included at least one term from that CES class.

Descriptive statistics were used to calculate the number of plans assessing CES classes, frequency of references, and differences among term integration across geographic locations and spatial scale of plans. Summary statistics, such as mean, median, and standard deviation, were calculated to assess the central tendencies and variations in CES terms/label occurrence.

Table 1. Summary of Cultural Ecosystem Services (CES) Classes Identified in the Plans

CES Classes	Definition/explanation	Search terms	Term variants
Aesthetic	"Many people find beauty or aesthetic value in various aspects of ecosystems, as reflected in the support for parks, "scenic drives," and the selection of housing locations" (Millenium Ecosystem Assessment, 2005)	Aesthetic*	Aesthetics; Aesthetic seascape; Aesthetic information; Aesthetic appreciation; Aesthetic enjoyment; Aesthetic values; Aesthetic benefits
		Aerial views	
		Natural beauty	
		Scenic value	
		Scenery*	Scenery; Scenery provisioning
Recreation and leisure	"People often choose where to spend their leisure time based in part on the characteristics of the natural or cultivated landscapes in a particular area" (Millenium Ecosystem Assessment, 2005)	Recreation*	Recreational fishing; Recreational opportunities
		Leisure	
		Tourism*	Coral reef tourism; Nature tourism
		Ecotourism	
		Boating	
		Diving	
		Whale watching	
		Beach going	
		Nature appreciation	
		Bathing	
		Sailing	
		Kayaking	
Cultural heritage and identity	Cultural identity services can be defined as "that is, the current cultural linkage between humans and their environments." (Bieling, 2014) Cultural heritage services can be defined as "memories' in the landscape from past cultural ties" (Bieling, 2014)	Identity*	Identities; Local identities
		Historic*	Historic value; Historic landscape; Heritage services
		Cultural heritage	
		Cultural identity	
		Cultural landscape	
		Cultural heritage values	
		Cultural diversity	
Spiritual, sacred and/or religious	"Many religions attach spiritual and religious values to ecosystems or their components." (Millenium Ecosystem Assessment, 2005)	Spiritual*	Spiritual appreciation; Spiritual benefits; Spiritual services; Spiritual fulfillment; Spirituality; Spiritual experience
		Ritual	Ritual representation
		Religious*	Religious; Religious value; Religious usage
		Ceremonial*	Ceremonial; Ceremonial sites; Ceremonies
		Sacred*	Sacred; Sacred places

CES Classes	Definition/explanation	Search terms	Term variants
Educational	"Ecosystems and their components and processes provide the basis for both formal and informal education in many societies." (Millenium Ecosystem Assessment, 2005)	Education*	Education; Educational; Educational walks; Educational source; Educational values
		Environmental education	
Inspiration for culture, art, and design	"Ecosystems provide a rich source of inspiration for art, folklore, national symbols, architecture, and advertising." (Millenium Ecosystem Assessment, 2005)	Photography	
		Literature	
		Songs	
		Inspiration*	Inspiration; Inspiration of art; Inspiration for art and design; Artistic inspiration; Inspiration for traditional songs and dances; Inspiration for culture
		Art	
		Folklore	
		Architecture	
Sense of place	"Many people value the "sense of place" that is associated with recognized features of their environment, including aspects of the ecosystem" (Millenium Ecosystem Assessment, 2005)	Sense of place	
		Home	
		Sense of belonging to	
		Connection with the coastline	
Social relations	"Ecosystems influence the types of social relations that are established in particular cultures. Fishing societies, for example, differ in many respects in their social relations from nomadic herding or agricultural societies" (Millenium Ecosystem Assessment, 2005)	Social capital	
		Socio-political representation	
		Social relations	
		Politics	
		Social cohesion	
		Societal	
Scientific	"Scientific values of ecosystems" (Costanza et al., 1997)	Ecological studies	
		Geological studies	
		Scientific*	Scientific research; Scientific inspiration; Scientific study site; Scientific knowledge
		Science	
Existence	"Existence value arises from human satisfaction from simply knowing that some desirable thing or state of affairs exists" (Randall, 1991)	Existence*	Existence; Existence value
Intellectual and representative interactions	Defined by Rodrigues et al. (2017) as a category including CES that did not fit well into any of the previous classes, and thus were classified under the CICES group level 'intellectual and representative interactions'.	Traditional knowledge	
		Local knowledge	
		Knowledge systems	
		Source of knowledge	
		Awareness	
		Ethics	

* Represents terms with multiple variants

3.4 Results

A total of 35 plans were identified from 20 countries (Table 2). Of the 90 terms originally identified by Rodrigues, 58 terms were referenced across the 35 plans. (Table 1). The majority of plans analyzed (71.4%) were released between 2015 and 2019. With the exception of plans released in 2019, all plans after 2015 included over 80% of CES categories (Appendix i).

Term inclusion was assessed across five major geographic regions: North America, Oceania, Europe, the Caribbean, and Asia (Figure 10). In the analyzed plan sample, a predominant representation was observed from North America (n =14) and Europe (n = 14 plans), representing 80% of analyzed plans. Other regions, such as the Caribbean (n = 3), Oceania (n = 3), and Asia (n =1), were underrepresented.

Table 2. Marine spatial plans analyzed and total CES classes and terms identified.

Plan Name	Scale	Country of origin	Release Date	Number of CES classes included	Number of terms total
Mapp-The Haida Gwaii Marine Plan	Local	Canada	2015	9	26
MaPP-Central Coast Marine Plan	Local	Canada	2015	10	29
MaPP-North Coast Marine Plan	Local	Canada	2015	10	31
MaPP-The North Vancouver Island Marine Plan	Local	Canada	2015	10	27
Long Island Sound Blue Plan	Local	USA	2019	7	19
Hawaii Ocean Resources Management Plan	Local	USA	2020	9	20
New York Ocean Action Plan	Local	USA	2017	8	21
Marine Spatial Planning for the Pedro Bank	Local	Jamaica	2015	4	9
The Sea Change—Tai Timu Tai Pari Hauraki Gulf Marine Spatial Plan	Local	New Zealand	2017	9	30
Pilot Pentland Firth and Orkney Waters Marine Spatial Plan	Regional	Scotland	2016	9	22
Shetland Islands Regional Marine Plan (SIRMP)	Regional	Scotland	2021	10	24
Regional Oceans Plan - Scotian Shelf Atlantic Coast Bay of Fundy	Regional	Canada	2014	4	10
Placentia Bay/Grand Banks Large Ocean Management Area Integrated Management Plan	Regional	Canada	2012	7	14
Gulf of St. Lawrence Integrated Management Plan	Regional	Canada	2013	6	10
Pacific North Coast Integrated Management Area Plan	Regional	Canada	2017	7	21
East Inshore and East Offshore Marine Plans	Regional	UK (England)	2014	8	20
South Inshore and South Offshore Marine Plan	Regional	UK (England)	2018	6	10
Marine Spatial Plan for Washington's Pacific Coast	Regional	United States	2017	9	25
Northeast Ocean Plan	Regional	United States	2016	8	23
Mid-Atlantic Regional Ocean Action Plan	Regional	United States	2016	11	22
South-east Regional Marine Plan	Regional	Australia	2004	9	20
Phoenix Islands Protected Area Management Plan	Regional	Kiribati	2008	6	16
Welsh National Marine Plan	National	Wales	2019	8	19
Estonian Maritime Spatial Plan	National	Estonia	2019	6	18
Scotland's National Marine Plan	National	Scotland	2015	6	17
The Maritime Spatial Plan 2030	National	Latvia	2019	5	13
Marine Spatial Plans for the Gulf of Bothnia, the Baltic Sea and the Skagerrak/ Kattegat	National	Sweden	2022	9	22
Maritime Spatial Plan	National	Denmark	2021	5	9
Norway's integrated ocean management plans	National	Norway	2019	7	16
Project Ireland 2040 - National Marine Planning Framework	National	Ireland	2018	9	24
The Israel Marine Plan	National	Israel	2015	6	12
Marine Spatial Plan for the Belgian part of the North Sea	National	Belgium	2019	6	11
Belize Integrated Coastal Zone Management Plan	National	Belize	2016	7	20
Integrated Management Plan for the North Sea 2015	National	Netherlands	2015	5	10
Grenada Enhanced Coastal Master and Marine Spatial Plan	National	Grenada	2016	9	19

3.4.1 Integration of Terms

Marine spatial plans included reference to an average of 8 different CES classes (73.2% of all CES), encompassing, on average, 19 different terms (Table 1). Plans included a minimum of 4 different CES classes, although only one plan, the *U.S. Mid-Atlantic Regional Ocean Action Plan,* integrated all 11 CES classes. Across CES classes, 'Recreation and leisure' services were referenced across all plans (Figure 5a) and included terms most frequently referenced, averaging 158.3 references per plan (Figure 5b). 'Scientific' and 'Cultural heritage and identity' were also highly incorporated, being included in 97% of plans. Reference to 'Existence' services was uncommon, only included in around 11% of the plans (n = 4).

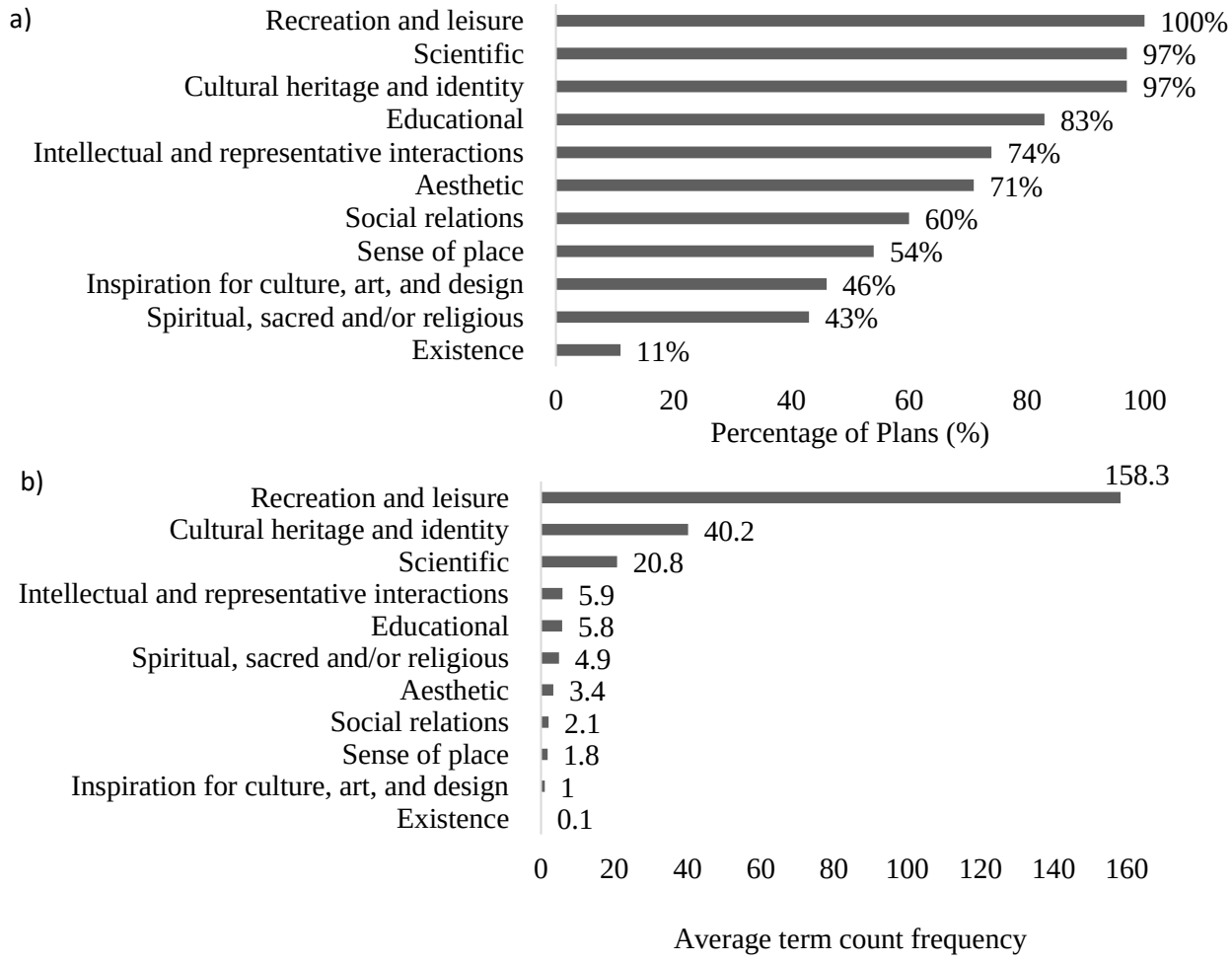

Figure 5. a) Percentage of plans integrating the CES classes and b) Average word count frequency for each CES class (i.e., average number of times terms representing each CES category were referenced per plan)

Aesthetic terminology was relatively well represented across plans, identified in 25 plans (Figure 5a). Of the plans that included aesthetic terms, the term 'aesthetic' appeared most often (across 51% of plans). The next highest integrated aesthetic term was 'natural beauty,' included in 40% of plans. Terms 'landscape aesthetics,' 'sensory simulation,' and 'scene-scape' did not appear in any of the marine plans analyzed (Figure 6). A total of 5 out of the 8 (63%) terms/literature labels representing the aesthetics CES category were included in the marine plans analyzed.

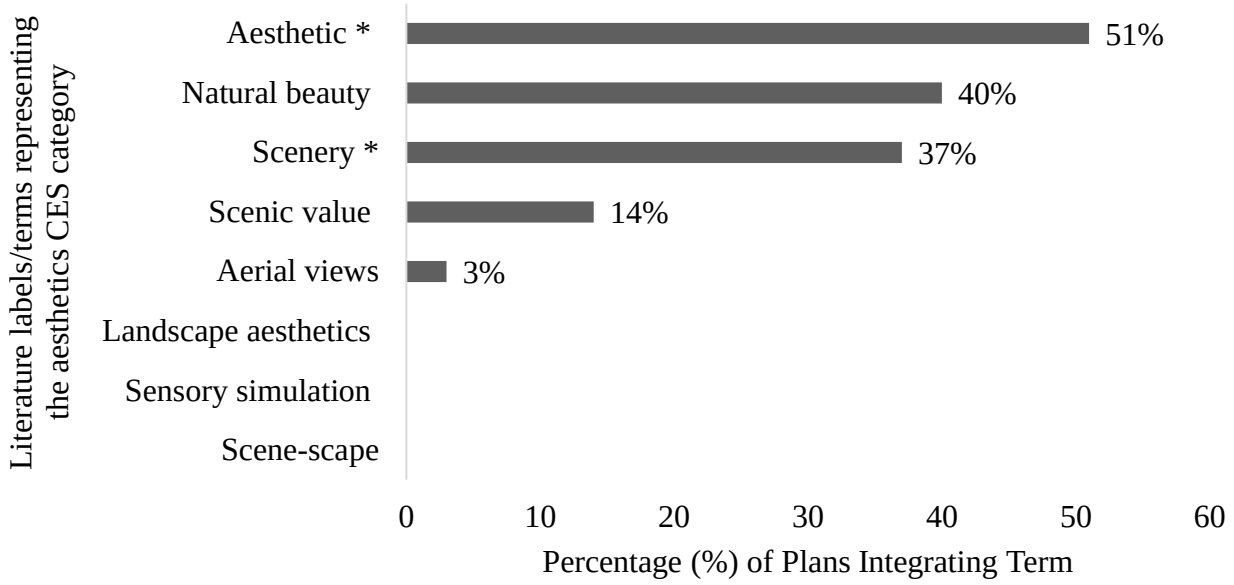

Figure 6. Percentage of plans integrating various aesthetic terms/literature labels. * Indicates labels that have term variants (also see Table 1). N = 25

Overall, aesthetic terms were included at very low frequencies. Within those plans that integrated aesthetics, aesthetic terms were referenced an average of 1.17 times. The term 'Aesthetics,' or a variant of the term (Table 1), was included a total of 53 times across all plans, referenced on average approximately 2.9 times in those plans, including aesthetics. The term 'Natural beauty' was included a total of 38 times across all plans and averaged 2.7 times in those plans integrating aesthetics. The term 'Scenery' was included a total of 20 times across all plans; on average, across the plans incorporating the term, it was referenced an average of approximately 1.5 times. The term 'Scenic value' was included a total of 6 times across all plans; on average, across the plans integrating the term, it was referenced an average of approximately 1.2 times. While the term 'Aerial view' was referenced in only one plan a total of 3 times.

The *Marine Spatial Plan for Washington's Pacific Coast (WPC)* had the highest references of aesthetic terms with a total of 21 references across two terms: 'Aesthetic(s)' (19 references) and 'Natural beauty' (2 references). The *WPC* also represents the highest references for two other classes: 'Recreation and leisure' and 'Inspiration for culture, art, and design'. The *MaPP – North Coast Marine Plan (NCMP)*, exhibited the highest diversity of aesthetic terms integrated, referencing 'Aesthetic(s)' (1 reference), 'Natural beauty' (1 reference), 'Scenery' (2 references), and 'Scenic value' (2 references). The *NCMP* similarly incorporated a wide range of CES classes, integrating 10 of the 11 classes (91%).

3.4.2 Integration Across Scale of assessment

Across scale of assessment, local plans included the highest integration of CES terms (Figure 7). Regional plans also represented CES classes well (median 8 CES terms). National plans included the lowest diversity of CES classes, expressing a median of 6 CES classes across plans (Figure 7).

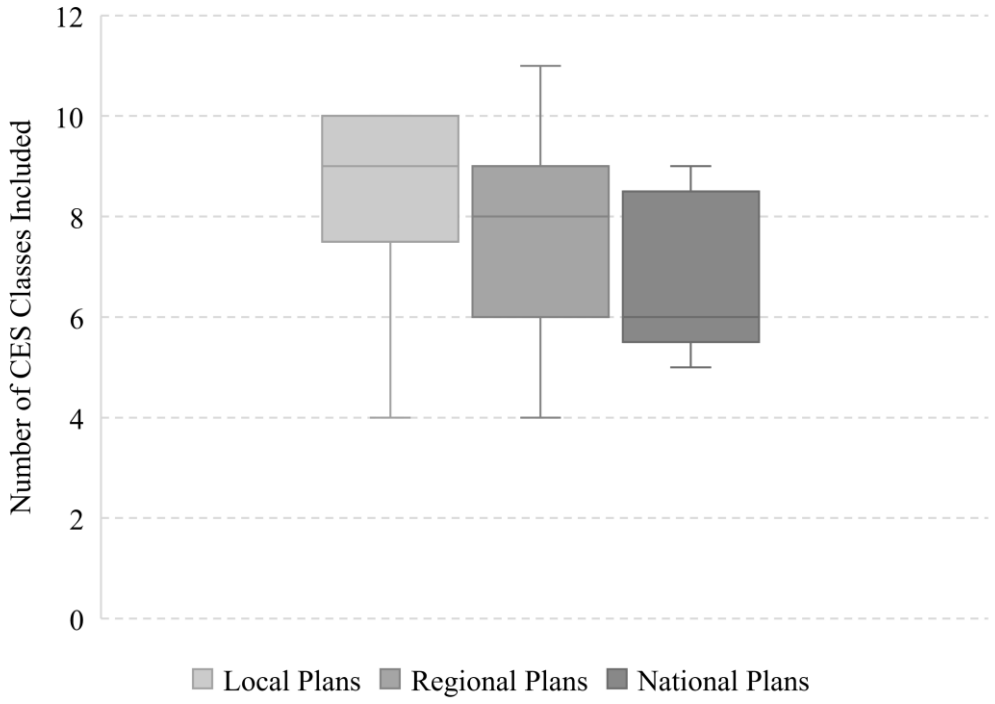

Figure 7. Boxplot of CES integration across geographical scales.

Likewise, the frequency of terms referenced was also highest for local plans across most CES classes (Figure 8).

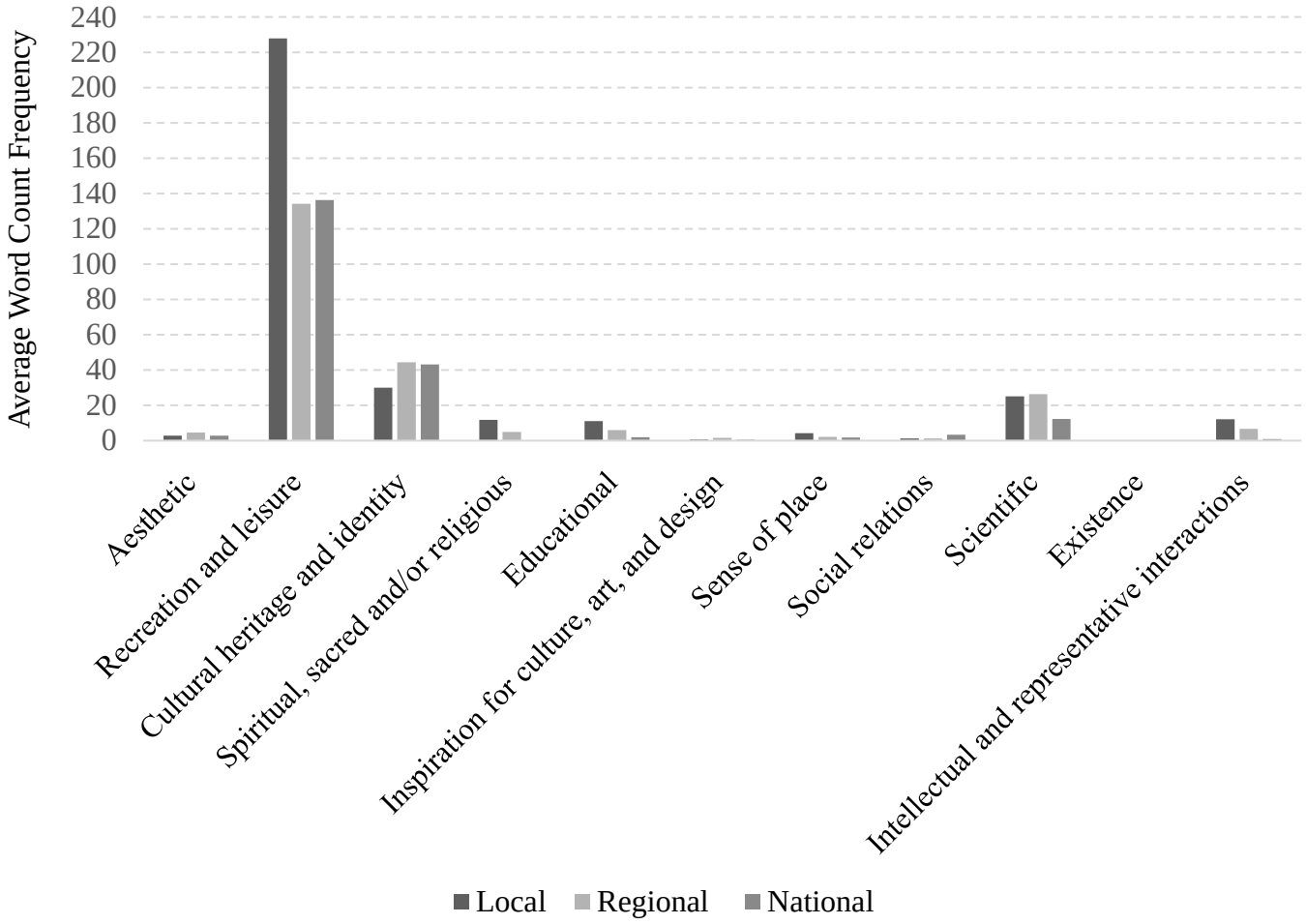

Figure 8. Average number of times terms representing each CES category were referenced per plan across different scales.

Of the aesthetic terms/labels included in marine plans, local plans demonstrated the highest percentage of plans including these terms (Figure 9a). However, local plans also integrated aesthetic terms at the lowest frequency (Figure 9b). Regional plans had the highest integration frequency for the terms 'Aesthetic' and 'Natural beauty' by far, with 32 and 21 references, respectively (Figure 9b).

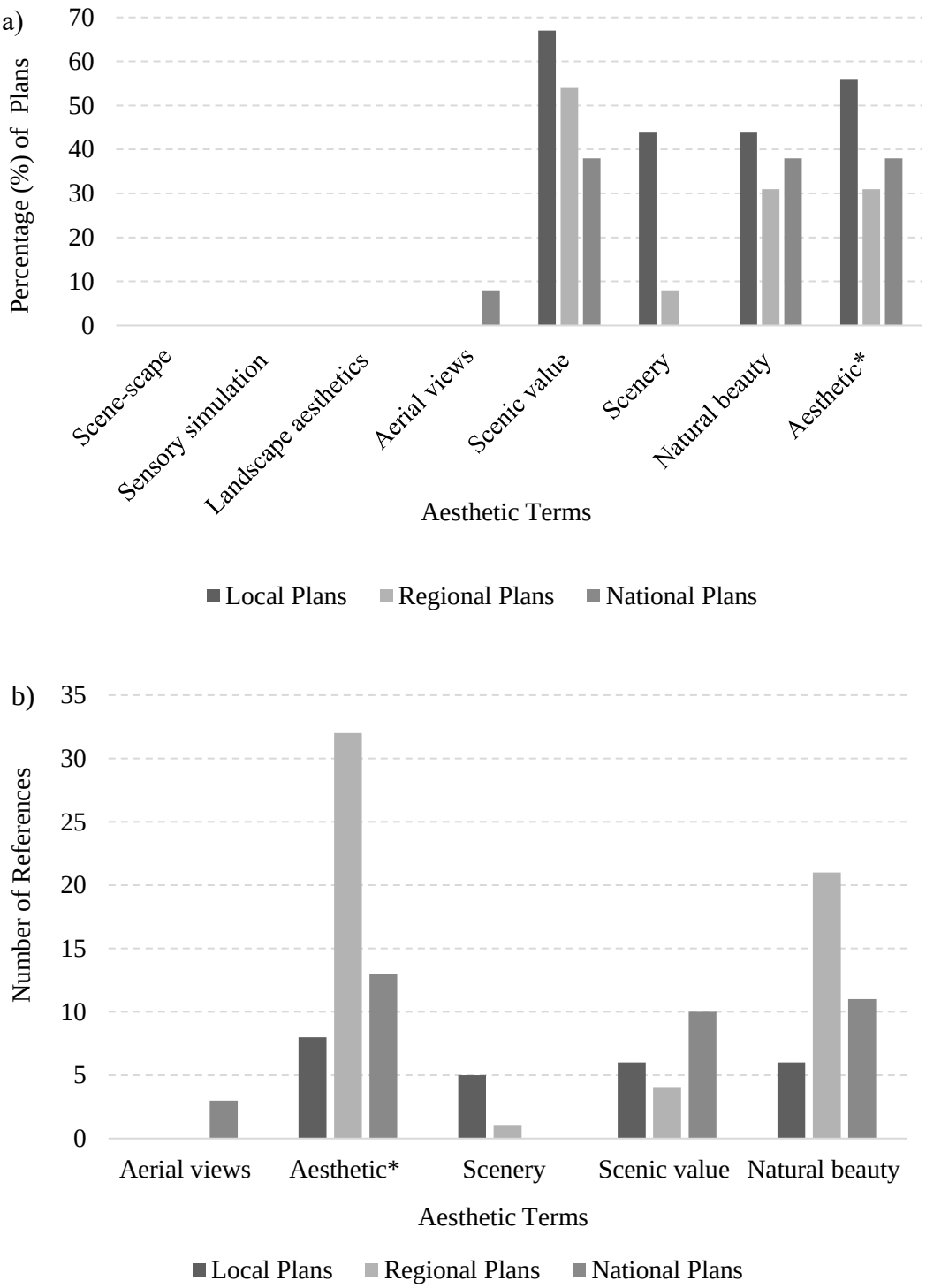

Figure 9. a) Percentage of plans including various aesthetic terms/literature labels across plan scales and b) Total number of aesthetic term references across plan scales.

3.4.3 CES inclusion Across Geographic Region

On average, marine plans originating from North America and Europe exhibited a very high diversity of CES classes (over 70% of CES classes; Figure 10a). Over 80% of North American and Oceanian plans included aesthetic terms (Figure 10b). The integration of CES terms was similar for Oceanian plans and Caribbean plans. The integration of aesthetic terms was similar for European plans and Caribbean plans. Only one Asian plan was assessed in this document analysis. This plan showed the least integration of CES classes and aesthetic terms compared to plans from other regions. North American plans also represented the highest average term frequency for most CES Classes (73%), including aesthetics (Figure 11.)

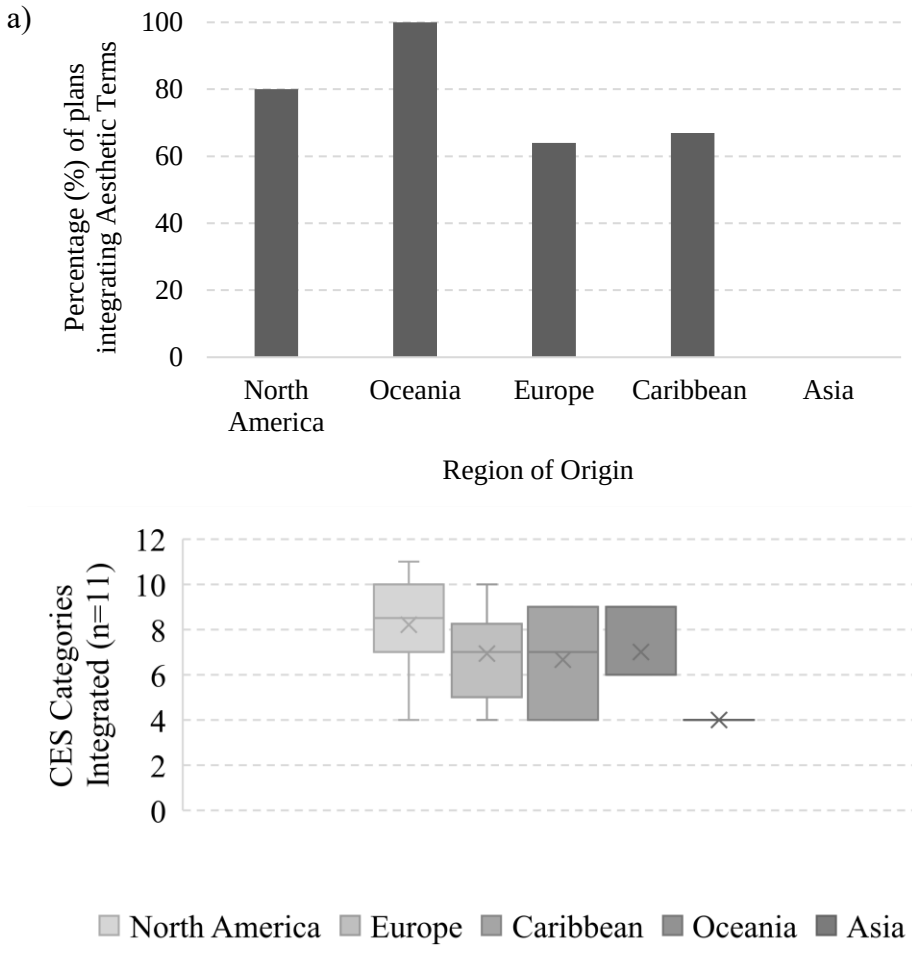

Figure 10. Based on plan region of origin a) percentage of plans integrating aesthetic terms and b) boxplot of CES integration. North America (n =14), Europe (n = 14 plans), Caribbean (n = 3), Oceania (n = 3), and Asia (n =1).

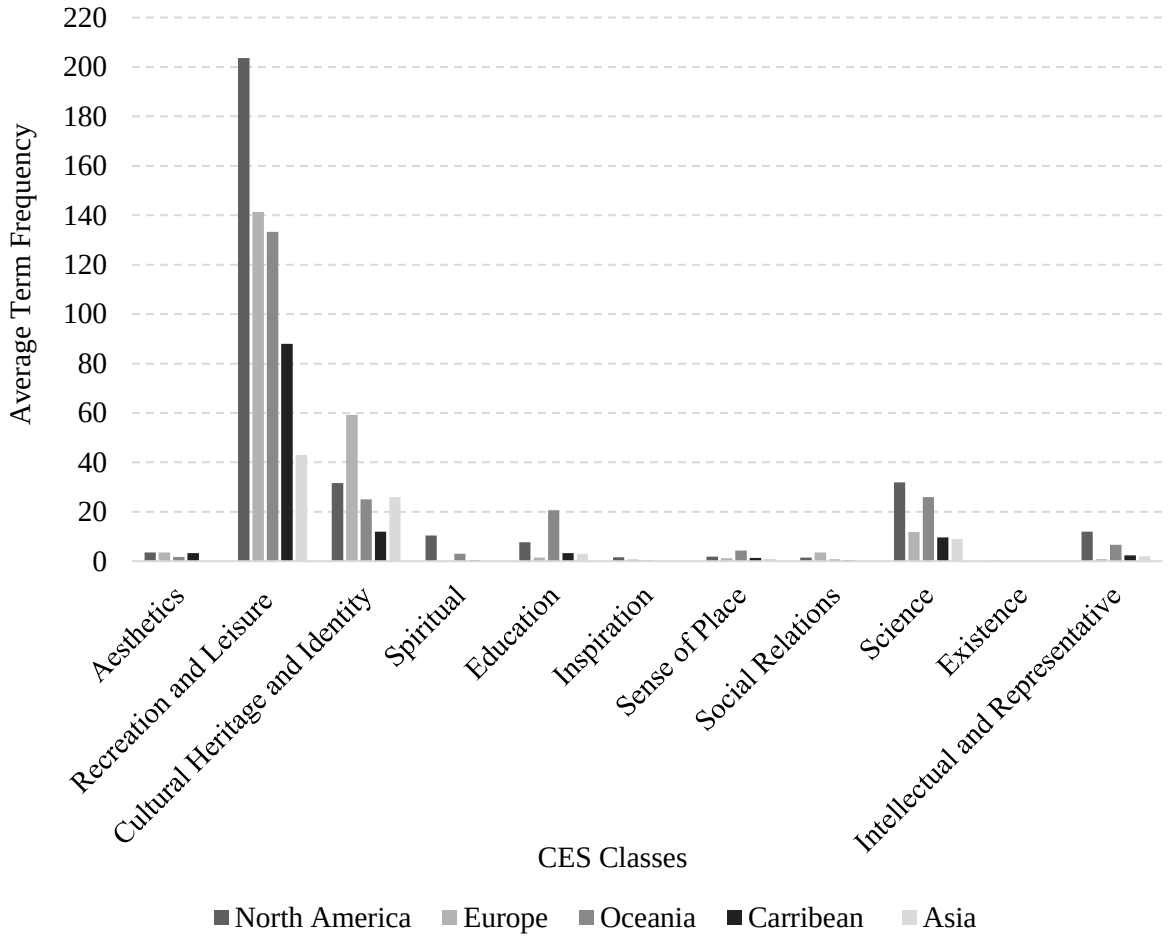

Figure 11. Average term frequency based on region of origin.

3.5 Discussion

3.5.1 Prioritizing CES and Aesthetics: Insights from Theory to Practice

The results of this study reveal that CES terminology is generally well recognized across plans, with most plans including over half of all CES classes. This result reinforces the growing global recognition of the importance of the socio-cultural dimensions of MSP, such as their contributions to high-level sustainability goals and effective implementation of MSP initiatives (Gee et al., 2017; Gilek et al., 2021; McKinley et al., 2019). However, inclusion is uneven and inconsistent across CES classes, reinforcing similar findings from the broader CES literature (Rodrigues et al., 2017). Some CES classes were more prominent across MSP planning documents, including a focus and emphasis on recreation and leisure services. Services like recreation and scientific benefits often reflect tangible and commensurable services, which can be evaluated using quantitative monetary metrics (Costanza et al., 1997; De Groot et al., 2012; Rodrigues et al., 2017).

Other well-represented CES, such as cultural heritage benefits, can also be considered tangible, often associated with specific places or services. Comparatively, other CES classes, despite inclusion, were minimally referenced, with terms often appearing only once in planning documents.

While all MSP plans recognize the importance of CES, aesthetics were only incorporated in approximately 70% of plans. Furthermore, MSP plans were generally vague in how they refer to aesthetics, with a high preference for variants of generalized 'Aesthetics' or terms that refer predominantly to the visual appeal aspects of ecosystems. In addition to the vague language used for integrating aesthetics, most plans referenced aesthetic terms minimally, averaging only 3.4 mentions per plan, suggesting a rather superficial inclusion. Comparatively, aesthetic services are well recognized as important within CES literature, appearing as the second highest-integrated CES class by Rodrigues et al. (2017). The economic importance of aesthetics has been suggested as a reason for their prevalence in literature (Costanza et al., 1997; De Groot et al., 2012; Rodrigues et al., 2017). The low level of reference and scant variability of terms integrated across established aesthetic CES terms (from Rodriguez et al., 2017) suggests a disconnect between the language used in aesthetic focused CES research and the terminology preferred by marine spatial planners, reflecting a form of social gap in MSP implementation. The lack of integration of aesthetic terminology and inconsistency in CES language may be due to the complex and socially oriented nature of aesthetics and CES.

Many CES classes linked to marine and coastal areas, such as aesthetics, are intricate, frequently subjective, and context-specific, often defying easy monetary valuation approaches (Ehler, 2021; Pennino et al., 2021). Even with its economic contributions through fields like tourism and housing, the evaluation of aesthetics is complex and multifaceted (Daniel et al., 2012). Aesthetic values frequently intertwine with other CES classes, including 'Sense of place' and 'Cultural heritage and identity,' complicating their valuation process and necessitating multi-criterion valuation methods (Daniel et al., 2012; Marshall et al., 2019). Consequently, identifying, assessing, and incorporating these values into marine planning can be challenging (Pennino et al., 2021). Significant data gaps, uncertainties, and a lack of established methods to assess and integrate aesthetic values and preferences for coastal and ocean seascapes further complicate their inclusion (Jones et al., 2016; Lee, 2017; Marshall et al., 2019).

The low number of references to aesthetics within marine spatial plans may also represent decision-makers hesitancy to integrate more subjective values (Fletcher et al., 2014). Aesthetic values and preferences are inherently subjective and varied, often differing between individuals and cultures, making them challenging to standardize in planning processes (Daniel et al., 2012; Tveit, 2009). Similarly, more subjective and intangible CES, like existence values, tend to get less attention in academic literature (Rodriguez et al., 2017), which was also evident in MSP plans where classes such as 'Sense of place', 'Spiritual, sacred and religious values', and 'Existence values' were among the least included. As such, decision-makers may be hesitant to incorporate aesthetic values and more intangible CES into MSP initiatives beyond a surface level, or at all, due to concerns about basing decisions on subjective, incomplete, or uncertain information and, therefore, potentially appearing biased and undermining the credibility of the planning process.

Another critical roadblock in explaining the science-policy gap in MSP integration of CES and aesthetics may reflect the insufficient role of marine social sciences within MSP (Flannery et al., 2018; McKinley et al., 2020). The marine social sciences have faced several challenges in establishing their value and validity, ranging from misconceptions about their methodological rigor to their influence within the science-policy nexus (McKinley et al., 2020). Consequently, marine social sciences have frequently been relegated to peripheral roles in projects, often limited to facilitation or educational aspects, rather than a central focus on understanding the complexities of socio-spatial relationships in marine environments (Flannery et al., 2018; McKinley et al., 2020). Consequently, the typically superficial integration of aesthetic values in marine spatial plans may reflect a lack of social science experts in MSP initiatives and challenges with appropriate use and communication of CES-relevant terminology. As a result, issues in communicating social science findings and their value are well recognized. For example, in workshops led by McKinley et al. (2020), marine social sciences community members noted the barriers created by the distinct technical languages of different scientific disciplines. They stressed the necessity of developing a common language to transcend these disciplinary silos without oversimplifying the core technical aspects of any field (McKinley et al., 2020). This perspective was also echoed at the 5th International Forum on Marine/Maritime Spatial Planning, as reported by UNESCO-IOC/European Commission (2023), which recognized the need for greater inclusion of social scientists in MSP processes to bridge these communication gaps and make academic knowledge more applicable and utilized in planning.

The challenges of not fully understanding or integrating the human dimension of marine and coastal SES might intensify due to the disconnect between academic literature and its practical implementation. This divide indicates a shortcoming in converting in-depth academic findings into actionable strategies in planning and policymaking and a deficiency in incorporating scholarly insights into the operational frameworks of planning and policy. Consequently, the valuable, nuanced understanding offered by academic studies often remains underutilized in practical settings (UNESCO-IOC/European Commission, 2023). This underutilization can lead to oversights in recognizing and addressing key human factors, such as community needs, cultural values, and social dynamics, which are essential for the success and acceptance of any planning initiative (Gilek et al., 2021; McKinley et al., 2019; Pennino et al., 2021). Bridging this gap requires a concerted effort to integrate academic knowledge with practical execution, ensuring that theoretical insights effectively inform and shape real-world applications.

Effective MSP requires an adequate understanding of the complexity of both biophysical and human dimensions (Santos et al., 2021). Currently, the focus of MSP appears to predominantly lean towards the more tangible classes of CES, leading to an incomplete representation and incorporation of the entire CES spectrum. Such a constrained focus risks planners falling short of a comprehensive understanding of the complexity of the human dimension of marine and coastal Social-Ecological Systems (SES). Consequently, this limited understanding might skew planning initiatives to favour specific interest holders, especially those in the recreation and tourism industry. This bias contradicts the comprehensive sustainability promises central to MSP theory, presenting a substantial threat to the social sustainability and legitimacy of MSP initiatives and potentially paving the way for conflicts (Gilek et al., 2021; Gilek et al., 2018; Saunders et al., 2020). For example, the recognition of aesthetic services in many marine spatial planning initiatives, particularly at local levels, marks a significant step towards valuing the contributions of coastal environments to communities and cultures. However, the manner and frequency of this recognition raise concerns about its depth and effectiveness. While aesthetic services are often mentioned in MSP plans, their treatment tends to be superficial, indicated by vague or infrequent references. This approach sharply contrasts with the detailed attention given to more tangible CES, such as recreation, suggesting a lower priority for aesthetic aspects.

The observed lack of comprehensive understanding and integration, suggesting a subsequent lack of prioritization, which might lead to a negative feedback loop. In this loop, the low priority given to less tangible CES, including aesthetics, exacerbates the deficiencies in integration and valuation methods, which then further contributes to a continued lack of comprehensive understanding and integration. In MSP, plans establish priorities and lay the groundwork for integrating CES into practical actions (Gilliland & Laffoley, 2008). Without clear guidelines and prioritization for these services, their effective integration becomes more challenging for planners. This low prioritization might also contribute to the recognized lack of dedicated funding for collecting and incorporating social data into ocean plans or gathering insights on social-ecological links (Cornu et al., 2014; Santos et al., 2021). As such, it impedes the development of a comprehensive understanding of these connections and robust valuation methods, thereby hampering the meaningful and effective integration of aesthetic services into MSP. This cycle highlights the need for a more thoughtful and inclusive approach to integrating all facets of CES, especially those with less tangible aspects like aesthetic services, to ensure their adequate representation and valuation in marine spatial planning.

3.5.2 Enabling CES Integration in MSP

By exploring how CES and aesthetics are integrated across a diversity of plans, these findings can provide insights into factors that enable better integration into MSP. One potential enabling factor is the scale of the plan. Local-scale marine spatial plans exhibited a more comprehensive integration of CES and aesthetic considerations. This trend aligns with the inherent nature of CES, which is deeply rooted in the unique interactions between natural environments and individual/community cultural histories, beliefs, and values (Hirons et al., 2016; Milcu et al., 2013). These dynamics often only emerge through interactions and engagements with interest holders and rights-holders at a local level, where the specific nuances of community-environment interactions and the local knowledge and priorities can be more accurately captured (McNamara et al., 2020). As such, the reduced geographical scope encompassed within local plans may help foster more community-based, bottom-up approaches.

Regional or national plans, due to their broader scope, may face challenges in capturing the detailed, localized knowledge essential for the meaningful integration of CES. These challenges may be related to the time and financial commitments associated with bottom-up

participatory strategies (Pennino et al., 2021). In national-scale plans, resources allocated for interest holder integration must be distributed among a much larger and more diverse group of communities and interests. The broader scope of these plans necessitates a more complex and extensive effort to incorporate diverse perspectives and inputs, leading to logistical and resource allocation challenges. In contrast, the more focused geographical scope of local plans allows for a more targeted allocation of time and financial resources. This concentrated approach allows for deeper and more meaningful engagement with specific communities, enabling the identification and integration of relevant CES.

The examination of aesthetic terminology in the MaPP - *North Coast Marine Plan (NCMP)* reinforces the suggestion that smaller-scale and bottom-up approaches are enabling factors in the integration of CES. The *NCMP*, originating from British Columbia, Canada, is a local scale plan recognized for its implementation of bottom-up, participatory, and community-based methodologies (Diggon et al., 2022; Diggon et al., 2021; Marine Planning Partnership Initiative, 2015c). Notably, the *NCMP* integrates four of the eight identified aesthetic terms, representing the highest diversity of aesthetic term integration observed across the plan sample (Marine Planning Partnership Initiative, 2015c). This integration primarily occurs within the context of area descriptions, as evident in the statement, "Tourism opportunities in the region provide a unique combination of natural beauty, rich cultural experiences, and historical features"(Marine Planning Partnership Initiative, 2015c).

The bottom-up approach of the *NCMP*, reflective of its local scale, highlights the value of such a perspective in integrating CES in MSP (Diggon et al., 2022; Marine Planning Partnership Initiative, 2015c). As MSP is fundamentally an area-based approach, the identification of spatial dimensions in the connections between people and marine environments is essential (Gee et al., 2017). This aspect is further emphasized by Gee et al. (2017), who highlight the importance of spatial specificity in effectively addressing the multifaceted relationship between communities and their marine surroundings. The *NCMP* demonstrates the enabling role of local-scale planning and bottom-up approaches in capturing and integrating local knowledge regarding areas that are important for the provisioning of CES, such as aesthetically valuable spaces (Marine Planning Partnership Initiative, 2015c). Furthermore, the integration of a comparatively broad array of aesthetic terms in the *NCMP* plan may indicate that its community-based, bottom-up approach

allows for plans to capture a more diverse set of perspectives (Diggon et al., 2022; Marine Planning Partnership Initiative, 2015c). The inclusive nature of the *NCMP* is further highlighted by its comprehensive inclusion of CES classes (Marine Planning Partnership Initiative, 2015c). Notably, the *NCMP* incorporates 10 out of the 11 identified CES classes, accounting for 91% of these categories (Marine Planning Partnership Initiative, 2015c). While the comparatively comprehensive integration of CES and aesthetics in the *NCMP* highlights the potential of local-scale, community-based planning, it is also crucial to recognize that the *NCMP* plan is a product of a co-led marine partnership between the Province of British Columbia and 18 First Nations (Diggon et al., 2022; Diggon et al., 2021; Marine Planning Partnership Initiative, 2015c). Indigenous communities possess deep, enduring ties to their lands, marked by a comprehensive understanding of the environment, shaped by centuries of experience and cultural traditions (Diggon et al., 2022; Diggon et al., 2021). This rich knowledge base is integral to the *NCMP*, allowing for a nuanced approach to marine spatial planning that considers the cultural, historical, and spiritual significance of the marine environment to these communities (Diggon et al., 2022; Diggon et al., 2021; Marine Planning Partnership Initiative, 2015c). The plan's success in capturing a wide range of CES, therefore, can likely also be attributed to its roots in indigenous perspectives and the value placed on their extensive local knowledge and understanding of the marine ecosystem.

Analysis of plans with a high frequency of references to aesthetic terms, such as *Washington's Pacific Coast Marine Spatial Plan (WPC MSP)* and the *East Inshore and East Offshore Marine Plans (ES MP)*, indicates that top-down mandates, such as the inclusion of aesthetics in governance or planning priorities, serve as an additional enabling condition for integrating CES and aesthetic elements into MSP. Notably, both plans are regional scale places emphasizing that high incorporation of aesthetics terms is not limited to local plans. While the *WPC MSP* and *ES MP* apply comparatively less bottom-up approaches (both still heavily emphasize interest holder engagement and public participation) than the *NCMP*, they both have higher frequencies of aesthetic terms (Bates et al., 2017; Diggon et al., 2021; Trosin et al., 2016). This increase in frequency is suggested to be a result of both plans having aesthetic considerations embedded in their planning foundations (Bates et al., 2017; HM Government, 2014; Trosin et al., 2016). The *WPC MSP* included aesthetics in its overarching goals, and the *ES MP* was designed to support and complement existing plans, including the aesthetic-focused ‘Area of Outstanding

Natural Beauty (AONB) management plans,' which are statutory plans that serve as a prime example of meaningful aesthetics integration within management, albeit primarily on terrestrial aspects (Bates et al., 2017; HM Government, 2014). This emphasizes the significance of explicitly acknowledging aesthetic values as a foundational element of the plan and developing top-down initiatives that support the integration of aesthetic values. This is further supported by examining other plans within the sample that had high frequencies of aesthetic terms, namely the *Welsh National Marine Plan (WNMP)* and the *Project Ireland 2040 National Marine Planning Framework (INMPF)*, both of which integrate top-down requirements for the inclusion of aesthetics (Government of Ireland, 2018; Welsh Government, 2019). The *WNMP* like the *ES MP* integrates AONB plans and their associated statutory designations (HM Government, 2014; Welsh Government, 2019). It has also established a policy mandating that development proposals must comprehensively assess and take measures to prevent any adverse aesthetic effects on these designated areas (Welsh Government, 2019). Within the *INMPF* aesthetic considerations are required under Ireland's national tourism policy *People, Place and Policy: Growing Tourism to 2025* which states that "the quality of our natural scenery and physical environment, built heritage, and the range of activities for visitors, are areas in which the State has a key role to play, through preservation of that which is irreplaceable and the development of that which enhances the visitor's overall experience" (Government of Ireland, 2018).

The findings of this study also reveal substantial regional disparities in integrating CES classes within marine spatial plans. Inconsistencies may be due to differences between underlying policies and planning priorities across countries. For example, high integration of CES and aesthetics in North American MSP plans may reflect the legislative frameworks in Canada and the United States, both of which mandate the inclusion of social considerations and interest holder involvement within respective laws and policies (Government of Canada, 2023a). In contrast, the European sample which collectively included a greater diversity of CES and aesthetic terminology integration, included marine spatial plans from 11 countries, each with unique policies, cultural perspectives, and planning priorities. For example, European countries like England, Wales, and Ireland have AONBs, as discussed above (Natural England, 2018; Natural Resources Wales, 2023). These designations, grounded in statutory frameworks, often necessitate the consideration of aesthetic impacts during developmental or planning processes (HM Government, 2014; Natural England, 2018; Natural Resources Wales, 2023). As a result, aesthetic values become a focal point

of conservation and planning efforts in these regions, potentially leading to a higher integration of aesthetic values (Natural England, 2018; Natural Resources Wales, 2023). However, other European countries lack such top-down recognition, potentially leading to lower integration of aesthetic values. This further supports the need for political recognition and top-down recognition as an enabling factor to facilitate the integration of CES and aesthetics in MSP. Conversely, given the consensus that bottom-up community-based approaches are pivotal for identifying socio-cultural factors like aesthetics, Oceania's 'locally managed marine areas (LMMA)' rooted in community-based marine management likely contribute to the high integration of aesthetics (Flannery et al., 2019; Friedlander, 2018; Gee et al., 2017; Nimwegen et al., 2022).

Therefore, it becomes evident that bottom-up approaches to interest holder, rights-holder, and community participation and engagement may not be sufficient to identify aesthetic values without active facilitation and guidance from top-down recognition. A key recommendation thus emerges to integrating CES in MSP, to encompass a combination of top-down and bottom-up approaches, integrating formalized frameworks and policies that mandate the inclusion of aesthetics, along with bottom-up approaches that facilitate the identification and understanding of context-specific aesthetic values and significant features. Recognizing the importance of aesthetics in the foundational steps of the marine planning process and actively involving communities in these discussions can ensure that aesthetic values receive the attention needed to allow for proactive planning rather than reactive conflict management.

3.5.3 Conclusions and Recommendations

Considering the findings of this study, two core observations emerge regarding the integration of cultural ecosystem services (CES) in marine plans. Firstly, marine plans reflect an uneven integration of CES classes, with a pronounced focus on recreation and leisure, likely due to its direct economic implications and its tangible nature (Costanza et al., 1997; De Groot et al., 2012; Rodrigues et al., 2017). Aesthetics, while highly regarded in academic literature, receives moderate relatively superficial integration in marine plans, possibly highlighting the hesitancy of planners to delve deeply into the more subjective and intricate facets of CES (Fletcher et al., 2014; Rodrigues et al., 2017). This resistance might stem from the inherent challenges associated with quantifying and integrating such subjective values, especially in the face of data gaps and the need to maintain the credibility of scientifically based marine planning processes (Cornu et al., 2014;

Flannery & Ellis, 2016; Pennino et al., 2021). Secondly, there is an evident disconnect between academic insights and practical marine plan implementations for CES classes, particularly the more subjective ones like aesthetics (Rodrigues et al., 2017). This disparity underscores the broader challenges in translating literature on complex socio-cultural values into data with practical management applications. As marine spatial planning endeavours to be holistic, it is imperative for future research to bridge these gaps, ensuring a more comprehensive integration of all CES classes. These findings suggest that there seems to be a global acknowledgment of CES in Marine Spatial Planning, including a growing recognition of aesthetic components. However, this study's findings show that these initiatives continue to reinforce a limited view of CES, focusing on more tangible ecosystem services like recreation, scientific benefit, and education.

The sparse integration of aesthetic terms within the sampled plans accentuates the pressing need to bridge the linguistic and disciplinary divides that constrain the meaningful integration of socio-cultural factors, including aesthetics, within MSP (McKinley et al., 2020; UNESCO-IOC/European Commission, 2023). Bridging these divides necessitates a multi-pronged approach, encompassing linguistic simplification, interdisciplinary collaborations, and the proactive inclusion of socio-cultural considerations within the foundational frameworks of marine plans. By addressing these divides, the marine planning community can stride towards more holistic, inclusive, and effective marine spatial planning processes that harmoniously balance ecological, economic, and socio-cultural dimensions in marine and coastal regions.

The research identifies several potential enabling factors, suggesting that effectively incorporating CES and aesthetic elements into MSP can be enabled by smaller-scale, localized planning approaches, community-based methodologies, and strong top-down support. The smaller scale of local plans is instrumental in fostering a bottom-up approach. This localized focus allows for a more detailed and nuanced understanding of the specific socio-cultural and environmental dynamics, enabling a more effective integration of CES and aesthetic considerations. Community-based, participatory methodologies enable a deeper understanding of the unique connections between communities and their marine environments. Additionally, the strong policy imperatives and legislative requirements for including social considerations in MSP initiatives are identified as an essential enabling condition for the integration of aesthetics and CES (Bates et al., 2017; HM Government, 2014). These top-down mandates provide a structured framework for the integration

of aesthetic values into the planning process, allowing for a much more in-depth integration. To nurture such enabling factors, several key recommendations were described and include a combination of knowledge capacity building and political mandating (for a summary, see Table 3).

Table 3. Summary of key recommendations to build enabling factors for integration of aesthetics and CES in MSP

Recommendation	Description	Potential outcome
Enhance the involvement of marine social scientists in MSP projects	The existing barriers in language and understanding hinder effective communication and interdisciplinary collaboration within MSP.	Involving social science experts more actively is essential to bridge these gaps, enrich dialogue, and contribute to more comprehensive approaches in marine management and governance
Top-down Recognition of CES and Aesthetics	Analysis shows that relying solely on bottom-up approaches might not sufficiently capture aesthetic values. Therefore, active facilitation and involvement by planning authorities are crucial.	Early recognition of the importance of aesthetics and proactive engagement with policymakers and governments are vital to ensure that these values are thoroughly integrated, reducing the likelihood of conflicts in the future.
Training and capacity building	Enhancing the understanding and appreciation of socio-cultural values, including aesthetics, among planning authorities and communities is key. This could be achieved through various means, ranging from extensive training programs to brief informational sessions preceding interest holder engagement.	Such educational initiatives can significantly improve the identification and integration of socio-cultural values into MSP.
Policy revision and development	It is imperative to re-evaluate existing policies and develop new ones where necessary, explicitly mandating the consideration and integration of socio-cultural values in marine spatial plans.	Implementing this step will ensure a systematic and consistent approach to embedding these critical values within MSP frameworks, thereby enhancing the effectiveness and relevance of marine spatial planning.

This study offers insights into how MSP efforts around the world integrate CES and aesthetics. This investigation reflects a sample of established plans. Future research can add to these insights by exploring a broader range of plans and additional variables. For example, this analysis only analyzed one plan from Asia. This limited sample size potentially skews the regional

representation and warrants a cautious interpretation of the findings. The lack of plans originating from Asia included in this study, despite the region's extensive marine spatial planning activities, emphasizes the challenge posed by language barriers. For example, many marine spatial plans from China and Indonesia were identified, yet the absence of English translations hindered their analysis (IOC-UNESCO, 2020, 2022). As such, there is an underlying issue of data accessibility due to language barriers that potentially mask the true extent of CES integration in non-English-speaking regions. Therefore, the observed regional variation underscores the importance of overcoming language and accessibility hurdles to ensure a comprehensive, inclusive analysis. Future research endeavours should advocate for and employ multilingual methodologies, enabling a broader, more accurate representation of regional trends in CES integration.

This study illuminates the complex terrain of integrating cultural ecosystem services (CES) into marine spatial planning (MSP), revealing progress, persistent challenges, and potential enabling conditions/factors. The integration of CES and aesthetic elements in MSP is not merely an addition to the planning process but a crucial step toward sustainable marine management. It emphasizes the deep connections between human communities and their marine environments, advocating for a comprehensive planning approach that respects and reflects these relationships. By embracing these insights and recommendations, MSP can evolve into a more inclusive, effective, and culturally resonant tool, ensuring the sustainability and health of marine ecosystems while supporting the diverse needs and values of the communities that depend on them.

Chapter 4: Investigating Nova Scotian's Aesthetic Values and Preferences for Coastal and Ocean Seascapes.

4.1 Introduction

4.1.1 Perception Research in Landscapes and Seascapes

Understanding societal values, perceptions, and priorities held by the public, communities, and key interest holders has been recognized as critical for successful sustainable management and planning in coastal Social-Ecological Systems (SES) (Weinstein et al., 2007). Public perception research is one approach to understanding individuals' values, preferences, and perceptions in the context of marine and coastal aesthetics. The term 'public perception' can be pragmatically defined as reflecting the collective views of individuals asked directly about their thoughts on specific issues or situations, often gathered from public opinion surveys or interviews (Dowler et al., 2006). Landscape perception research is a well-established field of study involving perceptions and beliefs related to the environment's visual or aesthetic components. This research is often considered necessary for informing landscape planning, policy, and development in terrestrial systems (Bubalo et al., 2019; Kyvelou & Gourgiotis, 2019; Scott, 2002; Termorshuizen & Opdam, 2009). Broadly, this field has found landscape perceptions and values are complex and dynamic and play vital roles in peoples' decisions about where to live, their occupational preferences, and their overall sense of well-being and relationship with their environment (Marshall et al., 2018; Marshall et al., 2019; Scott, 2002; Tribot et al., 2016). Perceptions can also subconsciously shape individuals' judgments and emotions toward specific landscapes, features, or developments (Moore-Colyer & Scott, 2005; Scott, 2002). As landscapes change through land use shifts, natural disasters, technological advancements, and evolving societal needs, conflicts can arise among different segments of the public who value specific landscapes (Marshall et al., 2019; Miller & Rivera, 2010; Scott, 2002; Silver & Grek-Martin, 2015). Landscape planners and regional authorities are often responsible for addressing and resolving these conflicts by attempting to balance private landowners' often-competing perspectives and requirements with the broader public interest (Cullingworth & Nadin, 2002; Scott, 2002). Therefore, understanding visual preference and how the public perceives their surroundings is vital for sustainable and socially acceptable development (Moore-Colyer, 1999; Moore-Colyer & Scott, 2005; Scott, 2002).

Certain landscapes hold special significance due to their unique characteristics, features, and patterns (Brady, 2006; Scott, 2002). As such, people frequently oppose significant changes to the visual identity of landscapes they are familiar with or attached to (Marshall et al., 2019; Miller & Rivera, 2010; Scott, 2002; Silver & Grek-Martin, 2015). Thus, how individuals perceive landscapes is not solely determined by the physical elements of the landscape but also depends on the values, past experiences, and socio-cultural influences that shape an individual's perception (Molnarova et al., 2012; Scott, 2002; Soliva & Hunziker, 2009; Strumse, 1996). Landscape perceptions are, therefore, seen as outcomes of interactions between people and their environment's physical and cultural aspects at specific moments (Emmelin, 1996; Kyvelou & Gourgiotis, 2019; Scott, 2002). Hence, it has been suggested that favourable reactions to a landscape stem from the overall impression of the entire landscape, not just the specific features and elements it contains (Appleton, 1994; Scott, 2002).

Understanding landscape perceptions is significantly less advanced in the marine realm than its terrestrial counterpart, as comprehensive research on marine and coastal landscapes (henceforth referred to as 'seascapes') has been notably lacking (Manning et al., 2023). Historically, studies on seascape perception have primarily focused on landscape changes due to the addition of specific industries or developments, such as offshore wind turbines (Gee, 2010; Gee & Burkhard, 2010; Haggett, 2011; Ladenburg & Dubgaard, 2009; Wolsink, 2010). Existing literature on seascape preference, aesthetic values, and aesthetic impacts generally appear in the context of cultural ecosystem services research (Fletcher et al., 2014; Rodrigues et al., 2017) and through studies related to specific industries and developments (Evans et al., 2017; McCartney, 2006), or a combination of both (Gee & Burkhard, 2010). Examples of seascape aesthetics literature include Gee (2010), who focused on local seascape perceptions and the role of seascape aesthetic qualities in shaping attitudes toward offshore wind farming. Other related research often takes a monetary valuation approach to aesthetic impacts on seascapes, such as the hedonic pricing method, which is an economic technique that gauges the value of environmental features by examining their impact on the prices of market commodities, especially real estate (Evans et al., 2017; Ladenburg & Knapp, 2015; Rosen, 1974). For example, Evans et al. (2017) applied this method to explore the impact of marine aquaculture development on coastal housing prices in Maine, USA. A further example of the monetary valuation approach is the Ladenburg et al. (2005) economic evaluation of the visual dis-amenities caused to an ocean seascape by offshore wind

farms. Despite these efforts, there remains a pronounced gap in comprehensive research on seascape aesthetics and perceptions. This gap accentuates the need for more targeted studies to bridge knowledge disparities and achieve a balanced understanding comparable to terrestrial landscapes.

The rapid expansion of the blue economy over the past few decades has introduced a range of visual changes to seascapes, altering people's experiences and the value they associate with these spaces (Eikeset et al., 2018; Falconer et al., 2013; Hoerterer et al., 2020; Manning et al., 2023; Maslov et al., 2017). Consequently, new developments in the marine waters and the coastal zone have become highly contentious and a significant source of conflict (Manning et al., 2023). For example, communities may experience conflict when values clash, such as between those prioritizing economic activities and those wanting the seascape to remain unchanged (Devine-Wright & Howes, 2010; Manning et al., 2023). However, the intricate and multifaceted nature of people's aesthetic values remains poorly understood, particularly in marine and coastal settings. As such, understanding the societal values, perceptions, and opinions of the public, communities, and key interest holders has been recognized as critical for successful sustainable management and planning in coastal Social-Ecological Systems (Weinstein et al., 2007).

Perception research, especially when combining visual preference surveys with conventional survey questions that explore underlying explanatory factors, offers a valuable avenue for gaining deeper insights into how individuals perceive and value the aesthetic attributes of seascapes. This methodology enables us to quantify public opinions and explore the nuanced dimensions of aesthetic values and preferences, ultimately contributing to more informed and culturally sensitive decision-making processes, particularly in marine planning and development in Nova Scotia's iconic coastal and ocean seascapes.

4.1.2 Understanding Factors that Influence Landscape Perceptions and Preferences

Numerous researchers studying landscape preferences contend that aesthetic preferences are the product of a dynamic interaction between a landscape's physical characteristics and the psychological responses of the people who view it (Molnarova et al., 2012; Mundher et al., 2022; Tveit, 2009; Vouligny et al., 2009; Wang & Zhao, 2017). Consequently, the analysis of landscape aesthetics typically falls into two complementary approaches:

(i) the transmitter approach, which assesses a landscape's intrinsic value based on its biophysical characteristics and

(ii) the receiver approach, which examines how human perception shapes our understanding of a landscape (Daniel et al., 2012; Fry et al., 2009; Tribot et al., 2018a).

In terrestrial settings, biophysical characteristics that have been linked to aesthetic values and preferences of landscapes include the 'naturalness', presence of manmade elements or human influence, foliage cover, presence and area covered by water, presence of mountains, and the landscape's colour contrast, among others, (Arriaza et al., 2004; Zhao et al., 2013). However, such physical features and explanatory variables have not been comprehensively identified in marine and coastal systems. Therefore, the present study primarily focuses on the receiver approach, mainly investigating the influence of psychological factors (e.g., values and beliefs) and cultural/demographic variables (e.g., gender, education, and geographic location), as well as specific landscape properties such as seascape types.

A review of existing literature has revealed several factors that have a potentially significant influence on landscape/aesthetic preferences (Howley, 2011; Svobodova et al., 2012; Wang & Zhao, 2017). First, demographic characteristics, there is evidence that income, gender, age, and education, may influence landscape preferences (Howley, 2011; Howley et al., 2012; Wang & Zhao, 2017). Second, the geographic location of individuals, such as place of residence and living in either an urban or a rural area, may influence landscape preferences. By developing a sense of place or identity, people develop a relationship with their environment through experiences, such as the landscape in which they live or were raised (Hunziker et al., 2007). Previous research has suggested that rural participants have enhanced preferences for managed landscapes, such as traditional farmlands (Howley et al., 2012; Walker & Ryan, 2008). Third, experience and familiarity with the landscape were found meaningful in explaining landscape preferences, either regarding their general appearance (Howley et al., 2012; Soini et al., 2012) or to specific landscape elements (Rambonilaza & Dachary-Bernard, 2007).

Fourth, individual values and beliefs have also emerged as significant factors influencing landscape preferences and perceptions (Howley, 2011; Howley et al., 2012; Reser & Bentrupperbäumer, 2005). These values, often termed 'environmental values,' typically span a spectrum of beliefs, ranging from highly developed/human-focused to strongly conservation-

oriented viewpoints (Kaltenborn & Bjerke, 2002; Reser & Bentrupperbäumer, 2005). Literature suggests that the orientation of an individual's values and beliefs on this spectrum significantly influences their landscape preferences. For example, researchers have found individuals with conservation-oriented value systems tend to oppose human influence on natural landscapes and have preferences for landscapes featuring wilderness elements (Kaltenborn & Bjerke, 2002; Park et al., 2008). Conversely, these studies also found that individuals with development or human-oriented value systems tend to adopt a 'human-centred' perspective rather than valuing the environment intrinsically, making them more inclined to appreciate landscapes marked by human influences.

4.1.3 Management Implications of Seascape Perception and Preference Research

The seascape perception research conducted in this chapter is pivotal for marine spatial planning (MSP) as it provides preliminary insights into how Nova Scotians perceive and value marine environments. Understanding these perceptions and values is critical for fostering public engagement and integrating human dimensions into regional and broader MSP initiatives (Jefferson et al., 2021). The recognized link between aesthetically appealing environments and human well-being suggests that by capturing diverse societal aesthetic perceptions and preferences for coastal and ocean seascapes, this chapters research also supports the need to develop policies that prioritize community well-being and quality of life (Marshall et al., 2019). Including aesthetic values in monitoring and evaluation frameworks also ensures that these non-tangible benefits are maintained over time, contributing to the overall success of MSP.

Additionally, perceptions of seascapes can influence attitudes towards conservation and development (Gee, 2010; Marshall et al., 2019). For example, how individuals perceive the aesthetic impact of industries such as offshore wind farming on seascapes can shape local attitudes towards such developments (Firestone et al., 2018; Gee, 2010). As such, the aesthetic preferences and perceptions and the factors that influence them identified through this chapter's research can aid in informing more effective and sustainable zoning decisions, where areas of high aesthetic value are shielded from industrial activities that might diminish their visual appeal. This strategic consideration and knowledge of influencing factors can help navigate and prevent conflicts between marine users and foster the social acceptability of development and conservation initiatives. By identifying the importance that Nova Scotians place on the aesthetics of coastal and

ocean seascapes, this chapter's research can also aid in validating the inclusion of aesthetic factors in management instruments like environmental impact assessments, enhancing MSP decision-making processes and the early detection of potential conflicts.

Incorporating seascape aesthetic perception and preference research into Marine Spatial Planning ensures that policies are deeply rooted in the public's values, facilitating a harmonious balance between development, conservation, and socio-cultural well-being. This approach is essential for crafting marine and coastal management strategies that uphold ecological integrity, support sustainable development, and enhance human well-being.

4.2 Research objectives

The present research strives to bridge existing knowledge gaps in aesthetic perception research by offering initial insights into how Nova Scotians value coastal and ocean seascapes. This study aims to further the understanding of the significance of aesthetic value in Nova Scotia's marine social-ecological systems, as well as how human activities and development affect aesthetic perceptions and preferences.

An exploratory public survey was created to align with the following research questions:

1. How important are the aesthetics of coastal and ocean seascapes to Nova Scotians?
2. How does visual appeal differ across different seascape types?
3. What factors influence people's aesthetic values, perceptions, and preferences of coastal and ocean seascapes?

The findings from this study will enable a discussion on the management implications for MSP in Nova Scotia and can serve as a foundation for more extensive research and inform efforts for more comprehensive and sustainable marine planning endeavours, ensuring that the evolving blue economy aligns with the preferences and values of coastal communities.

4.3 Methods

An exploratory public survey combining traditional survey questions and visual preference/photo choice elements was developed and distributed to Nova Scotians to investigate people's aesthetic values and perceptions of coastal seascapes. Visual preference surveys are a well-established method for aesthetic impact assessments and capturing public preferences for

overall landscapes and specific landscape features, commonly applied in the energy sector, landscape and urban planning sectors, and relevant research fields (i.e., landscape aesthetics and perception research) (Hafner et al., 2018; Kirchhoff et al., 2022; Noland et al., 2017; Palmer, 2022; Zhang et al., 2021). In previous research, photo choice surveys have been used to answer questions about the characteristics that shape the visual quality of a landscape, public preferences for development siting, tourist preferences, social acceptance of developments, and social sustainability (De Salvo et al., 2021; Hafner et al., 2018; Molnarova et al., 2012; Westerberga et al., 2015).

4.3.2 Data collection

Aesthetic preferences, values, and perceptions were collected via a public survey conducted across Nova Scotia over seven weeks from July 31st to September 20th, 2023 (Dalhousie Research Ethics Board file # 2023–002; see Appendix ii). The research design sought to characterize the aesthetic preferences, perceptions, and values that Nova Scotians derive from coastal and ocean spaces. This study was restricted to Nova Scotia residents to explore contextual variables like residence and experiences since non-residents and tourists may have different experiences, values, and preferences. As such, the target population included part-time and full-time residents living in Nova Scotia, and eligibility criteria restricted participants to those over the age of 18. The survey was designed to be exploratory and non-probabilistic, employing convenience sampling expanded by snowball sampling. Non-probability methodologies, specifically convenience sampling, are commonly used within exploratory research, as the results are not intended to be representative of a given population (Wolf et al., 2016). The application of non-probability sampling was deemed suitable for this project as the survey intended to capture response patterns within the survey participants and serve as a foundation for subsequent research rather than aiming to represent the aesthetic preferences, perceptions, and values of all Nova Scotians (Wolf et al., 2016).

The survey was conducted through Opinio, an online survey software hosted by Dalhousie University, Nova Scotia. Internet-based surveys are a widely used approach in social science research and have previously had success in conducting surveys related to visual preferences of landscapes (e.g.,Gao et al., 2014; López-Martínez, 2017; Pastorella et al., 2017). This survey utilized a diverse recruitment approach, combining advertisements across social media, flyers, and

social-network mailing lists to attract participants. Additionally, in-person convenience sampling was employed. Participants were recruited opportunistically on multiple social media platforms (Facebook, Instagram, LinkedIn) and through convenience sampling at public events (i.e., Oceans Day events and the Lunenburg Folk Harbour Festival) and in public spaces (i.e., waterfronts, coffee shops, and local shops), mainly in Halifax, Dartmouth, and to a lesser extent Bedford. Recruitment also occurred through snowballing as participants were encouraged to share the survey with whoever met the eligibility criteria. Social media recruitment further enabled social sharing to capture a broader audience's perceptions. In-person convenience sampling often involved distributing postcards or flyers with links to the online survey for individuals who could not participate immediately. Advertising flyers were strategically posted in busy locations and on community boards in Halifax, Dartmouth, and the surrounding communities to expand our outreach and engage a more diverse geographic and demographic audience.

The survey consisted of thirty-one questions: eighteen visual preference questions and thirteen traditional survey questions (See Appendix ii). Visual preference questions asked participants to evaluate and rate the visual appeal of 18 photographs depicting six types of coastal seascapes visible across Nova Scotia's coastal areas). Three photographs representing each coastal seascape type were incorporated to investigate potential variations in preferences within seascape types and mitigate potential biases stemming from differences in the photographs. Traditional survey questions featured Likert-scale questions (strongly disagree, disagree, neither agree nor disagree, agree, strongly agree) and categorical questions (See Appendix ii). A total of 126 participants completed the survey voluntarily and anonymously.

4.3.3 Variables Explored.

The response variables identified and examined were aesthetic values and seascape preferences (Table 4). **Aesthetic values** were explored by requesting participants to rate the importance of the aesthetic value of the ocean on a scale of 1 (not at all important) to 5 (extremely important). To explore **seascape preferences,** participants were prompted to evaluate the visual appeal of 18 photographs (3 photographs for each seascape type) depicting six different seascape types (i.e., beach, rocky shore, residential, estuarine, fishing boats, and aquaculture) commonly found in Nova Scotia.

As one of the goals of this survey was to investigate potential factors that influence people's aesthetic values, perceptions, and preferences of coastal and ocean seascapes, four categories of explanatory variables were examined as identified within landscape preference and perception literature (Table 4; see Section 4.1.2 for an in-depth description of each variable). **Demographic characteristics** included variables age, gender, income and education. To explore the influence of place, **geographic location** variables included residence region (county) and locale classification (i.e., level of urbanization). The effect of **values and beliefs** explored through questions relating to participants beliefs on ocean development, factors influencing the aesthetic appeal of seascapes, and perceived importance of different ocean values (Table 4). The effect of **experience/familiarity with the environment** was assessed with interaction variables including proximity of the home to the ocean, employment in a marine sector, frequency of interaction for recreation/enjoyment, and nature of recreational/enjoyment interactions.

Table 4. List of survey response and explanatory variables

Variable	Type	Levels
Response variables		
Aesthetic value	Ordinal	1 – not at all important => 5 – extremely important
Seascape preferences	Ordinal	1 – very unappealing => 5 – very appealing
Explanatory variables		
Demographics		
Age	Ordinal	18-24
		25-34
		35-44
		45-54
		55-64
		65 or above
Gender	Categorical	Female
		Male
		Prefer not to disclose.
		Nonbinary
Household Income	Ordinal	$0 - $29,999
		$30,000 - $59,999
		$60,000 - $89,999
		$90,000 - $119,999
		$120,000 or more
Education	Categorical	Less than high school diploma
		High school diploma or equivalent
		Some college or associate degree
		Bachelor's degree
		Graduate or professional degree
Geographic variables		
Locale classification	Categorical	Large city
		Suburb near a large city
		Small city or town
		Rural area
County	Categorical	Open field
Interaction variables		

Variable		Type	Levels
	Interaction Frequency	Ordinal	Every day Multiple times a week Once a week Once a month One to two times per year Less than once a year Never
	Proximity of home to the ocean	Categorical	I live on an ocean-front property where I can see and access the ocean I can see the ocean from my home I can't see the ocean from my home, but I can from my neighborhood I would need to travel by car or vehicle to see the ocean
	Marine employment	Categorical	I regularly work on or in the ocean (e.g., fisher, boat operator, diver, navy) I regularly work in coastal areas for my job, but do not regularly go on or in the ocean. I am employed in a coastal industry but do not regularly go out on in the ocean. I regularly work on or in the ocean as well as in coastal areas. I am not currently employed. My job is not coastal/ocean related.
	Nature of recreational / enjoyment interactions	Categorical	When I am in my home When I am on vacation (cottages, hotel, campground) When I am accessing the beach for recreation and /or enjoyment When I am participating in on the water activities (kayaking, canoeing, surfing) When I am visiting my town/cities waterfront When I am hiking in coastal areas
Value and belief variables			
	Opinion on development	Ordinal	I strongly support ocean development as a means of economic growth and job creation. I support ocean development, but it should be carefully managed to avoid negative impacts on the marine environment and ecosystems, I do not have a strong opinion on ocean development. I believe ocean development should be limited to protect the marine environment and ecosystems. I am opposed to ocean development and believe the ocean should be conserved and protected.
Factors			
	Sounds and smells	Ordinal	1 - strongly disagree => 5 - strongly agree
	Commercial presence	Ordinal	1 - strongly disagree => 5 - strongly agree
	Environmental impact	Ordinal	1 - strongly disagree => 5 - strongly agree
Values			
	Preservation	Ordinal	1 - not at all important => 5 - extremely important
	Recreation	Ordinal	1 - not at all important => 5 - extremely important
	Economic	Ordinal	Likert scale: 1 - not at all important => 5 - extremely important
	Culture	Ordinal	Likert scale: 1 - not at all important => 5 - extremely important

4.3.4 Data Analysis

Results were analyzed using Version 28 of SPSS (IBM Corp, 2021). Descriptive statistics were used to explore and describe the distribution of response and explanatory variables. The potential relationship between response and explanatory variables was explored through correlation statistics (Somer's D and Spearman's rho) and tests for group differences (Kruskall-Wallis and Mann-Whitney U). Where applicable (i.e., between photo ratings of the same seascape type), the internal consistency of responses across a set of questions was tested by calculating Cronbach's alpha (Appendix iii). Cronbach's alpha values below 0.7 indicate that the set of items measure different phenomena (DeVillis, 2003; Kline, 2005).

4.4 Results

4.4.1 Descriptive Analysis

4.4.1.1 Participant Demographics

Participants were mainly females (59%) and between the ages of 25 and 34 (Figure 12a). Most participants had some form of post-secondary education (93%), with many holding graduate or professional degrees (52%). The participants' income showed substantial variation, with over a quarter (26%) reporting an annual household income of $120,000 or above in CAD$, while another quarter (26%) indicated an annual income below $30,000 (Figure 12d).

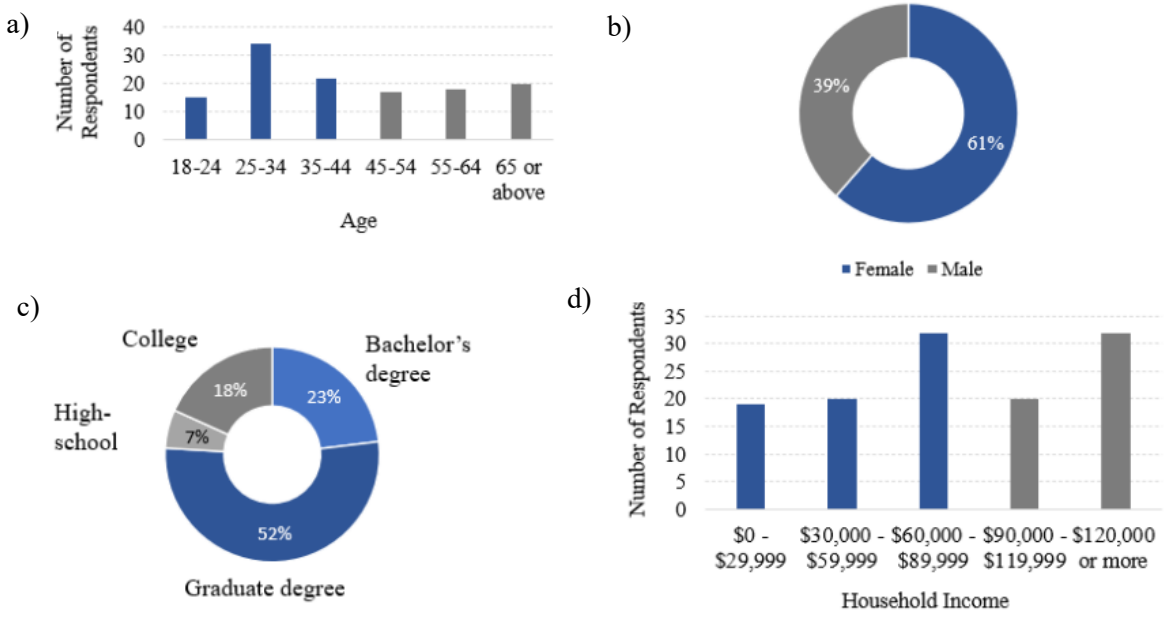

Figure 12. Summary infographic of participant demographic characteristics a) Age, b) Gender, c) Education and d) Household income.

4.4.1.2 Interaction and Geographic Variables

Participants were mainly from the Halifax Regional Municipality (HRM; 73% of participants). There was a relatively even distribution of participants between metropolitan areas, including large cities and suburbs (57%) and more rural areas, such as small towns and rural places (43% of participants; Figure 13a). Most participants reported living near the coast, either having waterfront access or being able to at least see the ocean from their home or neighbourhood (Figure 13b). Only about a quarter (24%) of participants had marine/coastal-related jobs, with another fifth of participants (21%) not currently employed.

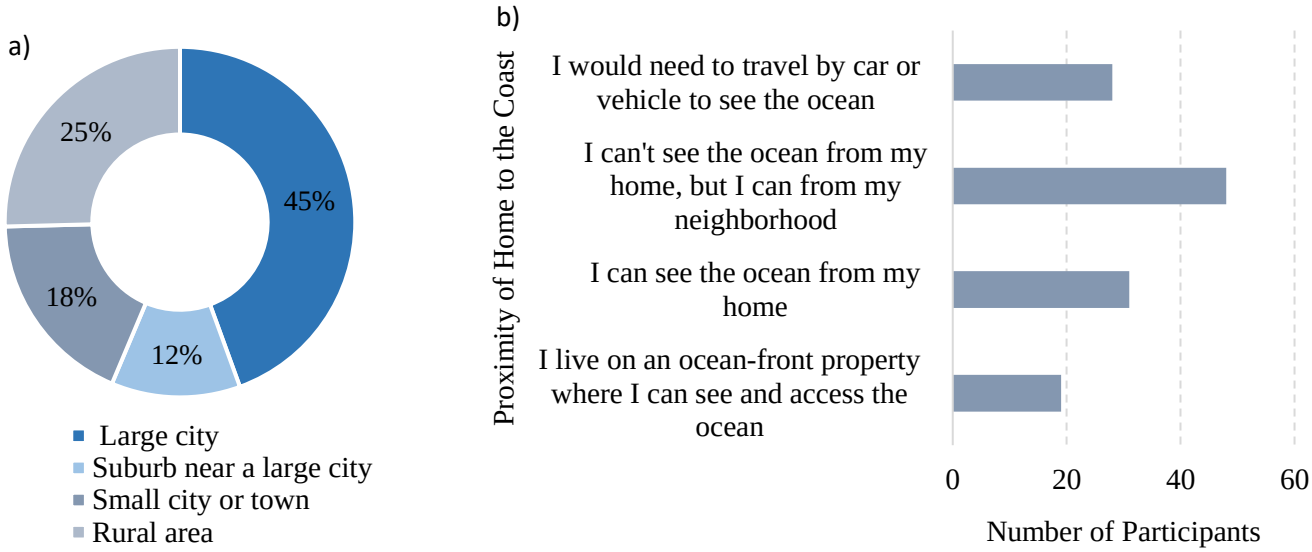

Figure 13. Distribution of participants based on a) locale classification and b) proximity of home to the coast.

Most participants, 70%, stated that they visit coastal or ocean areas for recreation and/or personal enjoyment once per week or more frequently (i.e., every day or multiple times a week). Responses to the question '*When do you most often access or view the ocean for enjoyment or recreation?*' varied among participants. The most common response was when visiting the beach (31% of participants), followed by '*when visiting my town/city's waterfront*' (20% of participants) and '*when I am in my home*' (19% of participants).

4.4.1.3 Values, Beliefs, and Views

Participants were asked to rate how important values (i.e., preservation, economic, cultural, aesthetic, and recreational) related to ocean and coastal ecosystems were to them (Figure 14). The

results indicate that participants generally consider all the ocean values examined 'important'. The value statement representing the preservation of marine wildlife and habitats was consistently reported as 'important' to participants, with the majority of participants (78%) reporting aesthetics as 'extremely important' to them (Figure 14). Value statements relating to the provisioning of recreational activities and cultural values were also consistently reported as 'important' to participants, with just under half (48%) of participants reporting that they were 'extremely important' to them. The lowest rated value statements were those representing cultural and economic values, which were still consistently reported as 'important'; however, only 24% of participants reported economics were 'extremely important' to them (Figure 14).

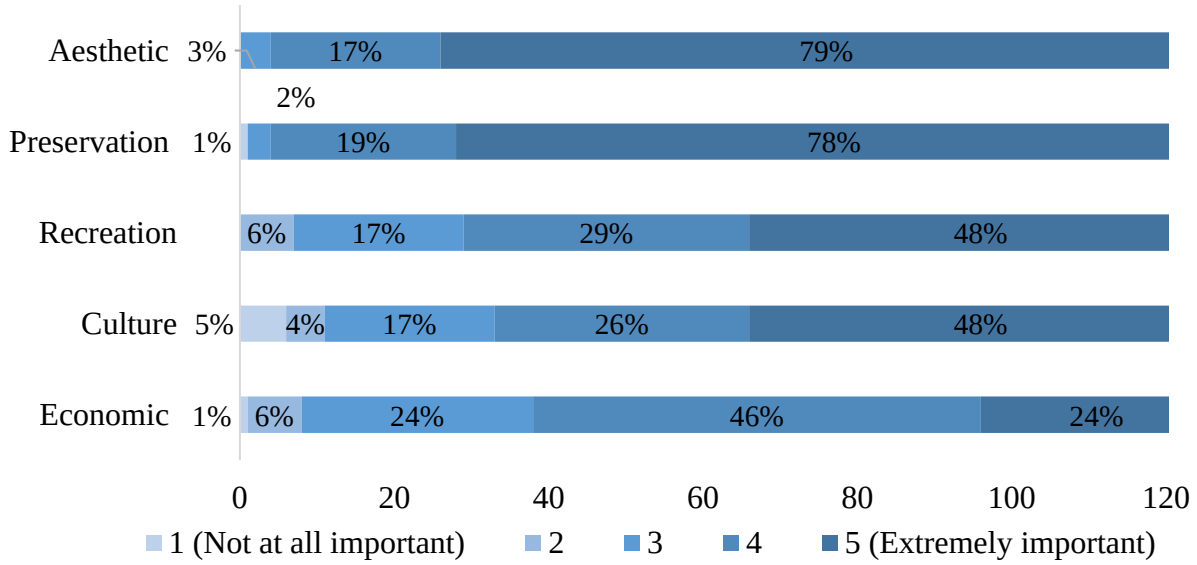

Figure 14. Participant importance ratings of values related to marine and coastal ecosystems.

To investigate how beliefs regarding factors influencing aesthetic appeal might shape participants' perspectives, the survey assessed participants' agreement with a series of three statements concerning the impact of various factors on aesthetic appeal (Figure 15). Most participants felt that sounds and smells were 'important' to their enjoyment of ocean spaces and that the environmental impact of marine developments significantly contributes to visual appeal; 60% and 41% of participants reported they strongly agreed, respectively. Alternatively, the response to the presence of commercial activities was more varied, with 29% of participants disagreeing and 28% agreeing.

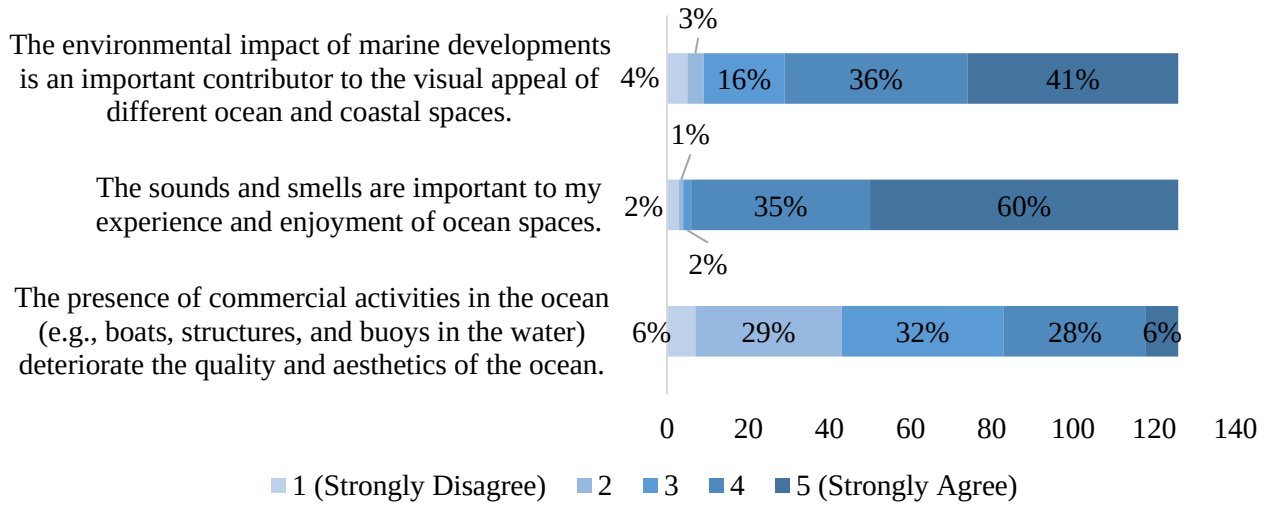

Figure 15. Participants level of agreement with three statements concerning the impact of various factors on aesthetic appeal.

The effect of personal values and beliefs on seascape preference was also explored by eliciting participants' views on ocean development, with participants predominantly (66%) supportive of ocean development with the stipulation that it should be carefully managed to avoid negative impacts on the marine environment and ecosystems (Figure 16).

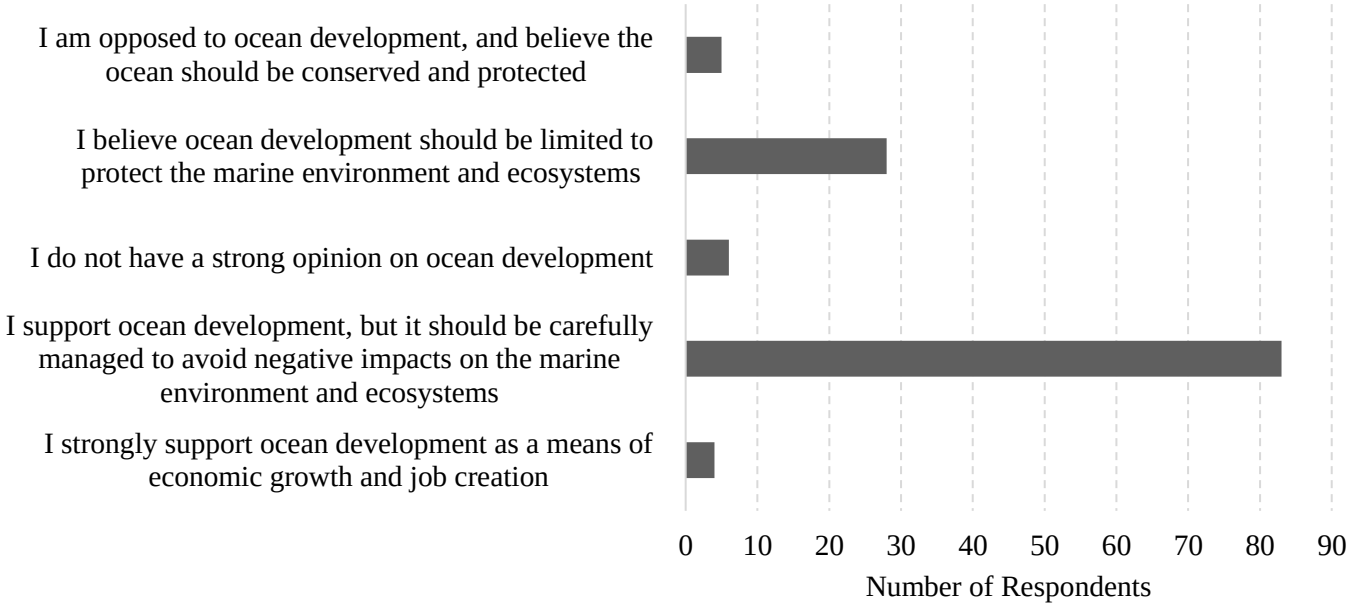

Figure 16. Distribution of participants based on views on ocean development.

4.4.1.3. Seascape Ratings

To explore visual preferences for different seascapes, participants rated the visual appeal of photographs depicting six different seascape types (i.e., beach, rocky shore, residential, estuarine, fishing boats, and aquaculture). Given high internal consistency values across photographs for each seascape types (as measured by Cronbach's alpha values above 0.7; See Appendix iii), median ratings across the three photographs depicting each seascape type were used to compare ratings across the different seascape types.

Participants generally rated the beach and rocky shore seascape types the most appealing, with both receiving a median rating of 5 (Figure 17). The residential, estuarine, and fishing boat seascape types were the next highest rated seascape types, each receiving a median rating of 4. The lowest rated seascape type was aquaculture, which received a median rating of 3.

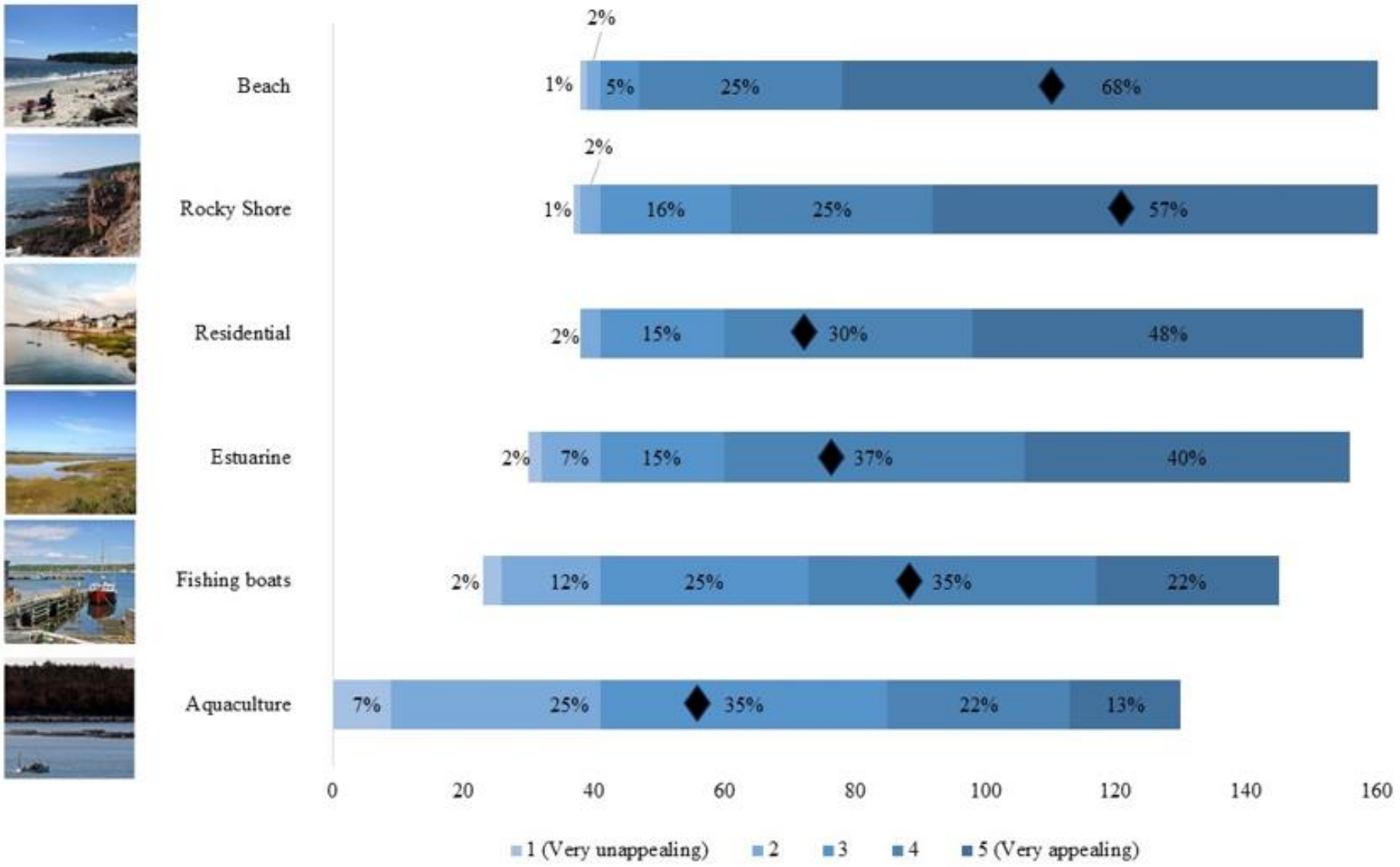

Figure 17. Visual appeal ratings across seascape types. Black diamonds represent median rating. Images are example images used in the survey.

4.4.2. Influence of Explanatory Variables on Aesthetic Value Ratings

The importance of aesthetic values was relatively consistent across all demographic, geographic, and interaction variables, with most variables showing no significant correlation or differences among groups (Table 5). There was also a statistically significant, negligible, positive correlation with interaction frequency (Table 5), with individuals visiting ocean and coastal spaces weekly or more on average ranking the importance of coastal aesthetic values higher.

Table 5. Association (Somer's D) statistics and Group Differences (Kruskal-Wallis and Mann-Whitney U) for relationship between explanatory variables and importance rating of the aesthetic value of the ocean.

Variable	Aesthetic Value
Demographic	
Age	-0.002
Income	-0.055
Education	6.215*
Gender	1712.500*
Geographic	
Type	0.756
County	10.082*
Interaction	
Frequency	**0.132**
Proximity of Home	6.069*
Employment	4.135*
Nature of Interaction	9.201*
Values and Beliefs	
Factors	
Sounds and Smells	**0.168**
Commercial Presence	0.004
Environmental Impact	**0.201**
Opinion on Development	0.09
Value ratings	
Preservation	0.136
Recreation	0.116
Culture	**0.248**
Economic	-0.051

* Represents group difference results.
Bolded numbers are statistically significant results for $p < 0.050$.

Some value and belief variables were found to have weak yet significant positive associations with participants' importance of aesthetics (Table 5). Participants who rated aesthetic values as extremely important also agreed on the influence of both the environmental impact and the sights and smells of such development on visual appeal, both factors exhibiting significant yet weak positive correlations (Table 6). Participants who expressed higher support for carefully managed ocean development had lower mean value ratings for aesthetic aspects of oceans, although differences were not statistically significant (Table 6). Greater importance of cultural values was also weakly, yet significantly associated with higher importance values of aesthetics ($d = 0.247$, $p < 0.001$). Similar positive associations were also shown for recreational value, although this was not statistically significant. Although the statistical analysis did not establish a significant correlation coefficient between the preservation value and the aesthetic value, it is worth noting that the two variables shared very similar distributions of responses, with 64% of participants reporting they felt that both values were 'extremely important'. No statistically significant or non-negligible correlations were observed between any of the other values (i.e., preservation, economics, and recreation) and the importance rating of the aesthetic value (Table 5).

Table 6. Mean values (± standard deviation) for aesthetic importance and visual appeal across various levels of explanatory variables.

Variable	Variable Levels	Aesthetic Importance	Beach	Rocky Shore	Residential	Estuarine	Fishing boats	Aquaculture
Gender*	Female (n = 75)	4.79 ± 0.473	4.65 ± 0.557	4.37 ± 0.866	4.29 ± 0.798	4.09 ± 0.970	3.67 ± 1.018	2.96 ± 0.922
	Male (n = 47)	4.74 ± 0.530	4.34 ± 0.939	4.51 ± 0.856	4.35 ± 0.773	3.81 ± 0.970	3.68 ± 1.125	3.19 ± 1.154
Age*	18-34 (n = 49)	4.78 ± 0.511	4.35 ± 0.779	4.41 ± 0.864	4.40 ± 0.714	3.78 ± 1.141	3.45 ± 0.914	2.96 ± 0.841
	35-54 (n = 39)	4.72 ± 0.510	4.56 ± 0.641	4.33 ± 0.838	4.08 ± 0.870	4.13 ± 0.833	3.49 ± 1.073	3.00 ± 1.076
	55 or above (n = 38)	4.79 ± 0.474	4.68 ± 0.775	4.53 ± 0.892	4.43 ± 0.755	4.12 ± 0.834	4.10 ± 1.085	3.18 ± 1.159
Income*	< $60,000 (n = 39)	4.74 ± 0.549	4.36 ± 0.668	4.51 ± 0.823	4.24 ± 0.724	3.99 ± 1.115	3.49 ± 0.970	3.03 ± 0.986
	$60,000 - $90,000 (n = 32)	4.88 ± 0.336	4.62 ± 0.751	4.31 ± 0.896	4.31 ± 0.859	3.97 ± 0.897	3.62 ± 1.100	2.66 ± 0.971
	> $90,000 (n = 52)	4.73 ± 0.490	4.61 ± 0.718	4.48 ± 0.754	4.37 ± 0.791	4.02 ± 0.939	3.79 ± 1.091	3.29 ± 1.035
Education	High school (n = 8)	5.00 ± 0.000	4.63 ± 0.517	4.37 ± 0.744	4.63 ± 0.517	3.87 ± 0.991	4.00 ± 1.069	2.87 ± 1.246
	College or associate degree (n = 22)	4.59 ± 0.590	4.41 ± 0.959	4.32 ± 0.780	4.48 ± 0.626	3.75 ± 1.173	3.95 ± 0.844	3.14 ± 1.037
	Bachelor's degree (n = 28)	4.79 ± 0.499	4.43 ± 0.634	4.46 ± 0.838	4.00 ± 0.981	3.96 ± 0.881	3.46 ± 0.962	2.93 ± 0.979
	Graduate or professional degree (n = 62)	4.81 ± 0.474	4.58 ± 0.737	4.47 ± 0.936	4.39 ± 0.731	4.08 ± 0.980	3.66 ± 1.130	3.11 ± 1.026
Locale Classification	Large city (n = 56)	4.73 ± 0.556	4.41 ± 0.757	4.41 ± 0.930	4.26 ± 0.732	4.00 ± 1.027	3.37 ± 0.945	2.95 ± 0.883
	Suburb near a large city (n = 15)	4.67 ± 0.617	4.53 ± 0.743	4.47 ± 0.640	4.13 ± 0.834	3.73 ± 0.961	3.33 ± 1.291	3.07 ± 1.033
	Small town or city (n = 23)	4.83 ± 0.388	4.52 ± 0.665	4.30 ± 0.974	4.24 ± 0.952	3.76 ± 0.824	4.00 ± 0.738	3.26 ± 0.964
	Rural area (n = 32)	4.81 ± 0.397	4.69 ± 0.780	4.50 ± 0.762	4.53 ± 0.718	4.25 ± 0.950	4.06 ± 1.134	3.03 ± 1.257
Proximity of Home to Coast	I live on an ocean-front property (n =19)	4.89 ± 0.315	4.84 ± 0.375	4.42 ± 0.902	4.74 ± 0.733	3.95 ± 0.911	4.26 ± 0.806	3.05 ± 1.268
	I can see the ocean from my home (n = 31)	4.71 ± 0.588	4.29 ± 1.006	4.55 ± 0.801	4.13 ± 0.806	4.06 ± 1.063	3.48 ± 1.180	2.94 ± 1.063
	I can't see the ocean from my home, but I can from my neighborhood (n = 48)	4.83 ± 0.429	4.54 ± 0.582	4.50 ± 0.799	4.46 ± 0.626	4.05 ± 0.947	3.65 ± 0.911	3.17 ± 0.975
	I would need to travel by car or vehicle to see the ocean (n = 28)	4.61 ± 0.567	4.50 ± 0.793	4.14 ± 0.970	3.96 ± 0.881	3.82 ± 0.983	3.46 ± 1.170	2.93 ± 0.858

Variable	Variable Levels	Aesthetic Importance	Beach	Rocky Shore	Residential	Estuarine	Fishing boats	Aquaculture
Employment*	My job is ocean related (n = 30)	4.73 ± 0.521	4.30 ± 0.915	4.40 ± 0.814	4.47 ± 0.681	4.23 ± 0.774	3.77 ± 1.006	3.20 ± 1.126
	I am not currently employed (n = 26)	4.77 ± 0.514	4.65 ± 0.689	4.46 ± 0.948	4.37 ± 0.686	4.10 ± 0.938	3.96 ± 0.958	3.15 ± 1.047
	My job is not ocean related (n = 70)	4.77 ± 0.487	4.56 ± 0.673	4.41 ± 0.860	4.22 ± 0.858	3.84 ± 1.044	3.50 ± 1.087	2.93 ± 0.953
Interaction nature	When I am in my home (n = 24)	4.96 ± 0.204	4.58 ± 0.929	4.83 ± 0.481	4.58 ± 0.775	4.08 ± 0.929	4.25 ± 0.944	3.04 ± 1.268
	When I am on vacation (n = 10)	4.90 ± 0.316	4.50 ± 0.972	4.50 ± 0.707	4.20 ± 0.422	3.90 ± 0.876	3.10 ± 0.876	3.00 ± 0.816
	When I am accessing the beach (n = 39)	4.67 ± 0.530	4.59 ± 0.595	4.18 ± 0.885	4.00 ± 0.803	3.99 ± 0.990	3.38 ± 1.184	2.90 ± 0.968
	When I am participating in on the water activities (n = 17)	4.88 ± 0.332	4.65 ± 0.606	4.71 ± 0.588	4.77 ± 0.562	4.23 ± 0.831	3.71 ± 1.213	3.71 ± 1.047
	When I am visiting my town/cities waterfront (n = 25)	4.60 ± 0.707	4.24 ± 0.831	4.16 ± 1.106	4.44 ± 0.712	3.64 ± 1.114	3.80 ± 0.816	2.88 ± 0.881
	When I am hiking in coastal areas (n = 11)	4.73 ± 0.467	4.55 ± 0.522	4.46 ± 0.934	3.91 ± 0.944	4.27 ± 0.904	3.45 ± 0.522	2.91 ± 0.701
Interaction frequency	Every day (n = 20)	4.85 ± 0.366	4.40 ± 0.681	4.55 ± 0.887	4.40 ± 1.046	4.05 ± 0.887	4.00 ± 1.076	3.00 ± 1.298
	Multiple times a week (n = 41)	4.80 ± 0.558	4.61 ± 0.802	4.54 ± 0.710	4.41 ± 0.843	3.95 ±1.139	3.88 ± 1.029	2.95 ± 1.071
	Once a week (n = 27)	4.89 ± 0.320	4.56 ± 0.698	4.56 ± 0.801	4.41 ± 0.636	4.11 ± 0.847	3.67 ± 0.961	3.19 ± 0.786
	Once a month (n = 27)	4.52 ± 0.580	4.44 ± 0.751	4.04 ± 1.091	4.00 ± 0.679	3.83 ± 0.930	3.33 ± 1.038	3.15 ± 0.949
	One to two times per year (n = 10)	4.70 ± 0.483	4.40 ± 0.843	4.30 ± 0.675	4.30 ± 0.483	4.00 ± 0.943	3.00 ± 1.054	2.90 ± 0.994
Preservation Value*	Not important (n = 1)	NA	NA	NA	NA	NA	NA	NA
	Neutral (n = 3)	4.33 ± 0.577	4.67 ± 0.577	4.00 ± 1.000	4.67 ± 0.577	4.67 ± 0.577	3.67 ± 0.577	4.00 ± 0.000
	Important (n = 122)	4.75 ± 0.494	4.51 ± 0.752	4.44 ± 0.853	4.32 ± 0.766	3.98 ± 0.976	3.67 ± 1.056	3.02 ± 1.016
Economic Value*	Not important (n = 8)	5.00 ± 0.000	4.25 ± 1.165	4.75 ± 0.707	4.00 ± 1.069	4.12 ± 0.834	2.75 ± 1.389	2.12 ± 0.991
	Neutral (n = 30)	4.83 ± 0.379	4.70 ± 0.535	4.47 ± 0.819	4.20 ± 0.925	4.13 ± 0.900	3.53 ± 1.042	2.60 ± 0.814
	Important (n = 88)	4.72 ± 0.546	4.48 ± 0.758	4.37 ± 0.888	4.37 ± 0.704	3.93 ± 1.010	3.78 ± 0.988	3.27 ± 0.991
Culture Value*	Not important (n = 11)	4.36 ± 0.924	4.18 ± 0.982	3.45 ± 1.368	3.86 ± 0.951	3.18 ± 1.471	3.54 ± 1.036	3.18 ± 0.751
	Neutral (n = 22)	4.68 ± 0.477	4.64 ± 0.727	4.59 ± 0.796	4.36 ± 0.727	3.79 ± 0.934	3.64 ± 1.002	3.18 ± 0.958

Variable	Variable Levels	Aesthetic Importance	Beach	Rocky Shore	Residential	Estuarine	Fishing boats	Aquaculture
Recreation Value*	Important (n = 93)	4.83 ± 0.407	4.53 ± 0.716	4.49 ± 0.732	4.35 ± 0.772	4.13 ± 0.863	3.68 ± 1.075	2.99 ± 1.058
	Not important (n = 7)	4.43± 0.787	4.00 ± 1.000	3.71 ± 0.951	3.64 ± 1.029	3.29 ± 0.951	3.43 ± 1.134	2.43 ± 0.534
	Neutral (n = 22)	4.55 ± 0.671	4.41 ± 0.959	4.14 ± 0.889	4.25 ± 0.783	3.64 ± 1.293	3.45 ± 1.101	2.64 ± 1.093
Commercial Presence*	Important (n = 97)	4.84 ± 0.400	4.58 ± 0.659	4.54 ± 0.817	4.37 ± 0.754	4.12 ± 0.853	3.72 ± 1.038	3.17 ± 0.990
	Disagree (n = 43)	4.81 ± 0.450	4.44 ± 0.854	4.30 ± 0.939	4.50 ± 0.824	3.99 ± 0.916	4.09 ± 0.895	3.44 ± 1.098
	Neutral (n = 40)	4.63 ± 0.628	4.55 ± 0.677	4.45 ± 0.876	4.51 ± 0.615	3.97 ± 1.074	3.77 ± 0.891	2.90 ± 0.900
Smells & Sounds*	Agree (n = 43)	4.84 ± 0.374	4.56 ± 0.700	4.51 ± 0.768	3.93 ± 0.768	4.00 ± 0.951	3.12 ± 1.117	2.77 ± 0.922
	Disagree (n = 4)	4.75 ± 0.500	5.00 ± 0.000	5.00 ± 0.000	4.25 ± 0.957	4.25 ± 0.957	3.75 ± 0.957	2.75 ± 1.258
	Neutral (n = 2)	5.00 ± 0.000	4.50 ± 0.707	3.50 ± 2.121	3.00 ± 1.414	2.50 ± 0.707	3.50 ± 0.707	3.00 ± 1.414
Environmental* Impact	Agree (n = 120)	4.73 ± 0.502	4.50 ± 0.756	4.42 ± 0.846	4.33 ± 0.762	4.00 ± 0.962	3.66 ± 1.065	3.05 ± 1.011
	Disagree (n = 9)	4.56 ± 0.726	4.33 ± 1.000	4.11 ± 1.364	4.44 ± 0.726	3.89 ± 0.928	4.33 ± 1.118	3.11 ± 1.269
	Neutral (n = 20)	4.45 ± 0.759	4.40 ± 0.598	4.30 ± 0.923	4.37 ± 0.841	3.45 ± 1.23	3.90 ± 0.718	3.50 ± 0.946
	Agree (n = 97)	4.85 ± 0.363	4.56 ± 0.750	4.47 ± 0.792	4.28 ± 0.787	4.11 ± 0.885	3.55 ± 1.080	2.94 ± 0.988
Opinion on development	I strongly support ocean development as a means of economic growth (n = 4)	4.75 ± 0.500	4.00 ± 0.816	4.75 ± 0.500	4.75 ± 0.500	4.50 ± 0.577	4.75 ± 0.500	3.75 ± 1.258
	I support ocean development, but it should be carefully managed (n = 83)	4.71 ± 0.553	4.54 ± 0.650	4.39 ± 0.908	4.31 ± 0.799	3.87 ± 0.999	3.67 ± 0.989	3.19 ± 0.993
	I do not have a strong opinion on ocean development (n =6)	5.00 ± 0.000	4.00 ± 1.549	4.00 ± 0.894	4.50 ± 0.548	3.67 ± 1.033	4.00 ± 0.894	2.67 ± 1.033
	I believe ocean development should be limited to protect the marine environment (n = 28)	4.86 ± 0.356	4.71 ± 0.534	4.54 ± 0.793	4.25 ± 0.799	4.29 ± 0.897	3.57 ± 1.069	2.64 ± 0.911
	I am opposed to ocean development, and believe the ocean should be conserved (n =5)	4.80 ± 0.447	4.00 ± 1.414	4.60 ± 0.548	4.00 ± 1.000	4.20 ± 0.837	2.60 ± 1.673	2.60 1.140

*Variable levels were condensed.

4.4.3. Influence of Explanatory Variables on Seascape Ratings

Seascape types were found to have significant associations with different explanatory variables (Table 7). Across demographic variables, only age had statistically significant, yet weak, correlations with visual appeal ratings of both the beach and fishing seascapes, whereby older individuals had higher visual appeal ratings (Table 7). Visual appeal ratings differed significantly for locale classification for fishing boat seascapes, with rural participants rating the seascape as 'appealing' and urban participants being more 'neutral'. Both urban and rural participants had very high ratings of the visual appeal of rocky shores. Visual appeal ratings differed significantly for proximity to home only for residential seascapes, with the majority of those living on waterfront properties rating the visual appeal of residential seascapes as 'very appealing'.

Across all seascapes, visual appeal ratings did not significantly differ based on employment in a coastal industry (Table 7). Participants with ocean-related jobs found aquaculture seascapes had higher median ratings for the visual appeal of aquaculture seascapes (3.20) than participants with non-coastal jobs (2.93), although group differences were not statistically significant.

There was a statistically significant weak positive correlation between the median visual appeal rating of the fishing boat seascape and interaction frequency (Table 7). Participants who accessed the coast for recreation more frequently felt that the seascape depicting fishing boats was 'appealing' ($d = 0.225$, $p < 0.005$). Participants who accessed the coast for recreation more frequently also felt that the seascapes depicting coastal residences and rocky shores were 'appealing'; however, these correlations were considered negligible (Table 7).

There were statistically significant differences in the median rating of the residential, fishing boat, and rocky shore seascape types across the different types of recreational interactions (Table 7). For beach, residential and aquaculture seascape types, visual appeal ratings were highest for participants whose recreational interactions were primarily through participating in water activities. For rocky shore and fishing seascapes, visual appeal ratings were highest for participants who interacted most with the ocean when in their homes. For estuarine habitats, interaction type had statistically significant differences in visual appeal ratings, with both participants who interact with the coast through hiking activities and through water activities having high visual appeal ratings.

Table 7. Association (Somer's D) statistics and Group Differences (Kruskal-Wallis and Mann-Whitney U) for relationship between explanatory variables and visual appeal across seascape types (RES = Residential, BE = Beach, FB = Fishing Boat, ES = Estuarine, RS = Rocky Shore, and AQ = Aquaculture).

Variable		RES	AQ	BE	FB	ES	RS
Demographic							
	Age	-0.002	0.091	**0.168**	**0.210**	0.065	0.033
	Income	0.089	0.105	0.115	0.129	0.108	0.098
	Education	5.095*	0.950*	2.559*	3.956*	2.049*	0.950*
	Gender	1836.000*	1979.000*	1473.000*	1806.000*	1934.000*	1979.000*
Geographic							
	Locale	4.564*	1.437*	5.086*	**13.232***	0.596*	1.437*
	County	6.417*	14.277*	8.292*	14.021*	11.728*	14.277*
Interaction							
	Frequency	**0.176**	0.071	0.028	**0.225**	0.055	**0.150**
	Proximity of home	**16.586***	1.639*	5.534*	7.787*	5.102*	1.639*
	Nature of Interaction	**22.621***	8.152*	6.099*	**14.73***	**13.992***	8.153*
	Employment	1.669*	2.722*	3.661*	3.773*	0.269*	2.722*
Values & Beliefs							
	Factors						
	Sounds and Smells	0.130	-0.073	0.029	0.057	0.177	**0.190**
	Commercial Presence	**-0.284**	**-0.249**	0.016	**-0.331**	0.004	0.059
	Environmental Impact	-0.052	**0.171**	0.121	**-0.183**	**0.220**	0.109
	Development	**0.278**	**-0.273**	0.097	-0.161	0.123	0.013
	Value Ratings						
	Aesthetic	**0.301**	-0.156	0.057	0.166	0.267	**0.315**
	Preservation	0.086	-0.146	-0.015	0.108	0.159	0.159
	Recreation	0.092	0.084	0.106	0.089	0.110	0.176
	Culture	**0.200**	-0.069	0.064	**0.168**	**0.278**	0.125
	Economic	0.102	**0.278**	-0.120	**0.261**	-0.09	-0.066

* Represents group difference results.
Bolded numbers are statistically significant results for $p < 0.050$.

Visual appeal ratings correlated with several explanatory variables related to people's values, beliefs, and views on ocean development. For aquaculture seascapes, visual appeal ratings slightly, yet significantly, increased with participants who were more supportive of ocean

development ($d = 0.273$, $p < 0.005$). Conversely, decreasing support for ocean development was significantly associated with increasing visual appeal for coastal residence seascapes ($d = -0.278$, $p < 0.001$).

The visual appeal of residential ($d = -0.284$, $p < 0.001$), aquaculture ($d = -0.249$, $p < 0.005$), and fishing seascapes ($d = -0.331$, $p < 0.001$) was significantly lower for those who felt that commercial presence was a detractor of visual appeal. There were no significant correlations in the visual appeal rating of the other seascape types and agreeance with the commercial presence factor (Table 7). The influence of sounds and smells on the enjoyment of ocean spaces was only significantly, yet weakly associated with decreased visual appeal in aquaculture seascapes. Participants who agreed that environmental impacts influenced visual appeal also felt that seascapes depicting beaches, rocky shores, estuarine environments, and coastal residences were 'very appealing', and those depicting aquaculture and fishing boats were 'unappealing'.

All seascape types, except for the beach type, had statistically significant weak positive correlations with at least one ocean value. Participants who rated the aesthetic value of the ocean as highly important felt that the residential ($d = 0.301$, $p < 0.05$) and rocky shore seascapes ($d = 0.315$, $p < 0.05$) were 'appealing'. Participants who rated the cultural value of the ocean as highly important felt that the estuarine ($d = 0.278$, $p < 0.001$), residential ($d = 0.200$, $p < 0.005$), and fishing boat seascapes were 'appealing' (Table 7). Participants who rated the economic value of the ocean as highly important felt that the fishing boat ($d = 0.261$, $p < 0.001$) and aquaculture ($d = 0.278$, $p < 0.001$) seascape types were 'appealing'. Participants who rated the preservation, aesthetic, and recreation values as extremely important tended to rate the aquaculture seascape type as unappealing. No other significant trends were observed across the visual appeal ratings of seascape types and importance ratings of the ocean values (Table 7).

4.5 Discussion

4.5.1 Aesthetic values and preferences

The survey results revealed that participants generally found the aesthetic value of the ocean to be extremely important. The analysis of these results revealed no substantial correlation between aesthetic value ratings and the demographic, geographic, or interaction explanatory variables. This outcome was unanticipated, as it is not consistent with what is suggested from terrestrial landscape perception research (Howley, 2011; Howley et al., 2012; Wang & Zhao,

2017). The lack of correlation between participants' interactions, demographics, or geographic location and aesthetic value ratings may hint at a universal appreciation for the natural beauty of coastal and ocean spaces, potentially rooted in or shaped by broader cultural or personal experiences unique to Nova Scotia population sampled. The high concentration of responses stating that the aesthetic value of the ocean was considered extremely important, further emphasizes a potentially intrinsic or widely cultivated appreciation for the aesthetic appeal of coastal and ocean spaces, which may reflect broader societal or cultural values. While it is important to recognize that the results of this survey are not representative of the Nova Scotian population, they may hint at the interplay between the region's robust maritime culture and the residents' appreciation of coastal and ocean spaces (Beck et al., 2023; DeWolf, 2018; Nova Scotia, n.d.; Nova Scotia Archives, 2023).

All seascape types were considered largely visually appealing. Yet, variability in visual appeal ratings across seascape types underscores the recognition that aesthetic perception is not consistent and that seascape types are important determinant of visual appeal and aesthetic values. Furthermore, when participants were presented with three photos depicting the same seascape type, there was a high degree of consistency in how they rated these photos. This consistency indicates a stable aesthetic perception tied to the overarching characteristics of the seascape rather than the specific details of individual photos. Such uniformity in ratings suggests that the study's findings are less likely to be skewed by one-off biases related to a specific photo's composition, lighting, or angle. Instead, the results reflect a genuine aesthetic response to the depicted seascape type.

Participants expressed a preference for more 'natural', or less human-influenced landscapes, with the beach and rocky shore seascapes receiving the highest median ratings. This inclination towards natural environments echoes findings from landscape assessments in terrestrial systems, suggesting that people often derive greater positive experiences from natural landscapes than those heavily influenced by human activities (Howley, 2011; Kaplan & Kaplan, 1989).

Residential, estuarine, and fishing boat seascapes also had relatively high (median = 4) visual appeal ratings. While residential and fishing seascapes encompass human-influence and development, these activities may carry cultural significance within the Nova Scotian context, which has a long history of coastal residence and fishing livelihoods. The strong visual appeal of

these seascapes accentuates how landscapes, rich in cultural and economic value, can deeply resonate with local communities (Daniel et al., 2012; Kaltenborn & Bjerke, 2002; Van Zanten et al., 2016).

Of the presented seascape types, aquaculture was least preferred, receiving the lowest visual appeal (median = 3), but also was the seascape type with the highest variation of responses, with nearly equal distribution of participants rating it as 'unappealing', 'neutral', or 'appealing'. This variability may be due to a variety of reasons, including ongoing debates, conflicts, and controversy of the sector. For some, aquaculture might symbolize human intervention or alteration of natural coastal environments. Concerns about the environmental impacts of aquaculture, such as potential pollution, disruption of natural habitats, or negative perceptions about aquaculture (Kirchhoff et al., 2022; Kraly et al., 2022), might also influence this rating, especially as views on development and environmental impacts variables were significant in influencing visual appeal ratings for aquaculture. The relatively low ratings given to the aquaculture seascape type might also be linked to insufficient education about aquaculture in Nova Scotia and the limited presence of aquaculture in Nova Scotian waters. This lack of awareness and familiarity is suggested to impact the overall perception of the industry and aesthetic preferences, as landscape preferences tend to increase with familiarity (Froehlich et al., 2017a; Svobodova, 2011). Given the longstanding controversy surrounding aquaculture in the province, these factors may be particularly influential in Nova Scotia and highlight the importance of recognizing aesthetic perceptions in managing the controversy (Kraly et al., 2022).

The significant differences in visual appeal ratings among the seascape types indicate that participants have diverse aesthetic preferences. Not all seascapes are perceived or valued equally, suggesting that specific seascape characteristics are more appealing to observers than others. The results suggest that the presence or absence of human-made structures or interventions and cultural factors can significantly affect aesthetic perceptions. The results underscore the complex interplay between natural beauty and cultural significance. While natural elements play a pivotal role in defining the aesthetic appeal of a seascape, cultural variables add layers of meaning and context, shaping how different seascape types are perceived and valued.

4.5.2 The influence of values and beliefs

Of potential explanatory variables, the influence of values and belief variables on visual appeal resonated across multiple seascape types. The survey results revealed that participants generally felt that both the aesthetic and preservation value of coastal and ocean spaces were extremely important. This observation resonates with the broader scholarly discourse that has established links between the aesthetic value of an environment/ecosystem and the motivation to engage in its conservation/preservation (Gobster et al., 2007; Lee, 2017; Saunders, 2013; Tribot et al., 2019). Research has revealed that people are generally more prone to protect what they find beautiful (Gobster et al., 2007; Saunders, 2013; Tribot et al., 2019). This aesthetic appreciation can foster emotional attachments and influence human behaviours, motivating people to take care of natural places and conserve them for current and future appreciation (Kovacs et al., 2006; Lee, 2017). For example, people want to visit, live in, and view visually appealing places. As such, they are more likely to want to preserve these spaces and their aesthetic value (Kovacs et al., 2006; Lee, 2017). Conversely, people tend to avoid or try to change and 'improve' places perceived as visually unappealing (Kovacs et al., 2006; Lee, 2017). Therefore, aesthetic preferences have been identified as one of the most significant contemporary drivers of landscape change, strongly influencing ecosystems and land management practices, including conservation initiatives (Gobster et al., 2007; Kovacs et al., 2006; Lee, 2017).

Given this influence on landscape management, aesthetics, particularly aesthetically appealing visuals, are often employed to support conservation initiatives and goals (Foale & Macintyre, 2005; Saunders, 2013). For example, consider the countless images of endangered or charismatic species or untouched nature utilized as representative symbols for biodiversity and wildness in conservation efforts by non-government organizations (NGOs), ecotourism promotions, or within television documentaries (Foale & Macintyre, 2005; Garland, 2008; Saunders, 2013). These symbols draw on emotions to win public support and mobilize resources for conservation (Foale & Macintyre, 2005; Saunders, 2013). Based on the clear links between landscape aesthetics and conservation values, there has been a growing push to consider the role of aesthetic values in informing conservation agendas and approaches (Marshall et al., 2019; Saunders, 2013). Although most studies exploring the connection between aesthetics and conservation concentrate on terrestrial environments, previous research and the findings from this survey suggest that this relationship also extends to the marine domain (Marshall et al., 2019). For

example, participants who agreed more strongly that the environmental impact of marine developments affects the visual appeal of ocean and coastal spaces also tended to rate the aesthetic value of these spaces as more important. Previous research has shown that there is generally an aesthetic preference for 'healthy' ecosystems with high ecological value (Gobster et al., 2007; Tribot et al., 2018b). This suggests that if an environment appears degraded or 'unhealthy,' it may be perceived as less attractive. As such, this belief may align with the notion that people are more motivated to protect environments they find aesthetically pleasing in order to maintain the aesthetic value of that environment (Gobster et al., 2007; Lee, 2017; Saunders, 2013; Tribot et al., 2019).

As discussed above, there are established links between perceived human influence and landscape preference (Howley, 2011; Kaplan & Kaplan, 1989). However, some participants demonstrated a greater acceptance or preference for seascapes showing signs of human activity. This was evidenced by their positive evaluations of landscapes like residential areas, aquaculture sites, and fishing boats. A particularly intriguing observation was the link between these preferences and opinions on commercial activities in the ocean. Those who appreciated the human-influenced seascapes (i.e., aquaculture, residential, and fishing boat seascapes) were also more likely to disagree with the idea that commercial elements (e.g., boats, structures, buoys) mar the ocean's aesthetic and quality. This result suggests that for these individuals, the presence of human elements or activities may not detract from the beauty or aesthetic value of the seascape.

Research has indicated that individual values and beliefs are pivotal in determining landscape preferences (Howley, 2011; Howley et al., 2012; Reser & Bentrupperbäumer, 2005). For some, the value of a landscape is intrinsically tied to its utility: how it can serve human needs (Howley, 2011; Howley et al., 2012). For others, the value is more ecocentric, rooted in the intrinsic worth of the ecosystem itself (Howley et al., 2012). Consider, for instance, a productive river or forest landscape. Some might value these primarily for their potential yields, such as timber or fish, viewing them through an anthropocentric lens (Kaltenborn & Bjerke, 2002). In contrast, others might appreciate them for their inherent ecological value, independent of any direct benefits to humans (Kaltenborn & Bjerke, 2002). This sentiment is echoed in studies like the one by Howley et al. (2012), which posited that farming landscapes, with their potential for food and fibre production, appeal to those who prioritize landscapes' utilitarian aspects. Extending this logic to marine settings, it is conceivable that some participants perceive commercial activities in the

ocean—for employment prospects or food provisioning—as not just neutral but as positively contributing factors shaping their aesthetic evaluations.

Participants' views on ocean development and the significance of its economic value offer additional insights into their seascape preferences. Higher support for ocean development among participants was also correlated with an increase in positive ratings for the aquaculture seascape type, underscoring the role of personal values in shaping seascape preferences. This connection between values and preferences becomes even more evident when considering the link between the importance of various ocean values and the median ratings for aquaculture and fishing boat seascapes. When participants emphasized the ocean's economic value more, their median scores for these seascape types generally increased. For individuals with a more utilitarian value of the ocean, fishing boats and aquaculture infrastructure may represent economic growth, efficiency, and a sustainable source of income (Howley et al., 2012; Kaltenborn & Bjerke, 2002). These benefits in turn may make the associated seascapes more visually appealing.

Cultural values significantly influence how individuals perceive the aesthetic qualities of both human-influenced and natural seascapes. This connection is evident as individuals who assign greater importance to the cultural value of the ocean also tend to give higher aesthetic ratings to seascapes featuring residential areas and fishing boats. Given the high number of coastal residents in Nova Scotia, the residential seascape type might resonate with some participants' sense of 'home' (Ganter et al., 2021). Similarly, fishing boats hold emblematic significance in the region, symbolizing a rich commercial fishing heritage integral to Nova Scotian culture (Nova Scotia, 2018). For many fishers, the act of fishing extends far beyond mere employment—it is an integral part of their identity and a cherished family tradition that has been handed down through generations, playing a vital role in fostering community well-being (European Union, 2021; Khakzad & Griffith, 2016; Poe et al., 2014). Furthermore, those with personal or familial connections to the commercial fishing industry may hold seascapes imbued with elements of marine economic activity in a nostalgic light, as these settings can evoke fond memories and meaningful personal experiences (Khakzad & Griffith, 2016). Consequently, individuals who value oceanic culture may be more likely to perceive seascapes with fishing vessels and coastal homes as more aesthetically pleasing, given their cultural resonance.

The connection between culture and aesthetic values was reinforced by the observation that participants' ratings of the ocean's aesthetic value increased with their appreciation for its cultural significance. Such a trend aligns with the strong interplay between culture and aesthetics recognized in the literature. It is suggested that an individual's aesthetic perceptions and evaluations reflect their cultural background and personal experiences (Jorgensen, 2011; Skřivanová & Kalivoda, 2010). As such, the aesthetic value of a landscape or seascape encompasses more than its immediate physical allure; it is interwoven with meanings, memories, and narratives that are culturally significant (Jorgensen, 2011; Swaffield & McWilliam, 2013; Taylor, 2008). The concept of cultural ecosystem services expands this view, positioning aesthetics as a vehicle for cultural enrichment, heritage conservation, and the reinforcement of identities (Marshall et al., 2019; Tribot et al., 2016). Consequently, a landscape's cultural elements are suggested to be pivotal in moulding its perceived aesthetic value (Mavromatidis, 2012). Through the cultural lens, these landscapes are not just scenically beautiful; they also hold special meaning for those communities and cultural groups who share these cultural connections (Stephenson, 2005). This complex interplay between culture and aesthetics suggests that our perception of beauty in nature is as much about the cultural tapestry it represents as it is about the landscape itself.

The results of this study additionally accentuates the importance of seascapes' 'natural beauty' in shaping the recreational and leisure experiences of Nova Scotians. Most participants who found the recreational value of the ocean to be extremely important also regarded the aesthetic value as extremely important, mirroring a broader tendency for individuals to choose leisurely pursuits in areas they find visually attractive (Gobster et al., 2007; Millenium Ecosystem Assessment, 2005; Wang et al., 2021). This aesthetic appreciation is a testament to the integral role that the visual qualities of seascapes play in the enjoyment and selection of recreation and tourism activities. The literature reinforces this connection, indicating that aesthetically pleasing environments are closely linked to positive emotional states — crucial for enhancing mental and physical health — which are sought after in recreational experiences (Gobster et al., 2007; Tyrväinen et al., 2016; Van Hecke et al., 2018; Wang et al., 2021). Consequently, the intrinsic allure of seascapes emerges as a central factor in outdoor recreation, emphasizing the pivotal role of scenic beauty in leisure activities among Nova Scotians (Tyrväinen et al., 2016; Van Hecke et al., 2018; Wang et al., 2021).

The study's results underscore the significant influence of moral opinions on aesthetic judgments. Participants who believed environmental impacts affect visual appeal found seascapes with aquaculture and fishing boats less appealing, yet those with fishing boats alone received a higher median rating. This difference could reflect how moral opinions shape aesthetic perceptions (Kirchhoff et al., 2022). Kirchhoff et al. (2022) found that aesthetic views can change based on moral positions, with people's attitudes toward the visual impact of structures in landscapes influenced by their ethical views on related activities or industries.

The study also reveals a correlation between lower visual appeal ratings of the aquaculture seascape type and higher importance placed on preservation, aesthetics, and recreation values. The perception that aquaculture development infringes upon these values could be driving this trend, with many voicing concerns regarding aquaculture's environmental impacts and its effects on coastal beauty and public access to recreational activities (Falconer et al., 2013; Perez et al., 2010; Shafer et al., 2010). Such negative perceptions likely influence moral opinions, which cyclically affect aesthetic evaluations, suggesting a feedback loop between ethics and aesthetics.

4.5.3 The Role of Place, Identity, and Attachment in Preferences

The survey results largely support the idea that one's familiarity with an environment and connection to a place plays a role in shaping their preferences for specific landscapes (Svobodova, 2011). These connections to place, termed 'place attachment,' signifies the emotional connections people form with specific environments, including place dependence and place identity (Brown & Raymond, 2007; Khakzad & Griffith, 2016; Pretty et al., 2003). Place identity encompasses feelings, memories, values, and meanings tied to specific locations and physical settings and how they impart significance to an individual's life (Brown & Raymond, 2007; Khakzad & Griffith, 2016; Pretty et al., 2003). Place dependence, in contrast, refers to connections explicitly based on activities that take place in that environment, reflecting the importance of a place in providing conditions that support an intended use, such as recreational activities (Brown & Raymond, 2007; Khakzad & Griffith, 2016; Pretty et al., 2003)

The survey results demonstrated that participants' proximity of home to the coast influenced their visual appeal rating, especially for residential seascape type. For example, participants who live on an ocean-front property where they can see and readily access the ocean tended to rate the residential seascape type as very appealing. This outcome is anticipated, given

that coastal residents would inherently be well-acquainted with seascapes featuring coastal homes. Building on past research, such as Svobodova (2011), there is a tendency for individuals to favour landscapes they are more familiar with. Consequently, the intimate familiarity derived from living in similar settings likely amplifies positive perceptions of the residential seascape type (Svobodova, 2011). As Walker and Ryan (2008) noted, people often develop strong attachments to the landscapes they live next to and those they can view from their homes. Based on the theory of place identity, one can logically assume such attachments may result from the positive emotions and memories one may associate with home (Svobodova, 2011; Walker & Ryan, 2008).

This trend of increased seascape rating and higher familiarity or place attachment can be observed across several other variables, including locale classification, employment in the marine sector, interaction frequency, and nature of interactions. Regarding locale classification, the survey results revealed that participants from 'Rural' areas tended to rate fishing boat seascapes as very appealing. This outcome aligns with expectations, as commercial fishing activities predominantly occur in rural regions across the province (Pisces Consulting, 2022). Consequently, individuals from these rural locales would be more familiar with such seascapes. Additionally, rural communities are more likely to have place attachments associated with these seascape types. For example, Khakzad and Griffith (2016) suggest that the presence of fishing material culture, such as fishing boats and shacks, plays a role in developing and maintaining place attachment in fishing communities. Rural communities are also likely to have more place dependence associated with the fishing boat seascape. Commercial fisheries have long been a vital economic driver for the province's rural regions (Nova Scotia, 2018). As such, rural participants are more likely to be directly or indirectly (i.e., via family members) involved in fishing-related occupations (Pisces Consulting, 2022). This reliance on the seascape type for livelihoods could, in theory, foster place attachments via place dependence (Anton & Lawrence, 2014). As such, rural residents' familiarity and place attachment could amplify their aesthetic appreciation of fishing boat seascapes (Anton & Lawrence, 2014; Svobodova, 2011).

Generally, it was observed that participants employed in a non-coastal related field tended to rate aquaculture seascapes as less appealing. Given that those employed in coastal industries likely interact with aquaculture seascapes more frequently, they would, in theory, have a stronger affinity for such settings. Additionally, those employed in coastal industries might be directly

involved in the aquaculture industry and, therefore, experience place dependence based on their reliance on these settings for a livelihood. However, for those employed outside the coastal realm, their limited exposure to aquaculture settings might render such seascapes less familiar and, therefore, less appealing.

The observed correlations between the nature of recreational interaction and seascape visual appeal ratings further underscore that people's familiarity with and attachment to landscapes influence their visual preferences for seascapes (Svobodova, 2011; Walker & Ryan, 2008). Different activities and perspectives can elicit varied aesthetic responses to the same coastal and ocean seascapes. For example, individuals who participate in on-the-water activities such as kayaking, recreational boating, and surfing appear to have a heightened appreciation for marine landscapes. Four of the six seascape types provided (i.e., beach, residential, fishing boat, and rocky shore) were rated more positively by these participants. There are several potential explanations for this trend. First, engaging in water-based activities may expose individuals to a diverse array of marine landscapes, from rocky shores and beaches to areas with fishing boats and coastal residences. Notably, these seascapes may be closely situated (i.e., there are often coastal residences near beaches), meaning even if an individual participates in recreational 'on-the-water' activities in one location, they may be exposed to several seascape types throughout this activity. This exposure might lead to greater familiarity and a deeper appreciation for these seascapes (Svobodova, 2011; Walker & Ryan, 2008). This exposure may also foster greater place attachment, as being on the water can create strong emotional and physical connections to specific seascapes. This place attachment might lead participants to view certain marine landscapes more favourably due to their positive emotions, memories, or associated experiences (Svobodova, 2011; Walker & Ryan, 2008).

Participants who interacted with the coast recreationally more frequently tended to rate the fishing boat, beach, residential, rocky shore, and estuarine seascape types as very appealing. As increased interaction suggests increased familiarity, this result is expected. However, ratings of the aquaculture seascape type tended to become less appealing with increasing interaction frequency, suggesting that those who interact with the coast frequently for recreational purposes find aquaculture seascapes to be visually unappealing. This result may be explained by the perceived

environmental risks of aquaculture and concerns regarding the degradation of environments that participants rely on for recreational purposes (Kraly et al., 2022).

Generally, the demographic variables were not found to be significantly influential on seascape preferences, except for age. The survey results revealed that as participants' ages increased, their median visual appeal ratings for the fishing boat seascape type tended to rise. This observed phenomenon may be explained by generational differences in culture and upbringing (Howley, 2011). Interestingly this observation has a terrestrial counterpart with Howley (2011) documenting a positive relationship between age and preference for agricultural landscapes. Howley (2011) hypothesized that this relationship may reflect generational differences in culture and upbringing, with relatively elderly participants more likely to be familiar with agricultural landscapes. Drawing a parallel, a similar theory can be posited here, reinforced by the 'graying of the fleet' phenomenon and the emerging environmental awareness among younger populations. The 'graying of the fleet' narrative posits a demographic shift within marine industries toward an older workforce (Cramer et al., 2018). This trend suggests that younger generations might have less exposure to or experience with commercial fishing. As previously discussed, landscape preference tends to increase with familiarity, which may explain why we see lower visual appeal ratings for younger generations (Svobodova, 2011).

At the same time, variations in preferences may be due to heightened environmental consciousness and activism among younger generations (Gray et al., 2019). Recent studies highlight that younger generations are proactively advocating for sustainable environmental policies and have heightened consciousness and awareness of the environmental consequences of human-induced activities ((Gray et al., 2019). Thus, the higher appreciation for seascapes with fishing activities in Nova Scotia among older individuals may suggest an apprehension among younger demographics related to the environmental footprint of commercial fishing.

4.5.4 Implications for Marine Planning and Management

The findings of this study accentuate the varied visual appeal of different seascape types, emphasizing that marine developments and policies cannot adopt a one-size-fits-all approach. The variable influence of explanatory factors across different seascape types suggests that decision-makers must grasp these nuanced preferences to craft effective policies. Recognizing the universally acknowledged importance of ocean aesthetics, it's crucial for decision-makers to

seamlessly incorporate these aesthetic values into their management objectives. This not only bolsters public support for conservation and development initiatives but also magnifies the societal benefits marine ecosystems offer (Marshall et al., 2019).

Given the interconnected nature of various ocean values, Marine Spatial Planning should focus on synergistic approaches, ensuring that preservation goals align with aesthetic values to amplify conservation outcomes. The study further reveals the significant role of personal values, beliefs, and local attachments in shaping seascape preferences, underscoring the contextual nature of aesthetic values and suggesting the importance of engaging with communities and interest holders in decision-making. Interest holders and community insights can refine marine spatial plans, ensuring they resonate deeply with the public while spotlighting locally valued seascapes. As the visual appeal of ocean and coastal spaces varies across seascape types, values and possibly age demographics, management strategies must be adaptive, accommodating the broad aesthetic value while catering to specific regional or demographic preferences. Moreover, the consistency in ratings across photos depicting the same seascape type suggests focusing on identifying preferences for seascape types rather than individual seascape features. This approach allows for identifying seascape types consistently recognized as aesthetically valuable across wider groups. By centring on these widely valued general seascape types, decision-makers and planners can integrate aesthetic considerations into MSP at more extensive scales, such as regional and national levels. This approach can also establish a foundation upon which more context-specific management decisions can be crafted. By having a base understanding of these broader preferences, decision-makers can better tailor their strategies to suit specific regions or communities' unique needs and values, ensuring both large-scale coherence and local relevance in marine management efforts.

The intricate balance of natural, cultural, and human elements necessitates a comprehensive approach to seascape management. Decision-makers are often challenged with integrating both tangible and intangible values, ensuring that cultural significance and human development are seamlessly incorporated into MSP. The collective insights from this study illuminate a path forward for decision-makers, underscoring the importance of a nuanced, participatory, and integrative approach to marine management and planning.

4.5.6 Conclusions

The survey results show that the ocean's aesthetic value is generally considered to be extremely important and that multiple seascape types are considered visually appealing. This importance appears universal across demographic, geographic, and interaction variables explored. Beyond aesthetics, many ocean values were considered important, and these values are often interconnected. As such, decision-makers and spatial planners must look for synergies where possible. Visual appeal ratings were seen to vary significantly between seascape types, indicating differential preferences among seascape features, including levels of human development or other cultural variables.

Additionally, the survey findings generally indicate that an individual's values and beliefs shape seascape preferences, suggesting that visual appeal is intertwined with moral judgements about the impacts of developments. While a general trend suggested that higher visual appeal ratings (i.e., greater attractiveness) correlated with increased familiarity and possibly place attachment, this pattern was not uniform across all seascape types. The interplay of natural elements, human development, and cultural variables in influencing perceptions underlines the complexity of seascape aesthetics. It points to the need for a multifaceted approach when considering seascape management, conservation, or development, considering the physical features and the intangible values associated with them.

While this research offers initial insights into potential influencing factors on aesthetic perceptions and preferences, this survey was exploratory, and the correlations observed can largely be considered negligible or weak. In addition, this study's relatively small and skewed sample size highlight the need for additional research in this area. As such, future studies should aim for a larger and more diverse sample size to ensure that the findings are representative and can be generalized to a broader population. Since most explanatory variables from prior literature on landscape preferences did not influence the importance rating of the aesthetic value of the ocean, researchers should consider a more extensive set of variables in the subsequent studies. This broader scope will help in truly grasping the factors that influence individuals' valuation of the ocean's aesthetic appeal. While the findings suggest prioritizing broader seascape types, it is recommended that targeted studies aimed at identifying the specific factors or features within seascapes that are considered appealing are performed to identify potentially influencing features.

Only through such expanded studies can we confidently characterize the intricacies of the relationship between the explanatory variables and seascape preferences.

Chapter 5: Discussion and Synthesis

The overarching objective of this research was to act as a preliminary exploration into how aesthetic values can inform more sustainable management and planning of marine Social-Ecological Systems. By exploring how aesthetics and broader CES are incorporated into implemented MSP plans, this research helped better characterize the social gap in MSP implementation and identified potential opportunities for better integration. This was supported by a case study exploring aesthetic values in Nova Scotia, which offered insight into potential influencing factors and variabilities.

A synthesis of these findings identified two key groups of challenges to the effective and meaningful integration of aesthetics in MSP, including both **institutional** and **research** barriers (Table 8). Here, 'institutional' refers to governmental planning processes, from an organization standpoint and 'research' refers to the state of understanding, quantifying, or evaluating CES and aesthetics.

Table 8. Overview of institutional and research barriers impeding the integration of aesthetics in MSP.

Group	Barriers
Institutional	• Lack of clarity in how to characterize and incorporate aesthetic values of ecosystems. • Lack of prioritization for aesthetic values. • A lack of consistency in language between research and practical implementation. • Superficial integration of aesthetics
Research	• Lack of context-specific and empirical studies in marine ecosystems. • Lack of standard characterization and valuation methods. • Lack of decision support tools to aid in integrating aesthetic values. • The 'social gap' in MSP.

From a synthesis of these findings, a framework for better integration of aesthetic values into Marine Spatial Planning is proposed (Figure 18). This framework outlines a systematic approach, defining separate, but interconnected institutional and research pathways, aiming to address the key barriers explored in Table 8. This framework is organized as a conceptual pyramid, with the broad base representing foundational steps reflecting the most broad-reaching barriers, such as identifying research gaps and involving social science and aesthetic experts in MSP. Moving up the pyramid, the steps become more specific and action-oriented, focusing on developing political will, policy development, valuation, decision-support, and science communication. The top of the pyramid represents the ultimate goal of effectively and meaningfully integrating aesthetic values into MSP. Each level builds upon the previous one, ensuring a cohesive and comprehensive approach that combines academic research with practical institutional applications. A description of each pathway, highlighting the necessity and recommended actions to achieve each step, is provided in the following sections.

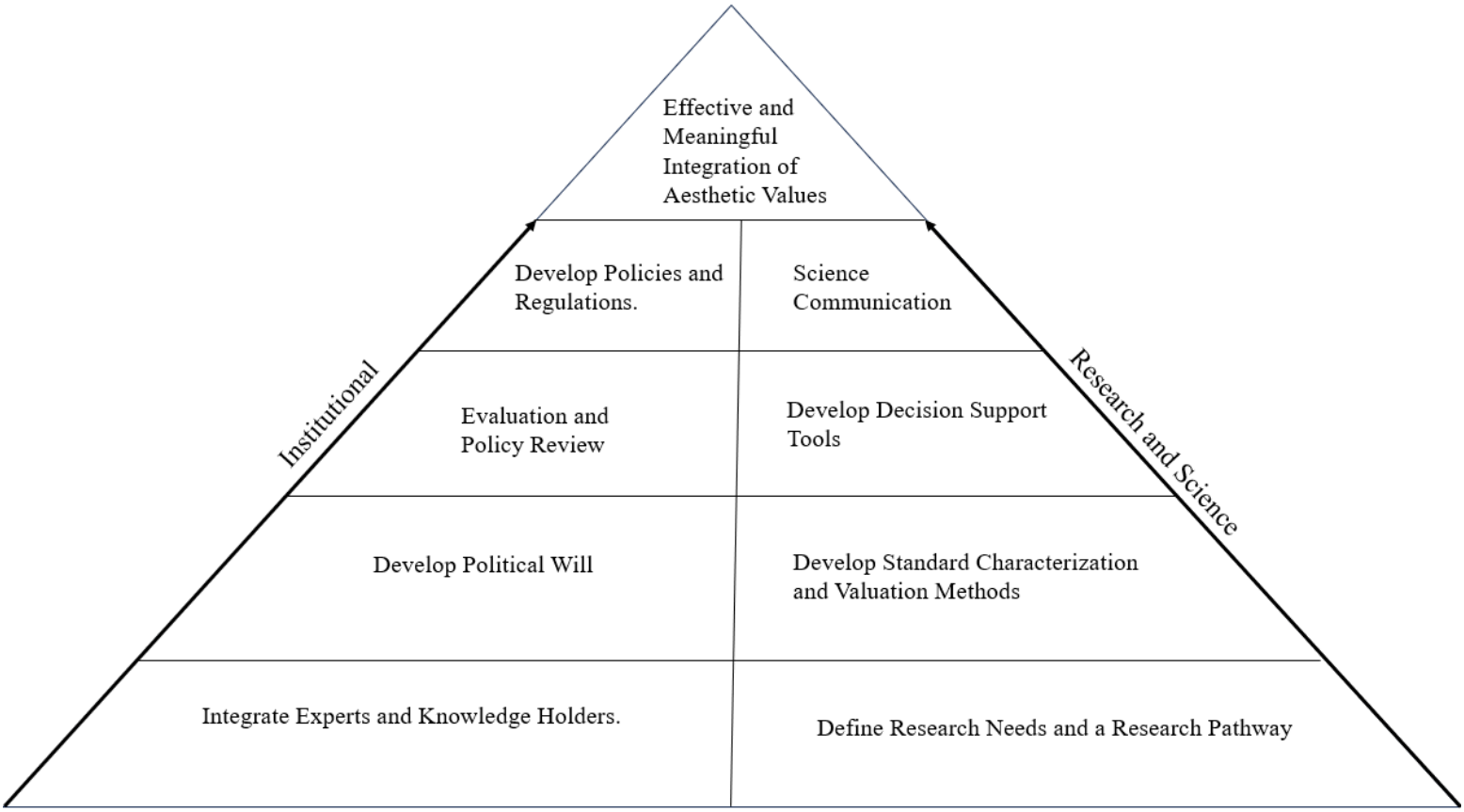

Figure 18. Framework for Aesthetic Value Integration in Marine Spatial Planning: A Pyramid of Institutional and Scientific Collaboration.

5.1 Institutional Pathway to Integrating Aesthetics in MSP

From an institutional standpoint, the deliberate incorporation of aesthetics into Marine Spatial Planning (MSP) is paramount for developing and implementing spatial plans that are functional and socio-culturally sensitive. Utilizing an institutional perspective ensures a deliberate and organized approach underpinned by policy and governance mechanisms, providing the necessary framework for effectively integrating aesthetic values within MSP.

5.1.1 Involving Experts in MSP

Effectively and meaningfully integrating aesthetics into MSP from an institutional perspective begins with the active involvement of social science and aesthetic experts. This step is crucial to ensure that the subjective nature of aesthetics is grounded in a scholarly understanding of cultural and social values. These experts can provide insights into how different communities perceive and value marine landscapes, enabling the integration of more nuanced socio-cultural considerations, such as the potential connections to place attachment highlighted in Chapter 4. Such a detailed and expert-led approach could lead to deeper and more thorough incorporation of aesthetic values, thereby aiding in addressing barriers relating to the current superficial integration of aesthetics observed in the document analysis portion of this study (Chapter 3).

Additionally, as suggested in Chapter 3, communication and language barriers language (i.e., the use of different discipline-specific ‘languages’, including jargon) regarding aesthetics and social science research may be amplified by the limited engagement of marine social scientists in MSP (Flannery et al., 2018; McKinley et al., 2020). Consequently, achieving the effective integration of aesthetics requires bridging these gaps. By embedding relevant experts directly within MSP teams, they can act as interpreters and mediators, bridging gaps in understanding and facilitating a richer, interdisciplinary communication.

Furthermore, experts can play a pivotal role in merging the terminology used in research and practical implementation. By ensuring that the language used in MSP initiatives is in sync with that used in academic studies, experts can facilitate a smoother translation of research insights into actionable strategies. Therefore, establishing consistency in language use can help overcome barriers related to suggested failures in effectively translating research into practice. This

consistency may also improve the overall effectiveness of policies and practices, making them more comprehensible, accessible, and comparable.

In practical application, involving relevant experts in MSP means employing social scientists and aesthetic experts within governmental institutions, setting up advisory panels, and including expert consultations in the MSP process to capture a broad spectrum of aesthetic considerations. For example, hosting regular workshops and seminars could serve as platforms for experts to exchange ideas, address prevailing challenges, and collaborate on innovative solutions. Furthermore, these events could act as incubators for capacity building, facilitating ongoing education and helping planners develop the skills needed to understand and apply aesthetic considerations in MSP.

5.1.2 Developing Political Will

Given that MSP is fundamentally a political process, political will, or the uptake and support by government actors and policies, plays a pivotal role in defining objectives, priorities, and the overall trajectory of initiatives (Flannery et al., 2019). Consequently, developing political will is crucial to ensuring aesthetic values are recognized and actively integrated into MSP. By setting the strategic direction, political will aids in shaping agendas and concentrating efforts toward the incorporation of aesthetic values into marine planning.

Political will also ensures the allocation of necessary resources for research and implementation, guiding the development and enforcement of policies that recognize and protect aesthetic values within marine and coastal environments (Jay, 2017). Without political support, these initiatives might struggle to receive the funding and attention they need. The research required to address the knowledge gaps identified in Chapter 4, including a lack of identified explanatory factors relating to the importance a person places on aesthetic values and the need for bottom-up approaches to planning as an enabling condition outlined in Chapter 3, both necessitate participatory processes. These processes demand considerable time and financial investment. Given the frequent lack of adequate funding for gathering and incorporating social data in MSP plans, developing political will is crucial in supporting the resource allocation necessary to support these foundational research needs and enabling conditions. Furthermore, political will is central to facilitating the policy changes (i.e., the following two steps) necessary to support the enabling condition of developing top-down directives and requirements for aesthetic integration.

Developing political will for incorporating aesthetic values into MSP will require targeted approaches. First, the creation of political support hinges on research and evidence-based advocacy. Therefore, research and innovation (i.e., the other pathway), such as developing tools to measure and capture CES values and aesthetics effectively, can help build political will. Furthermore, advocates can persuasively argue for policy support by offering well-researched, tangible evidence of the impact of aesthetic values in marine environments. However, the previous step (i.e., involving experts in MSP) is a prerequisite for successful evidence-based advocacy. The use of discipline-specific 'language' and communication gaps between scientists and decision-makers can obstruct the recognition and integration of aesthetic and other cultural ecosystem service values (Table 8).

Overcoming these barriers necessitates expert communication, including educational and awareness campaigns targeting policymakers and the general public. As socio-cultural factors, such as aesthetics, are often overshadowed by ecological and economic factors, these initiatives are vital in developing political and public awareness of the significant role of aesthetics in marine environments, emphasizing their cultural, recreational, and economic value. The familiarity principle refers to the idea that when making decisions, people are inclined to choose options related to something they already know about and are familiar with (Kidd et al., 2019; Zolyomi, 2022). Therefore, developing public and political awareness and understanding of aesthetic values is vital for cultivating political will.

As evoking emotions is usually an effective means to appeal to people and policymakers, organizations could partner with artists and storytellers to strengthen education and awareness campaigns (Zolyomi, 2022). This suggestion aims to apply a similar approach to that observed within European campaigns on nature conservation (Zolyomi, 2022). Familiar, local species are often used in these campaigns to trigger specific emotions, memories, or personal experiences that individuals can directly relate to (Zolyomi, 2022). By incorporating local art and stories into educational campaigns, there is the opportunity to illustrate marine aesthetic values, turning abstract concepts into vivid, tangible experiences that may connect to an individual's emotions or personal experiences. Finally, incorporating advanced technologies like virtual reality (VR) into these campaigns can provide immersive experiences, allowing individuals to directly 'experience' the potential aesthetic impacts in marine environments. These approaches can make the concept

of marine aesthetics more accessible, compelling, and memorable, thus further strengthening the case for their integration into MSP.

Lobbying and policy advocacy represent a more direct approach to developing political will (Kukutschka, 2014). Engaging in dialogue with decision-makers and aligning the advocacy of aesthetic values with their political and economic priorities can lead to more impactful policymaking. This approach ensures that the aesthetic dimensions of marine environments are not just considered but are integral to the overall strategy, aligning with broader political and economic goals. Seeking alliances with organizations, economic sectors like tourism and recreation, and coastal communities may enhance the advocacy efforts (Kukutschka, 2014). This approach fosters a more robust and cohesive voice advocating for the integration of aesthetic values in MSP.

Political support, cultivated through research, advocacy, and strategic alliances, lays the groundwork for a more receptive and informed policy-making environment. With aesthetic values more clearly understood and acknowledged at a political level, institutions are better positioned to undertake the next essential step: a comprehensive review of existing policies and regulations.

5.1.3 Policy and Regulatory Review

Institutions, backed by political will, should thoroughly examine current policies and regulations. This step involves meticulously examining existing legal and policy frameworks to identify opportunities and methods for integrating aesthetic considerations. The review involves an in-depth analysis that may include comparing international best practices, evaluating the effectiveness of current integrations of aesthetic values, and ensuring these integrations align with the broader environmental, cultural, and economic objectives within MSP. The objective of the policy review is to create a detailed plan for modifying or formulating policies that would institutionalize the incorporation of aesthetic considerations.

5.1.4 Policy Development for Aesthetic Integration

Based on the foundational plan outlined in the preceding step, the final institutional step is to revise policies or regulations so that they explicitly address and prioritize aesthetic values. This step is critical in ensuring that these values are not only recognized in theory but are also actively reflected and given prominence in legal and regulatory frameworks. These policies could range from guidelines on visual impact assessments for new marine developments to regulations that

protect aesthetically valuable marine and coastal seascapes. This study has identified that such top-down directives are an enabling condition for incorporating aesthetic values into MSP. For example, in the United Kingdom (UK), the Marine Policy Statement explicitly states that strategic consideration should be given to the visual impacts on seascapes and coastal areas during marine plan development. The top-down directive is further reinforced by the statutory designation of "Areas of Outstanding Natural Beauty (AONBs)" as detailed in Chapter Three. AONB designations provide legal protection for the natural beauty of aesthetically valuable landscapes. The integration of aesthetic terminology within UK MSP plans reflects the value of such top-down directives in policy. Among the plans analyzed, three of the top four with the highest frequency of aesthetic terms originated from the UK. These plans highlight the efficacy of top-down policy-driven directives in facilitating the incorporation of aesthetics into marine spatial planning, setting a precedent for other regions to follow in recognizing and safeguarding the aesthetic and cultural values of their coastal and ocean seascapes.

As aesthetic preferences and values appear to shift over time, as suggested by correlations between age and the preference for the fishing boat seascape type observed in the results of the exploratory survey, revision of policies must be transparent and iterative, ensuring regulations are adaptable to feedback from ongoing scientific research and interest holder input.

5.2 Scientific and Research Pathway to Integrating Aesthetics in MSP

Approaching the integration of aesthetics through a science and research lens is critical for grounding aesthetic values in empirical evidence and methodological rigour and bridging the social gap in MSP. This perspective is pivotal for transforming subjective aesthetic considerations into quantifiable metrics that can be systematically assessed and integrated into MSP.

5.2.1 Identifying Research Gaps and Defining Pathways

From a scientific perspective, the first step is identifying research and knowledge gaps in the current understanding of marine aesthetics. Researchers must outline clear research pathways that address these gaps, focusing on how marine aesthetics can be measured, valued, and integrated into spatial planning. This process should involve interdisciplinary research combining ecology, sociology, psychology, and economics to develop a holistic understanding of how aesthetics contributes to human well-being and how they can be preserved or enhanced through MSP. The exploratory survey conducted in this project lays a significant foundation for advancing research

in marine aesthetics. It highlights potential influencing factors and identifies gaps in the current understanding. As outlined in Chapter Four, recommendations for future research include broadening the sample size, investigating an extensive array of explanatory variables, and identifying specific elements within seascapes that enhance their aesthetic appeal.

In addition to broadening the quantitative scope of research, there is a significant recommendation to integrate more qualitative methodologies in future studies. This approach is pivotal in capturing the complex and subjective nature of aesthetic values and understanding the influencing factors identified through more quantitative research, such as the survey carried out in this project. One effective qualitative method is conducting in-depth interviews with various interest holders, including local community members, marine users, and experts in marine aesthetics (Bayeck, 2021; Manzo & de Carvalho, 2020). These interviews can provide rich, detailed insights into individual perceptions and emotional connections to marine and coastal seascapes, uncovering how personal values, beliefs, and place attachments shape aesthetic values (Manzo & de Carvalho, 2020). Workshops are another potentially valuable qualitative tool. They can facilitate group discussions and interactive activities that allow participants to express their aesthetic values and preferences in a collaborative setting. Workshops can encourage creative expressions, like drawing or mapping exercises, enabling participants to visually communicate their aesthetic connections to marine spaces, which may be difficult to articulate (Gee et al., 2017). This method may be particularly beneficial in gathering collective viewpoints and understanding shared values within a community.

Ultimately, a pathway composed of quantitative and qualitative research methods will be necessary to develop a more comprehensive understanding of marine aesthetic values and support integrating these values into MSP. This dual approach enables researchers to grasp the 'what' and 'how much' of aesthetic values and the 'why'—the deeper reasons behind individual and community connections to marine and coastal aesthetics. Identifying research gaps and establishing research pathways lays the groundwork for the following steps. This systematic approach ensures a comprehensive understanding of the field, guiding the creation and identification of consistent and practical methodologies for assessing and valuing marine and coastal aesthetics.

5.2.2 Standard Characterization and Valuation Methods

Identifying standardized characterization and valuation methods for aesthetic values is a critical step in the scientific and research aspect of integrating aesthetics into MSP. A challenge to integrating aesthetic values is the current knowledge gaps surrounding the characterization and valuation of socio-cultural factors, values, and benefits (Table 8) (Cornu et al., 2014; Flannery & Ellis, 2016; Pennino et al., 2021). The primary challenge here is translating the intangible aspects of marine aesthetics into quantifiable data. This quantification is essential for allowing meaningful comparison and analysis, which, in turn, facilitates the subsequent step of developing decision-support tools.

Identifying methods to characterize and assess the value of marine and coastal aesthetics that go beyond traditional monetary metrics is essential for effectively capturing their varied benefits. Ensuring the reliability and accuracy of these methods requires their validation across diverse contexts. This process involves rigorous testing and refinement in different geographical, cultural, and social settings. The ultimate aim is to identify widely applicable characterization and valuation methods that provide structured, replicable approaches while remaining flexible enough to be attuned to the unique aesthetic values and preferences of different communities and environments. Establishing such a versatile yet comprehensive framework is necessary to support the effective integration of aesthetics into MSP. It ensures that aesthetic considerations are integrated based on standardized and validated methods, facilitating MSP decisions that are both data-driven and reflective of the multifaceted nature of marine aesthetics.

An example of an existing characterization method that should be applied or tested in other areas to explore its applicability as a standard method is the Seascape Character Assessment (SCA). SCA is a method for assessing, characterizing, mapping, and describing seascape character (Natural England, 2012). The process follows the widely used and well-established terrestrial method of Landscape Character Assessment (Natural England, 2012). SCAs are valuable as they integrate natural and cultural factors, encompassing how people experience, perceive, and value a place. (Figure 19) (Natural England, 2012). This method also aids in identifying key elements, features, and characteristics that form a region's sense of place and character (Natural England, 2012). Furthermore, SCAs focus on holistically representing the whole geographic area rather than

focusing on specific protected sites or features (Natural England, 2012). As such, SCA provides a comprehensive place-specific evidence base and baseline information at the necessary scale for various decision-making processes (Natural England, 2012).

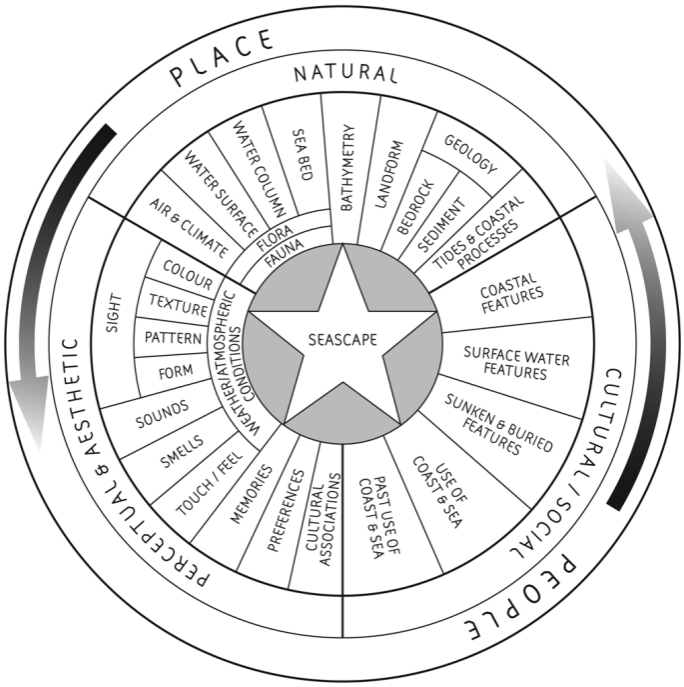

Figure 19. Depiction of variables encompassed within Seascape Character Assessments (Natural England, 2012)

SCAs offer an opportunity for a standardized spatial framework for characterizing coastal and ocean seascapes. As such, this characterization can be a crucial support in evaluating or making judgments about seascape quality or value or decisions about the appropriateness of development (Natural England, 2012). However, the SCA method must be combined with valuation methods, as SCA is not a valuation method (Natural England, 2012). Current valuation methods, such as the Hedonic Pricing and Travel Cost methods, predominantly focus on monetary aspects and may overlook the more intangible benefits of coastal and ocean aesthetics (Urbis et al., 2019). Therefore, it is advisable to adopt the 'quali-quantitative' valuation methodology proposed by Urbis et al. (2019), which blends quantitative elements (like paired comparison surveys) with qualitative aspects (such as semi-structured in-depth interviews). The suggestion here is to merge SCAs with 'quali-quantitative' valuation methods, allowing for the development of one cohesive characterization and valuation method.

5.2.3 Decision Support Tools for MSP

With valuation and characterization methods established, the creation of decision support tools is essential to facilitate the practical integration of aesthetics into MSP. These tools can help planners visualize the potential impacts of planning decisions on marine and coastal aesthetics and balance these considerations with ecological, economic, and social objectives. The tools should be user-friendly and designed to incorporate inputs from both experts and interest holders, allowing for a participatory approach to aesthetic integration.

A key recommendation is the incorporation of the previously discussed interaction matrices into these tools. These matrices delineating the interactions between marine sectors and aesthetic values can provide critical insights within decision support systems. Planners utilizing GIS and other geospatial technologies can superimpose these matrices on spatial plans. This process helps identify zones where economic activities could intersect with areas of high aesthetic value, leading to more informed decision-making. For example, if a marine area is identified as having high aesthetic value and significant potential for eco-tourism, policymakers might prioritize its conservation over other developments.

Additionally, decision support tools should feature interactive capabilities that simulate various planning scenarios. Furthermore, it is crucial to conduct training sessions for MSP practitioners. These sessions should teach the effective use of these tools, focusing on interpreting interaction matrices and incorporating interest holder feedback.

5.2.4 Effective Science Communication

The final step in the research and science pathway is effective science communication. The well-recognized communication gaps between science, policy, and the public must be effectively navigated to ensure the scientific understanding of marine aesthetics is translated into practice (Brownell et al., 2013; Hunter, 2016). This process involves disseminating research findings to MSP practitioners, policymakers, and the broader community in an audience-appropriate manner (Brownell et al., 2013; Stoll et al., 2022).

As science communication is a challenging skill many practicing scientists lack, researchers should actively collaborate with communication specialists (Brownell et al., 2013). This collaboration can help ensure that complex scientific information is translated into easily

understandable language (i.e., layperson's terms), making it accessible to a broader audience. By employing various communication strategies and mediums, such as plain language summaries, infographics, or interactive platforms, researchers can effectively convey their findings to the general public, MSP practitioners, and policymakers (Riera et al., 2023; Stoll et al., 2022). This approach fosters greater engagement, enabling individuals outside the scientific community to comprehend and appreciate the significance of the research, thereby promoting informed decision-making and public discourse.

Effective communication also entails direct engagement with relevant institutions. Experts and researchers are encouraged to provide training sessions and workshops to make sure that the most recent research findings, such as characterization and valuation methods and decision-support tools, are practically usable by planners. Such a step is crucial in transforming the research findings, accumulated through all prior steps, into actionable management applications and supporting adoption.

5.3 Applying the framework in practice: At different levels of MSP

The framework identifies general pathways and opportunities for advancing aesthetic integration in MSP. However, findings from the literature and the exploratory survey suggest the importance of recognizing place-based and contextual nuances. Therefore, MSP approaches to integration may be more suited to different levels of jurisdiction or scale.

At the national level, approaches to integrations should focus on harmonizing language between research and practical application and prioritizing aesthetics and CES in policy and institutions. This approach involves aligning terminologies used in academic research with those in MSP plans, bridging translation barriers between research findings and practical applications. Additionally, it requires recognizing and prioritizing aesthetic and CES values within policy and institutions. Prioritizing and acknowledging these values will establish foundational support and directives at the highest planning levels, creating a trickle-down effect that influences policies and practices at regional and local levels.

At the regional level, the approach to integrating aesthetic values and CES into MSP should focus on developing decision support tools and analyzing key influencing factors like seascape types and values, such as those identified in the exploratory survey conducted in this project. This

approach entails creating and utilizing tools for assessing the aesthetic and CES impacts in regional planning, alongside conducting more robust studies of regional seascape characteristics and cultural significance. It also involves regional collaboration and information sharing, particularly for seascapes that span administrative boundaries. The aim is to equip decision-makers with the necessary resources and insights for incorporating aesthetic and CES considerations into effective and sensitive marine and coastal management strategies.

At the local level, integrating aesthetic values and CES into MSP should focus on engaging interest holders and communities. Given the limited geographical scope of local level plans, they are well suited to facilitate the enabling condition of bottom-up approaches to planning. This bottom-up approach, through thorough engagement and participatory methods, makes it possible to understand and integrate nuanced local aesthetic and cultural values. Values that uniquely reflect the relationships that communities have with their marine environments. Such localized engagement ensures that MSP aligns with community identities and priorities, preserving the region's distinct cultural and natural heritage. As such, local scale plans can achieve the most in-depth integration of aesthetic values across all scales.

5.4 Recommendations for Nova Scotia.

Currently, Nova Scotia does not have province-level MSP initiatives, although the provincial government supports national-level MSP planning processes. These recommendations thus revolve around the future development of regional-level or local-level initiatives. As the survey revealed that the majority of Nova Scotians considered aesthetic values to be extremely important, the primary recommendation for advancing the integration of aesthetic values within Marine Spatial Planning in Nova Scotia is to establish clear top-down directives that support both research and integration efforts. Building on this recommendation, Nova Scotia needs to enhance its research on seascape public preferences and aesthetic values. Currently, the primary source of such research appears to be the exploratory survey conducted in this study, indicating a substantial gap in understanding the aesthetic preferences and values of Nova Scotians related to coastal and ocean seascapes. To address this gap, conducting a comprehensive seascape character assessment is recommended. This assessment would be crucial in identifying and characterizing key factors, such as the diverse values and preferences for various seascape types that the exploratory survey revealed.

Furthermore, augmenting this assessment with academic research is advised, especially using qualitative methods like interviews. Employing bottom-up participatory approaches, including community mapping, would provide deeper insights into more nuanced and community-centric aspects of aesthetic values. These approaches are pivotal for a more thorough understanding of the intricate relationship between Nova Scotians and their coastal and oceanic surroundings.

To encourage the adoption of these recommendations, governmental entities should partner with local academic and research institutions, such as Dalhousie University's Marine Affairs program. Specifically, these initiatives should involve local social scientists. Such collaborations can significantly advance research, providing access to specialized expertise and innovative methodologies. These partnerships could also aid in developing and refining tools and methods to integrate aesthetic considerations into Marine Spatial Planning (MSP), ensuring that marine and coastal management aligns with both environmental sustainability and the cultural values of Nova Scotia's communities.

These recommendations serve as a foundational step in fostering the integration of aesthetic values into Nova Scotian MSP. Such integration is necessary for the region to create culturally sensitive plans that resonate with Nova Scotians' intrinsic relationship with coastal and ocean spaces, supporting social well-being and sustainability. Such alignment is crucial for preserving Nova Scotia's unique sense of place and maritime culture as the blue economy grows.

5.5 Conclusion

In synthesizing these steps, a detailed blueprint for integrating aesthetics into MSP from both institutional and scientific perspectives is presented. Each step is interdependent and requires pursuit in consideration of the others. For example, while institutions are developing interest holder engagement frameworks, it is equally essential for scientists to work in parallel on creating robust valuation metrics. Valuation metrics must be adaptable and sensitive to the diverse inputs received during these engagements, ensuring that the metrics accurately reflect the range of aesthetic values and concerns expressed by different interest holders. This concurrent development ensures a cohesive approach where scientific methodologies and institutional strategies are aligned and mutually reinforcing. This ultimately leads to a more effective and comprehensive integration of aesthetics in marine spatial planning.

In the journey toward the pyramid's apex of effective and meaningful aesthetic integration in MSP, synchronizing institutional and scientific efforts is not just beneficial - it is essential (Figure 18). While institutions are crucial in actualizing the integration of aesthetics into Marine Spatial Planning, it is the foundational scientific research that informs and guides these efforts. This research provides the necessary evidence and methodologies to ensure policy development and implementation are based on sound, empirical knowledge. Only through a collaborative and multi-scaled effort can MSP effectively and meaningfully integrate aesthetic values.

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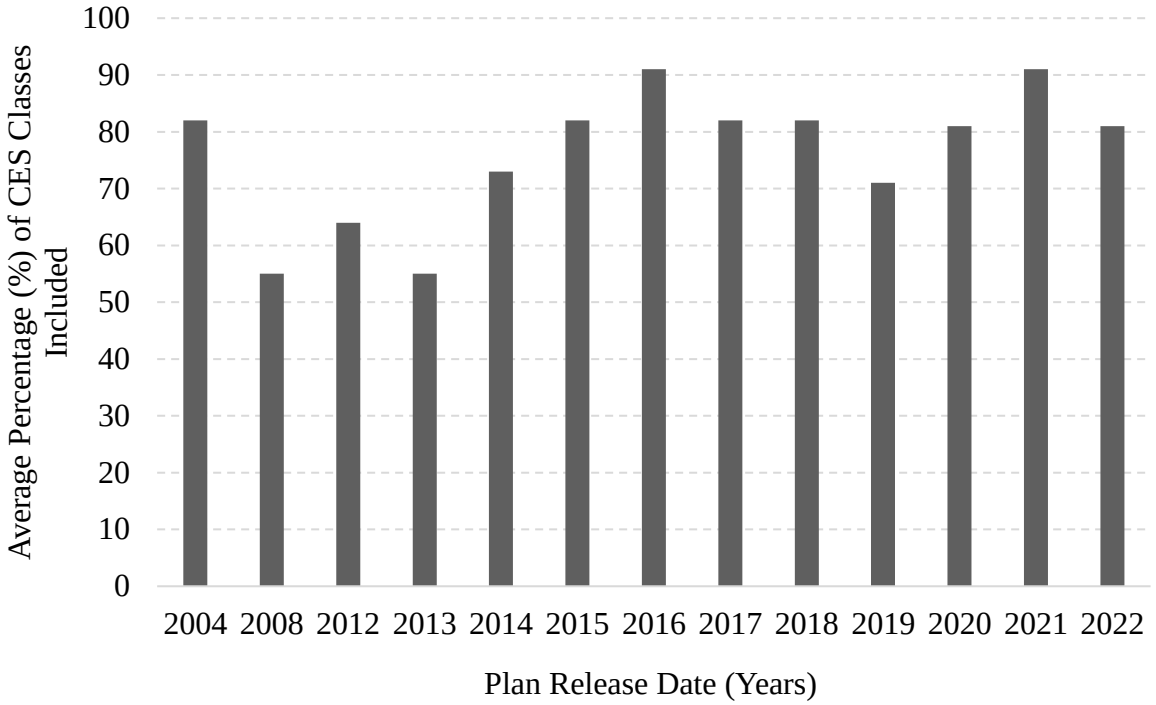
Appendices

Appendix i. Average percentage of CES classes included in plans based on date. The sample size of plans (n) per release date were as follows 2004 (n = 1), 2008 (n = 1), 2012 (n = 1), 2013 (n = 1), 2014 (n = 2), 2015 (n = 8), 2016 (n = 5), 2017 (n = 4), 2018 (n = 2), 2019 (n = 6), 2020 (n = 1), 2021 (n = 2), and 2022 (n = 1).



Appendix ii. Public survey distributed across Nova Scotia between July 31st to September 20th, 2023.

SURVEY PARTICIPATION CONSENT FORM

Title: Sea and Society: Exploring Nova Scotian's Aesthetic Values and Preferences for Ocean and Coastal Spaces.

Lead Researcher:
Therese Wilson
Marine Affairs Program
Dalhousie University
therese.wilson@dal.ca

Supervisors:
Dr. Jenny Weitzman [supervisor]
Leah Lewis-McCrea [supervisor]
Centre for Marine Applied Research
Dartmouth, Nova Scotia

You are invited to take part in a research study being conducted by, Therese Wilson, a Master of Marine Management Candidate in the Marine Affairs Department at Dalhousie University. This survey seeks to explore the influence of marine development and various marine activities and industries, on the aesthetic values of coastal landscapes. In this survey, you will be asked questions about your interactions with the coast and the values you derive from these interactions, as well as your perception of coastal landscapes.

The survey will take approximately 10 to 15 minutes to complete. Your participation in this research is entirely your choice. You do not have to answer questions that you do not want to answer and you are welcome to stop the survey at any time. Your participation will be anonymous. No questions in the survey will ask for identifying details such as your name or email address. However, since responses are anonymous, you will not be able to withdraw your response once the survey has been submitted.

All responses will be stored in a locked file folder and will only be accessible by the lead researcher. Survey data will be retained for a period of one year, after which it will be destroyed. The aggregated findings of this research will be described for academic purposes and the results will be shared via the publication of the graduate project. A published version of the graduate project will be publicly accessible on the DalSpace Repository after January 2024.

The risks associated with this study are no greater than those you encounter in your everyday life. There will be no direct benefit to you in participating in this research.

If you have any ethical concerns about your participation, you may contact Marine Affairs department at marine.affairs@dal.ca or Dalhousie University Research Ethics at (902) 494-3423, or email ethics@dal.ca (and reference REB file # 2023-002)."

If you agree to complete the survey, please check the following boxes and sign below.

- ☐ I have read and agree to the terms outline above
- ☐ I am over the age of 18
- ☐ I am a permanent or part-time resident of Nova Scotia
- ☐ I consent to take part in this survey

Date (DD/MM/YY) _____

INTERACTIONS WITH THE COAST

To begin, we ask you for some information about your interactions and experiences with the ocean and coastal areas.

How close is the ocean to <u>your home</u>? Please select the best option.

- ☐ I live on an ocean-front property where I can see and access the ocean
- ☐ I can see the ocean from my home
- ☐ I can't see the ocean from my home, but I can from my neighbourhood
- ☐ I would need to travel by car or vehicle to see the ocean

Do you work on, or use the coast or ocean <u>for your job</u>? Please select best option.

- ☐ I regularly work on or in the ocean (e.g., fisher, boat operator, diver, navy)
- ☐ I regularly work in coastal areas for my job, but do not regularly go on or in the ocean.
- ☐ I am employed in a coastal industry (e.g., shipping, coastal construction, tourism, research, fishing, aquaculture) but do not regularly go out on in the ocean
- ☐ I regularly work on or in the ocean as well as in coastal areas.
- ☐ My job is not coastal/ocean related
- ☐ I am currently not employed

How often do you visit coastal or ocean areas <u>for recreation and/or personal enjoyment</u>?

☐ Every day	☐ Once a week	☐ One to two times per year	☐ Never
☐ Multiple times a week	☐ Once a month	☐ Less than once a year	

When do you <u>most often</u> access or view the ocean for enjoyment or recreation?

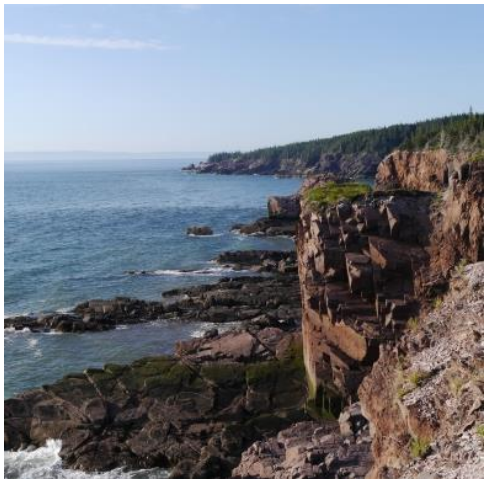
- ☐ When I am in my home
- ☐ When I am on vacation (cottages, hotel, campground)
- ☐ When I am accessing the beach for recreation and /or enjoyment
- ☐ When I am participating in on the water activities (kayaking, canoeing, surfing)
- ☐ When I am visiting my town/cities waterfront
- ☐ When I am hiking in coastal areas

VISUAL PREFERENCES AND AESTHETIC VALUES

In the following section, you will be presented with a series of images depicting different types of coastal and marine environments you might see across Nova Scotia, each with varying levels of human development and activity.

Please rate each image based on your visual preference (i.e., how visually appealing you find each scene), from 1 (very unappealing) to 5 (very appealing).

A.



Rate image A on a scale from 1 to 5

Very unappealing	1	2	3	4	5	Very appealing
	☐	☐	☐	☐	☐	

B.

Rate image B on a scale from 1 to 5

Very unappealing	1	2	3	4	5	Very appealing
	☐	☐	☐	☐	☐	

C.

Rate image C on a scale from 1 to 5

Very unappealing	1	2	3	4	5	Very appealing
	☐	☐	☐	☐	☐	

D.

Rate image D on a scale from 1 to 5

Very unappealing	1	2	3	4	5	Very appealing
	☐	☐	☐	☐	☐	

E.

Rate image E on a scale from 1 to 5

Very unappealing	1	2	3	4	5	Very appealing
	☐	☐	☐	☐	☐	

F.

Rate image F on a scale from 1 to 5

Very unappealing	1	2	3	4	5	Very appealing
	☐	☐	☐	☐	☐	

G.

Rate image G on a scale from 1 to 5

	1	2	3	4	5	
Very unappealing	☐	☐	☐	☐	☐	Very appealing

H.

Rate image H on a scale from 1 to 5

	1	2	3	4	5	
Very unappealing	☐	☐	☐	☐	☐	Very appealing

I.

Rate image I on a scale from 1 to 5

	1	2	3	4	5	
Very unappealing	☐	☐	☐	☐	☐	Very appealing

J.

Rate image J on a scale from 1 to 5

	1	2	3	4	5	
Very unappealing	☐	☐	☐	☐	☐	Very appealing

K.

Rate image K on a scale from 1 to 5

	1	2	3	4	5	
Very unappealing	☐	☐	☐	☐	☐	Very appealing

L.

Rate image L on a scale from 1 to 5

	1	2	3	4	5	
Very unappealing	☐	☐	☐	☐	☐	Very appealing

M.

Rate image M on a scale from 1 to 5

Very unappealing	1	2	3	4	5	Very appealing
	☐	☐	☐	☐	☐	

N.

Rate image N on a scale from 1 to 5

Very unappealing	1	2	3	4	5	Very appealing
	☐	☐	☐	☐	☐	

O.

Rate image O on a scale from 1 to 5

Very unappealing	1	2	3	4	5	Very appealing
	☐	☐	☐	☐	☐	

P.

Rate image P on a scale from 1 to 5

Very unappealing	1	2	3	4	5	Very appealing
	☐	☐	☐	☐	☐	

Q.

Rate image Q on a scale from 1 to 5

Very unappealing	1	2	3	4	5	Very appealing
	☐	☐	☐	☐	☐	

R.

Rate image R on a scale from 1 to 5

Very unappealing	1	2	3	4	5	Very appealing
	☐	☐	☐	☐	☐	

VALUES ON OCEAN USE AND DEVELOPMENT

In the following, we ask you for some information about your values, opinions, and preferences relating to ocean use and development.

Please rate how much you agree or disagree with the following statements.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
The presence of commercial activities in the ocean (e.g., boats, structures, and buoys in the water) deteriorate the quality and aesthetics of the ocean.	☐	☐	☐	☐	☐
The sounds and smells are important to my experience and enjoyment of ocean spaces.	☐	☐	☐	☐	☐
The environmental impact of marine developments is an important contributor to the visual appeal of different ocean and coastal spaces.	☐	☐	☐	☐	☐

Below, we will ask you about your values towards ocean and coastal areas.

Please rate how important each of the following values related to ocean and coastal ecosystems are to you, on a scale of 1 (not at all important) to 5 (extremely important).

The preservation of marine wildlife and habitats.

Not at all important ☐ ☐ ☐ ☐ ☐ Extremely important

Economic and employment opportunities on the ocean.

Not at all important ☐ ☐ ☐ ☐ ☐ Extremely important

The cultural and / or spiritual connections I have with the ocean.

Not at all important ☐ ☐ ☐ ☐ ☐ Extremely important

The natural beauty and quality of ocean and coastal areas.

Not at all important ☐ ☐ ☐ ☐ ☐ Extremely important

The provision and access to recreational opportunities.

Not at all important ☐ ☐ ☐ ☐ ☐ Extremely important

Which of the following statements <u>best reflects</u> your views on development in the ocean?

☐ I strongly support ocean development as a means of economic growth and job creation

☐ I support ocean development, but it should be carefully managed to avoid negative impacts on the marine environment and ecosystems
☐ I do not have a strong opinion on ocean development
☐ I believe ocean development should be limited to protect the marine environment and ecosystems
☐ I am opposed to ocean development, and believe the ocean should be conserved and protected

BACKGROUND AND SOCIO-DEMOGRAPHICS

Please provide some basic background information about yourself.

To which age group do you belong?

☐ 18-24 ☐ 25-34 ☐ 35-44 ☐ 45-54 ☐ 55-64 ☐ 65 or above

Please select the option that best represents your gender identity.

☐ Female ☐ Male ☐ Non-binary ☐ Prefer not to disclose

What is your total annual household income?

☐ $0 - $29,999 ☐ $30,000 - $59,999 ☐ $60,000 - $89,999 ☐ $90,000 - $119,999 ☐ $120,000 or more

What is your highest level of education?

☐ Less than high school diploma
☐ High school diploma or equivalent
☐ Some college or associate's degree
☐ Bachelor's degree
☐ Graduate or professional degree

Which county in Nova Scotia do you reside? _____

Which of the following best describes where you now live?

☐ Large city ☐ Suburb near a large city ☐ Small city or town ☐ Rural area




Appendix iii. Cronbach's alpha representing internal consistency across the three photographs depicting each seascape type.

	Seascape Type					
	Rocky Shore	Estuarine	Fishing boats	Beach	Aquaculture	Residential
Cronbach's Alpha	0.770	0.757	0.873	0.640	0.780	0.735

Appendix iv: MSP Plan References

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