Abstract Details		Abstract
Session 1: NbCS Design		
Abstract No.	1	**How do Geomorphic Conditions Inform Site Selection and Design for Nature-based Shoreline Protection?** The east coast of Vancouver Island along Parkville and Qualicum Beach exhibits a variety of shoreline types and features, resulting in a diversity of shoreline morphology and variability in the sediment deposition, erosion, and transport regimes. Coastal processes along this complex shoreline vary over a range of spatial and temporal scales. Identifying the areas that could benefit most from nature-based shoreline restoration or protection is difficult without a thorough understanding of the coastal processes. NHC performed a regional assessment of coastal processes for the wildlife management areas along Parksville and Qualicum Beach to identify sites that could benefit from community level projects and provide co-benefits of restoration of natural habitat. Regional scale assessments of coastal processes can provide a foundation for future shoreline restoration projects and improve the understanding of the vulnerability of the shoreline habitat to potential changes from climate change. This presentation discusses how regional scale assessments can be used to select sites where nature-based shoreline protection can be implemented and what elements are needed from a coastal processes assessment to inform nature-based designs.
Presenters	Pauline Martens	
Authors	Pauline Martens; Laura Ramsden; Neville Berard; Grant Lamont	
Abstract No.	2	**Effects of Scale in Design: Three Case Studies in Pacific Northwest** A key parameter in the design of Nature-based Coastal Solutions is the spatial scale of the project in relation to the coastal processes at the project site. Timescale is also an important consideration in design and implementation, especially for projects that are protecting infrastructure. This presentation briefly discusses the consideration of spatial and temporal scale in design and relates this to available design guidance as well as aspects of construction, monitoring, and adaptive management. This presentation then illustrates aspects of scale by examination of three projects in the Pacific Northwest that range from a smaller project for a private property up to a larger community scale project to illustrate challenges, opportunities, and lessons learned.
Presenters	Grant Lamont	
Authors	Grant Lamont; Phil Osborne; Laura Ramsden	
Abstract No.	3	**Intro to NRC Design Guidelines** This presentation provides a brief introduction to National Research Council of Canada's *Nature-Based Infrastructure for Coastal Flood and Erosion Risk*
Presenters	Enda Murphy	
Authors	Enda Murphy	

Abstract Details		Abstract
		Management – A Canadian Design Guide. This first edition of *Nature-Based Infrastructure for Coastal Flood and Erosion Risk Management – A Canadian Design Guide* signposts and provides evidence-based guidance for practitioners on approaches, methods, and techniques for selecting, designing, deploying, preserving, and adaptively managing nature-based infrastructure (a form of nature-based solution) to manage coastal flood and erosion risk in Canada. It builds on existing international guidance to provide insights and lessons learned from Canadian projects and contexts. Although primarily aimed at providing technical guidance to Canadian practitioners and professionals engaged in conceptualization, design, and implementation of nature-based coastal infrastructure, the guide may also prove useful to communities, decision makers, policy makers, or non-technical users.
Abstract No.	4	**<u>Sediment-based Solutions for Coastal Flood and Erosion Risk Management – A Summary of Recent Canadian Guidance</u>** Sediment is often the foundation for nature-based infrastructure (NBI) in coastal environments, especially estuarine, deltaic, wetland, and even open coast contexts—sediment provides a dynamic "structure" for flood and erosion resilience on which coastal processes can operate (and actively contribute to reshaping) but also provides the backbone for the establishment and hosting of plants and biota. Sediment often works very well when used in combination with both vegetation and engineered (e.g., rock) structures. This presentation will provide an overview of a chapter dedicated to Sediment-based Solutions (SbS) in a recent Canadian Guidance document for Coastal Flood and Erosion Risk Management (Osborne et al., 20024; Murphy et al.,2024). The focus of the SbS chapter is on non-cohesive sediment-based coastal systems (sand and gravel-sized material, up to cobbles) such as sand dunes and vegetated dunes, sand, gravel, cobble, and mixed beaches, although sediment-based solutions can also be implemented in cohesive sediment environments (containing muds, clays and silts). Sediment-based solutions often prioritize nourishment and sediment management approaches that preserve and protect natural processes and enhance habitats. Sediment-based solutions rely on natural coastal processes to re-shape placed sediment to form a dynamic beach, dune, berm, or shoal that can dissipate wave and storm energy and provide both flood and erosion protection. The dynamic nature of sediment-based solutions requires different considerations to more static, grey infrastructure. References: •Murphy, E., Cornett, A., van Proosdij, D., & Mulligan, R.P. (Eds.) (2024). Nature-Based Infrastructure for Coastal Flood and Erosion Risk Management – A Canadian Design Guide. •Osborne, P. D., van Proosdij, D., & Camarena, A. (2023). "Chapter 8 – Sediment-Based Solutions." In Murphy, E., Cornett, A., van Proosdij, D., & Mulligan, R.P. (Eds.) Nature-Based Infrastructure for Coastal Flood and Erosion Risk
Presenters	Phil Osborne	
Authors	Phil Osborne; Danika van Proosdij; Amaury Camarena; Enda Murphy	

Abstract Details		Abstract
		Management – A Canadian Design Guide.
Session 2: NbCS Case Studies - Salt Marsh		
Abstract No.	5	**Building a Living Dike in Boundary Bay, BC** Salt marsh provides both wetland habitat and natural flood protection through dissipation of wave energy, but is under threat as global sea level rise threatens its survival through coastal squeeze. To address this, the City of Surrey is undertaking the Living Dike project in Boundary Bay, which experiments with nature-based methods to protect salt marsh habitat and maintain flood protection value as sea levels rise under a changing climate. The first phase of the Living Dike project was the salt marsh pilots, which experiments with different methods to create, raise, and protect salt marsh that include thin layer placement of sediment, edge stabilization techniques, and marsh planting techniques. The second phase of the Living Dike project is to pilot a wide green dike, which adapts a design from Northern Europe consisting of erosion-resistant clay and sandy clay planted with grass and herbaceous species, in order to provide flood protection by holding back ocean water and dissipating wave energy on a gently-sloped, vegetated seaward face. Future project phases will incorporate the findings of the pilot projects to construct a "living dike" of integrated salt marsh and wide green dike on a larger scale across Boundary Bay. The salt marsh pilots were constructed in 2023 and are currently in adaptive management, whereas the wide green dike pilot is being constructed over two construction seasons in 2024 and 2025. What has been learned through construction and monitoring of the two Living Dike pilot projects so far is presented.
Presenters	Evan Elder; Miriam Marshall	
Authors	Evan Elder; Eric Morris; Allison Matfin; Matt Osler	
Abstract No.	6	**Field Trials on a Living Dike in BC: Wave Attenuation of Edge Treatment Features*** Nature-based infrastructure projects, including hybrid systems combining structural and natural elements, are progressively seen as viable coastal flood risk management solutions. Identified barriers to wider uptake of nature-based infrastructure projects include: the lack of monitoring data characterizing the performance of different nature-based features in diverse environments, and the absence of detailed technical guidance for designers on predicting performance. Of particular interest for designers of nature-based coastal infrastructure projects is the degree to which different features attenuate or dissipate waves across a range of water-level conditions. The Living Dike is an innovative sea-level rise adaptation project being undertaken by the City of Surrey, Semiahmoo First Nation, and the City of Delta in the macro-tidal Boundary Bay, British Columbia. The pilot project involves upgrading existing sea dikes (levees) and encouraging the growth of existing salt marshes by placing sediment and planting vegetation on the intertidal foreshore at several locations. The pilot also involves field trials of various wave attenuating edge treatments for the constructed marsh platforms, including a berm constructed from biodegradable mesh bags containing oyster shells, brushwood dams, a sand berm, and a gravel berm. This study describes quantitative field measurements of nearshore waves and an
Presenters	Braydon Foster	
Authors	Braydon Foster; Ana Chará-Serna; Gwyn Lintern; Enda Murphy	

Abstract Details		Abstract
		analysis of wave transmission coefficients for the different edge treatment features at one of the Living Dike pilot sites. A qualitative assessment of the stability of the different features was also conducted. Wave data was obtained from near-continuous pressure measurements at points along multiple cross-shore transects between October 2023 and January 2024. The measured wave height attenuation across the four different edge treatment features (oyster bag berm, sand berm, gravel berm, and brushwood dam) was assessed and benchmarked against wave heights at an adjacent control transect to isolate the influence of the features from other processes affecting wave transformation (e.g., shoaling, depth-induced breaking, bed friction). Based on the data captured in the four-month study window, the wave height evolution across the four feature types differed substantially from that at the control transect. Calculated wave transmission coefficients (Kt) for the four features, based on significant wave heights (Hs), were approximately linearly correlated with relative freeboard (Rc/Hs) within the range Rc/Hs $\gtrsim$ -5. The brushwood dam resulted in the lowest wave transmission coefficients for Rc/Hs $\lesssim$ -2 ($0.25 < Kt < 0.75$). In addition, observations from the qualitative monitoring portion of this study provide insights into potential design changes for future NBS projects.
Abstract No.	7	**<u>Will Natural Forcing Factors Limit the Success of the Living Dyke at Boundary Bay?</u>** Modelling the effectiveness of nature-based solutions towards dissipating wave energies requires high quality measured field data for calibration and validation, since models often cannot pick up nuanced features of the nearshore areas of interest. Even more importantly, field scientists can make observations that are not yet incorporated in modelling packages, such as interpretation of the role of fine scale geomorphologies, effects of large flotsam, seasonality of growth and effects of biology on the sediment supply, effects of snow and other weather events, and precise local knowledge provided by community members about processes and issues. Since 2020, the Geological Survey of Canada/Natural Resources Canada has been conducting fieldwork in several areas of Canada being considered for Nature Based coastal protection. This talk focusses on the field observations made in Boundary Bay, BC. Wave energy dissipation as well as natural sediment transport patterns have been observed for the entire Bay, and measurements of wave dissipation have been made at the living dike pilot sites. This talk discusses those data as well as the more observational data (listed above) which are not yet captured by the hydrodynamic models, but which must be incorporated in the planning for a living dyke to succeed. Current field activities are focused on quantifying different modes of sediment transport to and from the area.
Presenters	Gwyn Lintern	
Authors	Gwyn Lintern; Michelle Côté; Phil Hill; Braydon Foster; Delaney Benoit, Pauline Martens; Enda Murphy; John Readshaw	
Abstract No.	8	**<u>Sturgeon Bank Sediment Enhancement Pilot Project Case Study – Year 2 Project Updates</u>** The Fraser River Delta comprises extensive tidal flats and brackish marshes that formed at the mouth of the Fraser River where river discharge historically deposited fine-grained sediments. Since the 1980s at least 160 hectares of low elevation brackish tidal marsh has died off across the foreshore of Sturgeon Bank in Richmond, BC. While several contributing factors have been identified in the
Presenters	Eric Balke	
Authors	Eric Balke; Derek Ray; Grant Lamont; Neville Berard; Mika Davis;	

Abstract Details		Abstract
	Gary Williams; James Rourke	marsh recession, human interventions have altered natural physical processes by limiting sediment transport and deposition, resulting in a sediment deficit, the net loss of tidal elevation at the marsh leading edge, and associated marsh recession. The Sturgeon Bank Sediment Enhancement Pilot Project explores an innovative approach to sediment nourishment and restoration of the receded Sturgeon Bank tidal marsh by redirecting dredged sediment destined for disposal-at-sea. Pilot project objectives are to (i) Demonstrate the response of the Sturgeon Bank foreshore to sediment deposition, with the aim of (a) restoring the receded marsh by increasing the elevation along the leading edge and (b) facilitating resilience against sea-level rise for both the marsh and the City of Richmond, and (ii) Determine cost effective and innovative methods to mimic natural sediment delivery and retention at Sturgeon Bank, via adaptive management, which may then inform full-scale restoration efforts. This presentation builds off the special session from the June 2023 Coastal Zone Canada conference, which detailed the realization of the marsh recession, through conceptual design, to the initial Year 1 implementation – and instead provides an update on the Year 2 sediment addition for the project, which was conducted in February 2024. The presentation will focus on the Year 2 implementation work, including a summary of sourcing of sediment and contractor coordination, Year 2 construction methodology, and post-construction follow-up monitoring results, as well as lessons learned throughout and plans for Year 3 sediment addition.
Abstract No.	9	**Piloting Process-based Marsh Creation Approaches in the Fraser River Estuary** Tidal marshes have been constructed in the Fraser River Estuary for over 40 years. Nearly all projects to date have been motivated by the need to compensate, bank, or offset habitat, as mandated by Fisheries and Oceans Canada (DFO) policy. Within this context tidal marsh creation designs have primarily been driven by project certainty, not experimentation and innovation. Funded by the BC Salmon Restoration and Innovation Fund, our multidisciplinary team aims to innovate and advance tidal marsh creation methods in the Fraser River estuary through a Process-based Marsh Establishment Pilot Project (ProMEPP). Through ProMEPP we aim to deviate from conventional hard engineering designs and tap into and accelerate natural accretion processes as a means of creating new marshes in the estuary. This presentation will describe some of the methods being developed for this project as it nears implementation in 2025-2026.
Presenters	Daniel Stewart	
Authors	Daniel Stewart; Eric Balke; Tara Martin	
Session 3: NbCS Case Studies in Action		
Abstract No.	10	**Esquimalt Gorge Park: a Case Study in NbS and Collaboration** The Gorge Waterway is a crucial ecosystem in the heart of Victoria, but it has been heavily modified by shoreline hardening, docks, and development. Esquimalt Gorge Park, located in the Township of Esquimalt, is a gem of parkland with a long history of human uses. Using nature-based solutions, this Green Shores demonstration project will remove hardened estuarine shorelines, address erosion, improve the health of local ecosystems, and integrate the restoration with opportunities for people to experience nature and interact with this important habitat. It also ties into adjacent restoration efforts, bringing cumulative improvements for aquatic and terrestrial species.
Presenters	DG Blair; Megan Turnock	
Authors	DG Blair; Megan Turnock	

Abstract Details		Abstract
		The project is a shining example of collaboration, drawing on the expertise, resources, and energy of multiple partners including Township of Esquimalt, Capital Regional District, Stewardship Centre for BC (SCBC), Coastal Collaborative Sciences (CSS), and Pacific Salmon Foundation (PSF), as well as a consulting team with LEES+Associates (Landscape Architecture), Golder/WSP (Coastal Geomorphology), and D. R. Clough Consulting (Biology). Through these partnerships, the project has navigated the regulatory process at the federal, provincial and local levels and through consultation with First Nations. A significant factor enabling this collaboration was the use of the Green Shores Credit and Rating System to align the project partners, guide the project goals, and communicate with regulatory agencies. Construction is now anticipated for this fall (2024) and the project has applied to be certified through the Green Shores for Shoreline Development program of the Stewardship Centre for BC and anticipates rating Gold (highest rating). Led by the Stewardship Centre for BC, the project team used a milestone approach to implementation over a three-year period that included: a Feasibility Study; a Design Workshop with stakeholders and consultants; and a Technical Advisory Committee comprised of representatives from local and regional government, conservation organizations, Fisheries and Oceans Canada, and technical experts and consultants. Technical Advisory Committee meetings held on a regular basis kept the project on track, even with some challenging circumstances thrown in. Demonstration projects led by municipalities and local governments are a critical toehold in generating momentum toward a more resilient approach to coastal zone management and restoration. This case study will provide insights into the process and strategies for nature-based solution implementation, collaboration, funding, and project implementation with the intention of supporting others in their efforts.
Abstract No.	11	**From Peak to Pelagic: Adapting with Coastal Climate Change through Eco-cultural Restoration** As coastlines continue to change, learning to adapt with the change becomes an important skill for coastal adaptation practitioners. The change is happening quickly, so we need strategies that both help us understand the change and mitigate the effects of this change simultaneously. Tsleil-waututh Nation in North Vancouver, BC is testing small-scale eco-cultural pilots rooted in Indigenous Technologies and Science that help ask the question: How can coastal adaptation strategies benefit both the humans and non-humans being affected but sea level rise and climate change? These pilots look at the landscapes holistically with the intent of starting small but scaling up as we learn more about the needs of the ecosystem in which the pilots are implemented. The pilots help create a framework that informs future mitigation and restoration works. These strategies function as a step towards respectful adaptation, stewardship, and resilience to ensure healthy eco-cultural landscapes are around for generations to come.
Presenters	Benji Eisenberg	
Authors	Benji Eisenberg	
Abstract No.	12	**San Diego Coastal Resilience Master Planning: NbS across the City's Coastline**

Abstract Details		Abstract
Presenters	Jason Gyokery	Climate change increasingly puts our communities, critical infrastructure, and natural resources at risk of coastal flooding and erosion due to sea level rise. To address these risks, the City of San Diego is developing a Coastal Resilience Master Plan which will identify specific resilience and conservation needs along the coastline and develop a portfolio of nature-based solution projects to promote resilience, protect critical habitats, support coastal access, and mitigates risks associated with sea level rise. Nature-based solutions evaluated by the plan include a wide range of built or engineered solutions that can provide community benefits, such as stormwater management, flood mitigation, and urban heat island reduction.
Authors	Jason Gyokery	

Workshop 2: Eco-cultural Marsh Restoration as NbCS in Salish Sea Estuaries		
Abstract No.	13	**<u>Eco-cultural Marsh Restoration as NbCS in Salish Sea Estuaries</u>** Estuarine tidal marshes are biodiversity hotspots that provide critical habitat for many species, efficiently sequester carbon, and support shoreline resiliency to climate change impacts such as coastal flooding. The protection, restoration, and stewardship of these habitats are important nature-based climate solutions that support various ecological, socioeconomic, and cultural values. In the Salish Sea of southwestern British Columbia, hyperabundant resident Canada Geese (Branta canadensis, 'CAGO'), introduced to Vancouver Island and the Lower Mainland in the late 1960s and 1970s, are degrading estuaries. CAGO herbivory (grazing and grubbing) of marsh vegetation removes aboveground (leaves and stems) and belowground plant components (roots and rhizomes), resulting in erosion, soil compaction, and decreased vegetation growth and productivity. Together these grazing effects result in a loss of habitat and ecosystem services, including carbon storage. Since 2010, Guardians of our Salish Estuaries (GooSE) has been installing habitat exclosures to prevent CAGO herbivory and promote ecological restoration. CAGO damage is typically highest in marsh communities dominated by Lyngbye's sedge (Carex lyngbyei), a foundational species critical for juvenile salmonids and the estuarine food web, with various additional ecosystem services (e.g. carbon storage, shoreline stability). Restoring these areas is achieved passively through natural expansion of protected vegetation and actively by transplanting sedge within areas degraded by CAGO. These components make up the GooSE eco-cultural restoration method, which is inspired by Indigenous fish trap designs and uses thin flexible branches (e.g. willow) interwoven between vertical alder wood poles, all of which are sustainably sourced. Eco-cultural restoration is a nature-based climate solution that has been implemented in over 60,000 m2 of marsh habitat in 8 Vancouver Island estuaries, with benefits for nature and the climate. In multiple estuaries, restoration efforts are being deployed by Indigenous communities that want to actively restore critical salmon habitat and manage these productive areas within their territories, often adjacent to reserve lands. The implementation and success of eco-cultural restoration depends on various factors including environmental conditions (e.g. elevation, salinity), seasonal variation in CAGO herbivory, fence maintenance, Carex transplant stock (nursery or local donor), and overall fencing design. The potential climate benefits of this restoration approach are being assessed by measuring the carbon stocks and accumulation rates at sites across estuaries at different stages of recovery. In this
Presenters	Dominic Janus; Tim Clermont; Marianne Fish; Darwyn Moffat-Mallet; Sarina Clay-Smith	
Authors	Dominic Janus; Tim Clermont; Marianne Fish; Darwyn Moffat-Mallet; Jacklyn Barrs	

Abstract Details		Abstract
		workshop, we will explore various aspects of this collaborative and innovative eco-cultural restoration program, including methods, effectiveness monitoring, adaptive management, implications for carbon sequestration, and lessons learned.
Workshop 3: Regulatory challenges and Opportunities for NbCS		
Abstract No.	14	**Regulatory Permitting Primer for NbCS Projects** Navigating regulatory processes, permitting, and municipal/regional construction/design guidelines can be a barrier to implementing NbCS projects, specifically without allowances for pure restoration or shoreline protection projects. This talk is designed to be part of a broader special session that focuses on case studies which highlight regulatory considerations and lessons learned during design and implementation of a variety of recent coastal Pacific projects. The talk will start with a primer, providing a high level overview of regulatory considerations, permitting, and design limitations for coastal NbS projects, including BC Environmental Assessment Office, DFO Fisheries Act, Transport Canada Canadian Navigable Waters Act, and Environment Canada Disposal at Sea/Beneficial reuse. Then use the Sturgeon Bank Sediment Enhancement Pilot Study to outline limitations and considerations.
Presenters	Mika Davis	
Authors	Mika Davis	
Abstract No.	15	**Regulatory Challenges to Restoration and Nature-based Coastal Projects** There is a desire for coastal projects to incorporate more nature-based approaches to design, with an emphasis on habitat restoration and climate change adaptation. However, proponents and practitioners face regulatory hurdles since existing legislation is based on more traditional construction methods and impacts. Restoration projects that are built to compensate for the loss of habitat due to a primary project have a clear permitting framework (e.g., Fisheries and Oceans Canada Fisheries Act Authorization) using methods such as habitat equivalency calculations. For restoration and nature-based projects that are not linked to another project, the regulatory landscape is unclear. How can legislation, policy and guidance be framed to help rather than hinder and encourage nature-based and restoration projects, other than through offsetting? Permitting approaches for Fisheries and Oceans Canada, Vancouver Fraser Port Authority, and BC Environmental Assessment Office will be discussed within the context of recent Hatfield projects.
Presenters	Becca Kordas	
Authors	Becca Kordas	
Abstract No.	16	**DFO Regulatory Framework to Restoration Projects** The Fish and Fish Habitat Protection Program (FFHPP) of Fisheries and Oceans Canada (DFO) helps conserve and protect fisheries and aquatic ecosystems through administration of the fish and fish habitat protection provisions of the Fisheries Act. FFHPP also administers the relevant provisions of the Species at Risk Act for listed aquatic species. This presentation will provide an overview of FFHPP and our project review process including when and how to submit a project for review, with an emphasis on shoreline restoration and protection projects. FFHPP's review process will be discussed along with some project planning and design considerations for shoreline restoration/protection projects based on our experiences with a variety of projects.
Presenters	Andrew McInnis	
Authors	Andrew McInnis	

Abstract Details		Abstract
Session 4: Innovative Tools for NbCS		
Abstract No.	17	**Resilient Coasts for Salmon: Supporting Coastal Resilience with Shoreline Mapping** Through the Resilient Coasts for Salmon project, the Pacific Salmon Foundation (PSF) is empowering the communities of eastern Vancouver Island with the data to make informed management and planning decisions related to coastal climate change adaptation. The Resilient Coasts team has been creating a spatial coastal modification dataset, which shows the extent of hardened infrastructure such as seawalls, overwater structures like personal docks and marinas, and areas of log accumulations from forestry waste on the shore. We are interested in tracking these features as they all have impacts to Pacific salmon migration and feeding patterns, as well as to habitats that salmon and other creatures of the coastal food web rely upon. To support local governments of coastal communities in moving towards nature-forward adaptation to sea level rise, these data will be made publicly available through the Strait of Georgia Marine Reference Guide (sogdatacentre.ca/sogmrg). Summary reports will also be made for communities to share our findings and key take-aways, as well as analyses related to important coastal factors such as sensitivity to sea level rise, wave exposure, projected floodplains, and forage fish habitat. These data and analyses can be used to identify potential locations for potential restoration. Join us to learn more about the creation of these data, and how they can help communities understand the interactions between coastal modification and impacts of climate change, and better tackle cascading impacts to Pacific salmon and the coastal food web.
Presenters	Kyla Sheehan	
Authors	Maria Catanzaro; Nicole Christiansen; Isobel Pearsall; Kyla Sheehan	
Abstract No.	18	**Seeing through Satellites, Stories and Streets: Addressing Data Scarcity to Contextualize NbS in the City** Coastal cities in the Global South face growing ecological disruption due to unplanned urbanization. Nature-based solutions (NBS) are increasingly seen as vital for addressing climate, biodiversity, and societal challenges. However, the spatial assessment and planning of NBS is criticized for overlooking unequal climate risks and adaptation resources as well as their translation for local social and ecological conditions, especially in the Global South where implementation relies heavily on global funding and external knowledge and expertise. This presentation addresses the data scarcity challenges faced by emerging cities in the Global South, characterized by lower institutional capacity and technical limitations due to the concentration of national resources in capital cities, potentially impeding the effective deployment of NBS as a complex siting challenge. The presentation underscores the challenges in climate vulnerability assessments and NBS planning due to deliberate data misrepresentation, incomplete municipal records, and limited data sharing among municipal departments, with a focus on understanding data scarcity in informal settlements where climate change and biodiversity vulnerabilities are heightened. It highlights how informal settlers and the spaces they inhabit often co-render them as 'data black spots', impeding integration into in top-down policy instruments used for NBS interventions, and
Presenters	Ana Polgar	
Authors	Ana Polgar	

Abstract Details		Abstract
		examines reasons for data misrepresentation including political considerations, economic pressures, social stability, and administrative accountability. Case studies from India, Indonesia, Brazil, Kenya, Peru, South Africa and Uganda reveal sources of data scarcity such as limited government capacity, cost barriers, external data collection hurdles, classified databases, dependence on private sector, and technical limitations within local institutions. The research proposes a methodological framework that integrates machine learning-enhanced open earth observation data with street-level observations and qualitative spatial data. This approach aims to enhance ground-truthing and accountability, providing a better contextualization for NBS interventions. It emphasizes PPGIS as a means to address both data gaps and socio-spatial inequality, giving due attention to informal settlements to prevent maladaptation through NBS, while being wary of the ethical considerations of community-based spatial data collection. It advocates for a combination of capacity-building initiatives, financial support, policy reforms, international collaboration, advocacy for improved data accessibility. The proposed strategies also include efforts to enhance transparency and collaboration between governments and external data providers, fostering a data ecosystem conducive to more inclusive, informed, and ethically responsible NBS planning for integrated climate change adaptation and biodiversity enhancement. The presentation aims to guide practitioners and researchers in leveraging geospatial information responsibly in data-scarce environments for effective deployment of NBS that suits the local social and ecological context.
Abstract No.	19	**Advancing NbCS with DHI's Coastal Mapper – Marine Habitats** Well-functioning coastal marine environments provide essential services, including habitats for marine life, support for fisheries, recreational opportunities, biodiversity preservation, and climate change resilience. Marine habitat also serve as core components to many nature-based coastal solutions (NbCS). However, marine environments are under significant pressure from human activities and climate change, resulting in habitat degradation and a consequent decline in ecosystem services. This increases risks for coastal communities, which face heightened threats from flooding, erosion, and loss of livelihoods. To address these challenges, and improve the uptake and performance of NbCS, there is an urgent need for innovative monitoring and management solutions that offer reliable, scalable, and systematic data to support effective decision-making for habitat restoration and coastal risk mitigation. In this context, we will present DHI's Coastal Mapper – Marine Habitats, an advanced earth observation tool designed to meet these needs. Coastal Mapper utilizes cutting-edge satellite technology, AI, and human-assisted machine learning to map and monitor marine habitats. This user-friendly, cloud-based platform empowers coastal professionals, researchers, and decision-makers with real-time insights into coastal habitat conditions. The tool combines multitemporal satellite imagery with sophisticated algorithms to deliver accurate, scalable, and flexible monitoring solutions, even in remote or inaccessible areas, without the need for permits or environmental disruption.
Presenters	Meven Huiban	
Authors	Meven Huiban; Mads Christensen	

Abstract Details		Abstract
		Our presentation will demonstrate how Coastal Mapper systematically maps and monitors submerged aquatic vegetation (SAV) and other marine habitats, aiding in the assessment of ecosystem health, identification of areas for protection or restoration, identification of project areas requiring maintenance or adaptive management, and compliance with environmental regulations. We will showcase the platform's capabilities in providing continuous monitoring and informing adaptive management, cost-effective management of large marine areas, and its role in enhancing marine planning, habitat management, aquaculture, and regulatory adherence. We will also discuss the broader applications of using Coastal Mapper for natural and nature-based climate change mitigation and adaptation, highlighting how these habitats act as natural defenses against erosion and storm-induced flooding, improve water quality by filtering pollutants, and sequester carbon. Join us to explore how Coastal Mapper – Marine Habitats can transform the monitoring and management of coastal ecosystems, ensuring their health and resilience for future generations. This presentation will provide an in-depth look at the tool's functionalities, practical applications, and the significant impact it can have on the sustainable stewardship of coastal environments.
Session 5: NbCS Case Studies - Sediment Based Projects		
Abstract No.	20	**<u>Progress on the Design of a Dynamic Revetment at Tsulquate, BC</u>** Like many BC coastal communities, the Gwa'sala-'Nakwaxda'xw Nations (GNN) are preparing for projected impacts of climate change and sea level rise. Their Tsulquate 4 Reserve, just north of Port Hardy is located at the mouth of the Tsulquate River. Much of the existing housing and infrastructure, which was developed during the 1960s and 70s, is currently exposed to both river and coastal flood hazard. That flood hazard is projected to become more severe with climate change and sea level rise. Further, continued erosion of Tsulquate Beach has put ten homes directly in the ocean's path. The GNN are taking concrete steps to address these risks in a project that will involve retreat from at-risk homes, installation of a river dike along the northern bank of the Tsulquate, and installation of a dynamic revetment along Tsulquate Beach. A dynamic revetment, also known as a cobble berm, attempts to mimic the wave dissipation properties of a natural cobble storm beach. The cobbles are free to move and rearrange themselves in response to wave action but are resistant to erosion and net transport. This approach was selected for its potential to reduce wave runup, the ease of public access to the beach, and the natural appearance of the structure. This presentation will focus on the ongoing design of the dynamic revetment for GNN. The design is based on foundational guidance documents developed in the 80's and 90's through empirical research. The key design parameters were the volume, size, and gradation of the placed cobble sediment. Important additional considerations included how to accommodate the need for additional sediment due to loss, and due to rising sea levels. The foundational guidance was supplemented with learnings from more recent research and case studies. State of the art computational modelling was used to address knowledge gaps, and to
Presenters	Clayton Hiles	
Authors	Clayton Hiles; Eric Morris; Evan Elder; Rachel Burns	

Abstract Details		Abstract
		further refine the design. It is expected that scale testing of the dynamic revetment design will be carried out in September at the National Research Council Large Wave Flume, and that this presentation will include a summary of the results.
Abstract No.	21	**Birch Bay – The Puget Sound Region's Largest Gravel Beach Nourishment/Restoration Project** Birch Bay is a large bay 7 km south of the US-Canada mainland border within Whatcom County, WA. The Birch Bay beach has extensive development and a previously degraded beach system. Development over the beach and backshore, including a county road, groins and shore armor, past major gravel mining by the Air Force during the Cold War, and a system wide reduction in sediment supply had resulted in increased storm damage to Birch Bay Drive and the built environment, and loss of nearshore beach and backshore habitats. The degraded and lowered beach resulted in frequent winter storm damage and coastal flooding. Pre-project forage fish spawning was very limited. An initial gravel beach nourishment concept was created for the more developed portions of the bay by Wolf Bauer in 1975. A pilot gravel beach nourishment project was built in 1986 which was monitored and renourished and proved to be successful. Decades of planning and project development work led to the 2014 to 2019 design, right of way acquisition, permitting, and construction. The 1.6-mile-long beach nourishment project was constructed in 2020-2021 consisting of 81,000 cubic meters of imported gravel and sand, a wide pedestrian trail, stormwater infiltration, backshore vegetation, and amenities such as crosswalks, benches, and refurbished parking. The "Birch Bay Berm" is the largest beach nourishment endeavor in the greater Puget Sound region. The $15.3 million project occurred through many years of engagement between Whatcom County Public Works and community organizations, which was expanded during the design process. Steps included community meetings, feasibility studies, coordination with the Lummi and Nooksack Tribes, agencies, and homeowners' associations, and pursuing grants. These efforts resulted in substantial transportation related funding, permit acquisition, on- and off-site mitigation, and required post project monitoring. The talk will cover the purposes of the project, challenges, methodology, and current status. This will encompass coastal geomorphological and modeling studies, design specifics, implementation processes, and quantitative monitoring findings up through year 4, highlighting adjustments in beach morphology and profile with minor onshore gravel transport. An adaptive management framework was put in place for the nourished beach but has not been needed to date. Key insights and lessons learned from the project will be shared.
Presenters	Jim Johannessen	
Authors	Jim Johannessen; Avery Maverick	
Abstract No.	22	**RE:BEACH - Unsticking Oceanside's Sediment Challenge** For over five decades, the City of Oceanside has grappled with the challenge of maintaining its sandy shoreline. Despite annual beneficial reuse of dredged material from Oceanside Harbor, chronic coastal erosion remains a pressing issue. In response, the City initiated an independent study in 2021, led by GHD, to explore opportunities for beach restoration.
Presenters	Daniel Dedina	
Authors	Nick Sadrpour; Daniel Dedina; Brian Leslie	

Abstract Details		Abstract
		The study examined local, regional, and international project examples, resulting in five alternatives to address long-term shoreline erosion sustainably and cost-effectively. The recommended approach involved a pilot-scale groin concept, which underwent feasibility assessments, numerical modeling, economic evaluations, and multi-criteria analysis. However, concerns arose by stakeholders, residents, and neighboring cities about potential erosional impacts on downcoast beaches. Enter Phase 2: the RE:BEACH design competition. Building upon technical data and community input, three international teams developed innovative sand retention interventions attempting to incorporate nature-based strategies where feasible. The winning design, endorsed by the Oceanside City Council, combines an artificial reef and two headlands. RE:BEACH Oceanside demonstrates how collaboration, public engagement, and determination can make a difference in preserving sandy coastlines. Join us to hear how RE:BEACH Oceanside has cobbled together a strategy, to sieve through the grainy challenge of sediment retention through community science, regional engagement, public workshops, a jury of experts, and a little grit to make some movement on sand sticking around.
Abstract No.	23	**<u>Lessons Learned from the Implementation and Monitoring of Nature-based Design Solutions in Southern California</u>** After years of vulnerability and adaptation planning, California started aggressively funding innovative, nature-based solutions to serve as important pilot projects for the state. Several of these projects have now been monitored for several years offering lessons learned for others considering these soft forms of shoreline stabilization. This presentation will highlight key takeaways from GHD's experience in the design, construction, monitoring and adaptive management of two nature based shoreline stabilization solutions.
Presenters	Brian Leslie	
Authors	Brian Leslie	
Workshop 4: Comparison of NbCS in Canada and the United States - A Collaborative Presentation and Discussion		
Abstract No.	24	**<u>Comparison of NbCS in Canada and the United States</u>** BCE and DHI (the team) jointly present a collaborative, knowledge-sharing based 60-minute workshop discussing the similarities and differences between nature-based solutions (NbS) in Canada vs the United States (USA). Although the two countries have similar goals of increasing NbS projects, key differences exist in their definition, regulatory environment and subsequent implementation. The team will describe similar case studies in Canada and the USA, and each firm's unique experience within these environments, to facilitate discussion on techniques considered, regulatory challenges and/or design challenges, and general lessons learned. The session aims to include significant contributing dialogue from the conference audience. Specific topics for this comparative discussion may include: • Partial vs. Full Process-Based Restoration – partial restoration that retains some stressors to the environment (i.e. some hard armor) compared to full restoration that removes all stressors:. • NbS – How do the two countries define NbS? How does this definition affect
Presenters	Veronique Bourgault; Morgan Tidd; Jessica Cote; Jessica Wilson; Grant Lamont	
Authors	Veronique Bourgault; Morgan Tidd; Jessica Cote; Jessica Wilson; Grant Lamont	

Abstract Details		Abstract
		permitting and execution of these types of projects? • Hybrid Solutions – how are hybrid solutions defined? How are they viewed by regulatory and funding agencies? • Design Life vs Least Impactful Alternative – what are attitudes around this in the two countries? How do we communicate this to shareholders? What permits or regulations are in place to hinder or support these? • Large Wood – how are the attitudes, and use of large wood, different? • Habitat Restoration –What are the attitudes and regulations around habitat restoration as offsets? • Biological Monitoring – permitting and funding for monitoring, what are different measures of success used, what are the timelines for determining success of a NbS? • Greenshores vs Shorefriendly – importance of space when implementing NbS, how to work with individual homeowners when neighbors are uncooperative, how to increase community outreach.
Session 6: NbCS Case Studies - Approaches with Co-benefits		
Abstract No.	25	**Decolonizing Planting; What is a Weed? Climate Change, Resiliency and Native Plantings** The City of Vancouver has been working with local Coast Salish ethnobotanist Cease Wyss to look at integrating ways of utilising native plants in improving the outcomes of nature-based solutions like city rain gardens, among ever-increasing challenges of climate change and water management on the coast. This work has lead to looking at what plants are valued culturally and what plants are not, despite the roles they play in supporting local ecological systems and plant relationships. This workshop looks at the questions arising in implementing a decolonial approach to developing living systems that help us manage stormwater.
Presenters	Chelsey Schmidtke	
Authors	Julie McManus; Chelsey Schmidtke	
Abstract No.	26	**Upstream NbS for Downstream Ecosystem Health** Join us as a representative from the City of Vancouver explains the evolution of it's rain gardens, nature-based stormwater management solutions, and how they have demonstrated effective mediation of harmful chemicals to salmon bearing waters; capturing toxic chemicals at the source before they enter local water streams. A recent study conducted with researchers from the University of British Columbia has shown that these green infrastructure systems demonstrate effectiveness particularly to chemical 6PPD-quinone; created from tires interacting with the atmosphere. Once created, 6PPD-quinone enters rivers and streams when rain runs off roads into waterways. The chemical is lethally toxic to key species like coho salmon and rainbow trout at high concentrations, with the ability to kill fish following exposures lasting only a few hours (US EPA, 6PPD-quinone). Using a computer model to extrapolate the study results shows that rain gardens would prevent more than 90 per cent of the chemical from directly entering salmon-bearing streams in an average year. This demonstrates the efficacy of utilising upstream green infrastructure like rain gardens to safeguard the health of downstream coastal ecosystems.
Presenters	Julie McManus	
Authors	Julie McManus	

Abstract Details		Abstract
Abstract No.	27	Collaborative Exploration of Novel Bull Kelp (Nereocystis luetkeana) Restoration Techniques in an Urban Ecosystem Conserving critical near-shore habitat complexes is a priority action within the Burrard Inlet Action Plan, and the səl̓ilw̓ətaʔɬ (Tsleil-Waututh) Nation is addressing declines in q̓aṁ (kelp) within their territory by co-leading a 2.5-year pilot project with the Kelp Rescue Initiative to tailor bull kelp (Nereocystis luetkeana) restoration methodologies to səl̓ilw̓ət (Burrard Inlet and Indian Arm). The goal of this project is to provide techniques that can be used to re-establish bull kelp populations within a heavily urbanized environment to promote healthy coastal ecosystems that provide cultural and ecological benefits such as providing habitat for traditionally harvested food sources and protecting against shoreline erosion. The field season in 2023 characterized abiotic and biotic conditions at reference sites, compared these conditions to three identified restoration sites (Nine O'clock Gun, Crab Park, and New Brighton Park) to determine their viability for larger-scale restoration, and trialled the green gravel (kelp-seeded gravel) and kelp-seeded tile restoration methods. The restoration trial involved outplanting two green gravel sizes (2 to 3 cm and 3.5 to 5 cm) and kelp-seeded ceramic tiles (7.5 cm x 7.5 cm) epoxied to natural substrate. From the site characterizations, it was concluded New Brighton Park has sufficiently large substrate to be a restoration site, and a depth of -1 m to -2.5 m relative to chart datum should be targeted for outplanting in future years. The restoration trials saw limited success past April; however, lessons learned suggest outplanting larger kelp-seeded rocks and attaching kelp-seeded tiles to larger substrate could increase restoration success. The research methods and questions were refined for 2024, and treatments were altered to include kelp-seeded large gravel (4.5 to 6.4 cm), small cobble (6.5 to 9 cm), medium cobble (9.1 to 12.7 cm), and ceramic tiles bolted to concrete blocks at two restoration sites (New Brighton and Whey-ah-Wichen). Preliminary results from the 2024 field season suggest that the medium cobble and ceramic tiles bolted to concrete blocks treatments had higher outplant survival than the small cobble and large gravel treatments. Notably, bull kelp outplants at both sites reached the surface and produced sori (reproductive tissue) creating canopy-forming habitat and providing the possibility of bull kelp recruitment at these sites in subsequent years. This Indigenous-led restoration project hopes these efforts can supply the tools, knowledge, and stakeholder engagement needed to accelerate the conservation and restoration of bull kelp forests in Burrard Inlet waters to support climate-ecosystem co-benefits.
Presenters	Camryn Good; Lindsey Ogston	
Authors	Camryn Good; Cora Den Hartigh; Jasmin Schuster; Lindsey Ogston	
Abstract No.	28	**Blue Carbon Canada** In temperate coastal oceans, blue carbon ecosystems (salt marshes, eelgrass meadows; potentially kelp forests) sequester significant amounts of carbon from the atmosphere and ocean and store it in biomass and sediments. Marine soft sediment habitats are also important carbon reservoirs. There is increasing recognition of the role that oceans can play in climate change
Presenters	Julia Baum	
Authors	Julia Baum	

Abstract Details		Abstract
		mitigation, including through blue carbon. Yet, in Canada, the country with the world's longest coastline, uncertainty about ocean carbon reservoirs has hindered inclusion of these resources in our climate solutions portfolio, and prevented rightsholders and resource managers from considering these benefits in decision-making processes. Blue Carbon Canada is an NSERC-supported research program working to advance scientific understanding of the capacity for Canada's oceans to serve as natural climate solutions. In partnership with provincial and federal government, academic and non-profit collaborators we aim to: 1) Quantify the current national carbon storage potential of Canada's blue carbon ecosystems, salt marsh and eelgrass meadows, and critically appraise this capacity for kelp forests ecosystems; 2) Project how climate change, in concert with user-designed shoreline development and habitat protection scenarios, are likely to alter these carbon stores out to 2050; 3) Evaluate the carbon sink potential of marine soft sediments under different protection scenarios; and 4) Mobilize this new knowledge to inform Canadian ocean policy, protected area management, climate change mitigation accounting, and climate action in federal and regional governments. This talk presents an overview of this research program, including progress and challenges encountered in its first two years, and our efforts to mobilize this new knowledge.
Session 7: NbCS Case Studies - Local Sites		
Abstract No.	29	**Colquitz Park: Applying Green Shores Principles in an Estuarine Environment in Southern Vancouver Island** Colquitz Park lies on the left bank of the Colquitz River which discharges into a shallow basin (Portage Inlet) in Saanich, BC. The shoreline has experienced significant erosion and loss of riparian habitat due to encroachment of residential areas and regular mowing. The District of Saanich desired that the park be restored using nature-based solutions, whilst aiming for Green Shores for Shoreline Development (GSSD) accreditation. Objectives included to stabilize the shoreline, improve the riparian habitat, identify climate-related risks and solutions, and provide guidance to recreational activities. Recognizing that riverine flows in the urbanized Colquitz River would play a significant role in erosion processes, our project team, led by Associated Engineering with support from DHI, focussed on modelling this channel. We conducted a frequency analysis on available flow data and adjusted these values for an assumed return period based on an analysis of projected climate change effects. We then developed a HEC-RAS 2D model of the channel and the basin considering various tidally-influenced boundary cond The modelled results were used to develop several restoration concepts for review by the client. These concepts incorporated specific nature-based solutions intended to embody green shores principles, with the goal of gold level certification. Techniques implemented include strategic vegetation selection and
Presenters	Eric Finney	
Authors	Eric Finney	

Abstract Details		Abstract
		placement, redesigning existing storm outfalls to include more natural features, main channel regrading, restraining public access to designated areas, and inclusion of limited erosion protection through adding channel roughness. The hydraulic model also represents a value-added feature of the project which can serve as a backbone for future flood mapping for the client. Implementation of the design will hopefully occur in the summer of 2025, with final assessment of Green Shore certification occurring shortly thereafter.
Abstract No.	30	**Developing Nature-based Design Alternatives to Conventional Seawalls in False Creek, BC** The City of Vancouver is planning to pilot a new type of shoreline design at Coopers' Park, utilizing nature-based approaches and referencing the work developed as part of the 2022 Sea2City Design Challenge. The Coopers' Park Foreshore Restoration Project leverages the Coopers' Park renewal and Cambie Bridge seismic upgrade projects, which will be completed in tandem with the foreshore restoration works. The objectives of the Project are to enhance shoreline habitat, increase flood protection, and improve the amenity value for the public visiting Coopers' Park. Design development for the Project is currently underway, with construction planned for 2025. The existing seawall pathway will be shifted inland to accommodate a series of shoreline terraces at different elevations to expand the intertidal and backshore area. The terraces will be designed to anticipate eventual flooding and upward migration of shoreline habitats with sea level rise. The design incorporates a variety of habitat features to naturalize the shoreline and increase ecological, aesthetic, and cultural value. The elevation of the seawall path will also be raised to mitigate the impacts of seasonal flooding. This Project will be used to pilot different design elements to inform the City's future design strategies for other areas of False Creek. Our presentation will highlight design alternatives to conventional seawalls and discuss the unique challenges and design constraints of implementing nature-based solutions in a heavily urbanized environment.
Presenters	Megan Vaughan; Kait McGeary	
Authors	Megan Vaughan; Kait McGeary; Becca Kordas; Kait McGeary; Katya Yushmanova; Daniel Leonard	
Abstract No.	31	**Working Towards Long Term Nature-based Shoreline Restoration at Whey-ah-Wichen (Cates Park), BC** Long-term foreshore and bluff erosion at Whey-ah-Wichen or Cates Park is a growing concern for both Tsleil-Waututh Nation and the District of North Vancouver as it threatens archeological sites, cultural use and recreation potential of the site. Whey-ah-Wichen is located within Burrard Inlet at the confluence of multidirectional tidal currents and winds, and is exposed to a busy vessel corridor. A Shoreline Restoration Plan for Whey-ah-Wichen is under way to enhance climate change resilience using nature-based solutions, preserve the historical significance, enhance Tsleil-Waututh Nation cultural use, and integrate visitor usage and education. Various shoreline modifications were made previously, including boulder
Presenters	Arthur Denefle; Pauline Martens	
Authors	Pauline Martens; Megan Vaughan; Kate Menzies	

Abstract Details		Abstract
		armouring of the bluff and a beach nourishment at Roche Point. Tsleil-Waututh monitoring of the site has documented continued erosion due to storm waves, high public use and uncontrolled drainage pathways. Impacts of colonial development throughout Burrard Inlet and its catchment area have altered sediment delivery and resulted in ongoing bluff erosion and a sediment starved foreshore. At present, 17% of the shoreline is actively eroding and 25% is vulnerable to future erosion. To address the complex exposure and geometry of the site, a combination of design concepts is being proposed. The concept designs include perched beaches and detached headlands protecting composite (mixed sand and gravel) pocket beaches and foreshore nourishments with dynamic cobble revetments in the backshore. This approach aligns with the natural features, coastal processes and geomorphological context of the site to restore and protect the Whey-ah-Wichen shoreline while providing opportunity to enhance both habitat and recreation. Our presentation will summarize the site's coastal geomorphology, coastal processes and shoreline ecology, review previous nature-based and traditional shore restoration and protection measures, and summarize the proposed approach to long term nature-based restoration for the site.
Session 8: Capacity Buildings for NbCS		
Abstract No.	32	**An Introduction to the Certified Coastal Professional Program** The Coastal Zone Foundation (CZF) is an American organization with the primary purpose of advancing scientific and related technical and professional knowledge necessary for the management, protection and use of coastal and ocean resources. As part of this goal, the CZF has developed the Certified Coastal Practitioner Credentialing Program (CCP). The CCP program is intended to provide coastal professionals from a range of backgrounds and industries with a baseline level of knowledge spanning the multi-disciplinary nature of coastal projects and coastal zone management. The program "defines the body of knowledge that reflects the best practices for coastal management, offers broad knowledge of the topics covered and complements existing coastal licenses and education programs". This presentation will introduce the audience to the requirements for becoming a Certified Coastal Practitioner and provide some first-hand observations, together with recommendations for adaptations to better suit the Canadian context.
Presenters	Susan Davidson	
Authors	Susan Davidson	
Abstract No.	33	**A Vision for a Transdisciplinary Coastal Systems Engineering Academic Program in BC*** The explosion of interest in nature-based solutions (NBS) research and practice in the last two decades has been driven by the enormous global potential for NBS to contribute to the simultaneous realization of multiple societal goals, including climate mitigation, adaptation, disaster risk reduction, sustainability, and biodiversity. Nowhere is this potential greater than in the world's coastal zones and estuaries, which store enormous quantities of "blue carbon", are home to the majority of the global population, and are experiencing dramatic impacts from climate-driven
Presenters	Enda Murphy	
Authors	Enda Murphy	

Abstract Details		Abstract
		changes including sea-level rise. Despite an increased general awareness of NBS, they remain underutilized, owing in part to challenges with predicting performance in diverse, complex coastal systems.Complex, multi-faceted, dynamic system problems require transdisciplinary innovation, which moves beyond traditional multidisciplinary or interdisciplinary approaches that coordinate input from various knowledge domains; to provide a dedicated space for a more inclusionary, participatory, reflective, and holistic convergence of academic and non-academic viewpoints. A vision is presented for a modern, transdisciplinary coastal systems engineering academic program in British Columbia, underpinned by whole system principles and NBS. Audience input and feedback is sought to frame and guide the development of the program. It is proposed to utilize field monitoring and modelling techniques to gain a deeper understanding of coastal system processes across multiple scales within coastal observatories or "Living Laboratories". These will include real-world coastal systems, and nature-based solutions pilot projects, which will provide focal points for a diverse team of researchers from different disciplines (e.g., engineering, earth, ocean and atmospheric sciences, biological sciences, data sciences, social sciences, architecture, and landscape architecture) to develop integrated systems models, and transformative, nature-inspired engineering solutions to coastal hazard management problems. It is proposed to engage and partner with First Nations to meaningfully co-apply Indigenous knowledge alongside "western" coastal engineering practice (i.e., a "Two-Eyed Seeing" approach), enabling knowledge-sharing, community capacity-building, and co-development of coastal engineering solutions in harmony with nature. It is anticipated that research goals and outcomes will converge toward the development of: •More sophisticated, integrated, multi-scale coastal and estuarine systems models (combining process- and data-driven approaches) capable of predicting multiple and coupled sub-system (e.g., hydrodynamics, bio-geomorphology, habitat suitability, and social) responses to perturbations and interventions over multiple time-scales; •Groundbreaking, nature-inspired solutions to coastal hazard risk management challenges, leading to transformational change in meeting global societal objectives related to coastal climate adaptation, disaster risk reduction, sustainability, climate mitigation, and biodiversity.
Abstract No.	34	**Communication of NbS Designs and Co-benefits at Green Shores® Demonstration Sites***
Presenters	Kelly Loch	
Authors	Kelly Loch	Awareness and understanding of the application of nature-based solutions is critical to their adoption by First Nations and stakeholders that include homeowners, local governments, and non-governmental organizations. Communication about the application of nature-based solutions at three different Green Shores® shoreline restoration demonstration sites on East Coast Vancouver Island incorporated a range of approaches including utilizing baseline surveys, ongoing collaborative work with a project technical team, design workshops for the restoration projects, delivering Green Shores training, and providing outreach

Abstract Details		Abstract
		activities. Communication with the public is an important objective of these projects, as the restoration sites are located within urban settings and in very popular parks that have high visitation and use. Restoration activities are expected to change how the parks will be utilized by the public, for example how shorelines can be accessed. Outreach and engagement is ongoing and includes a number of approaches such as displays at local farmer's markets and the creation of interpretive signage. The application of the Green Shores framework also includes information intended to promote public awareness about the importance of these shoreline ecosystems and the multiple benefits the restoration projects provide for both the environment and community members. Examples of how these methods helped to communicate the benefits and limitations of applying nature-based approaches including feasibility, long-term reliability, and co-benefits at these sites will be shared. Linkages about communication for these Green Shores projects and other initiatives such as salmon habitat restoration and community coastal floodplain mapping implementation will be discussed.
Session 9: NbCS Case Studies - Lesson Learned		
Abstract No.	35	**A Case Study on Design, Permitting, Engagement, and Funding Complexities: Mermaid Creek Marsh Restoration** Since the mid-1900s, Mermaid Creek Salt Marsh has experienced significant erosion, losing over 50% of its area. Peninsula Streams and Shorelines (PSS) – in collaboration with DHI, McElhanney, SeaChange Marine Conservation Society, and the World Wildlife Fund – initiated a project to restore and expand the salt marsh. A hybrid Nature-based Solution (NBS) was developed, aiming to: (1) extend the salt marsh beyond its historical extent, (2) protect against wave erosion, (3) enhance the site's ecological values, (4) sequester blue carbon, (5) preserve or enhance the site's recreational and cultural values, and (6) foster community engagement and capacity building. The design featured an expanded salt marsh near Mermaid Creek outlet and crescent-shaped, low-elevation rock berm structures at strategic points to prevent erosion along the leading edge of the marsh. The project was also originally planned in phases to facilitate adaptive learning and management, and to optimize marsh restoration materials and minimize protective measures. Public engagement and discussions with permitting agencies started early, utilizing various approaches including site walks, public presentations, and booths at public events, alongside responses to public inquiries. The detailed design was completed in spring 2023, with construction anticipated for summer 2023. However, despite predominantly positive public feedback and support from local governments and the W̱SÁNEĆ First Nations, concerns from a select number of local residents and delays in the permitting process have currently stalled the project.
Presenters	Jessica Wilson	
Authors	Jessica Wilson; Kyle Armstrong; Nigel Lindsey; Danker Kolijn; Sarah Cook; Jacklyn Barrs	

Abstract Details		Abstract
		This case study will outline the project's objectives and design, along with insights into the funding, public engagement, and permitting processes. It will also address the conflicting needs and challenges encountered in such projects, providing lessons learned and recommendations for the successful implementation of other small-scale NBS projects.
Abstract No.	36	**Lessons Learned in Three Innovative BC NbCS** This presentation will feature lessons learned across three British Columbia projects featuring innovative nature-based coastal solutions. A high-level overview of each project and a unique lessoned learned with respect to design and implementation of nature-based coastal solutions will be shared for each project. The projects are: (1) Xwu'nekw Park Sea Dike Project (Squamish, BC) •The park is located on the Mamquam Blind Channel and Loggers Lane between Victoria and Main Street. This project involves a shoreline upgrade to provide flood protection for downtown Squamish. The project will feature a new flood protection wall and waterfront walkway. •Waterfront trail improvements included bicycle and pedestrian path, lighting and street furniture. The project will also include the installation of a concrete pier that supports fixed gangways from the dike down to a floating dock on the Mamquam Blind Channel. •The nature-based habitat compensation design included large woody debris, herring spawning nets, expanded intertidal marsh benches, and riparian planting. (2) Beach Grove – City of Delta Seawall Assessment •The Beach Grove Seawall is approximately 1.2 km long, situated between 12 and 17A Avenue along Boundary Bay's western shorefront. The seawall provides essential flood protection for residents that reside in the Beach Grove neighborhood. •As part of the City of Delta's work to increase resiliency to climate change impacts, grant funding from Emergency Management BC's National Disaster Mitigation Program was secured to conduct a condition assessment of the seawall and develop a concept design solution for future upgrades. •AtkinsRéalis completed a detailed structural assessment, geotechnical assessment, and conceptual design development. •The preferred concept design solution for future seawall upgrades included beach fill with the potential of incorporating a living shoreline. (3) Sterling Shipyard Remediation and Habitat Compensation Planning •AtkinsRéalis conducted a supplemental Phase III Environmental Site Assessment (ESA) risk assessment, remedial planning, geotechnical review, habitat assessment and offset conceptual and final design for the former shipyard site which involved infilling of an existing foreshore area in Burrard Inlet within an active area of the Port. •Habitat designs for offsetting serious harm to CRA fish included Ecoconcrete, kelp ropes, and an intertidal reef.
Presenters	Michael Tranmer	
Authors	Michael Tranmer	
Abstract No.	37	**Design for Resilience: Integrating Ecology, Culture, and Community in Coastal Parks and Infrastructure**
Presenters	Sarah Primeau	

Abstract Details		Abstract
Authors	Sarah Primeau; Jeff Cutler	Space2place design, a nationally recognized landscape architecture firm, is leading multiple nature-based coastal solutions projects within coastal and riverfront parks. This session will delve into three projects, showcasing creative and site-specific responses to climate change and sea level rise, aimed at regenerating ecological and social health. The featured projects will include the preliminary design for Iona Beach Regional Park and Iona Island Wastewater Treatment Plant n Richmond, BC; the ongoing development of parks in Vancouver's River District (East Fraser Lands); and the design for a new linear park along the Nicomekl River in South Surrey. These projects integrate ecological resilience, recreational opportunities, public art, education, and Indigenous reconciliation, while addressing the complex hydrological and ecological dynamics of coastal environments. Space2place presenters will share insights into their multidisciplinary design processes, which includes working with scientific researchers to develop and test novel design solutions. The presentation will also explore how space2place is navigating the complex regulatory frameworks of coastal settings. The presentation will also focus on collaboration with diverse stakeholders, the general public, and local Indigenous Nations, and how inclusive participatory practices lead to more successful and resilient solutions. These projects serve as models for integrating community needs with climate adaptation, contributing to the broader discourse on reconciliation in infrastructure projects and public parks. Join us to explore the transformative potential of landscape architecture in fostering sustainable coastal environments and learn how innovative, nature-based design solutions can foster resilient ecosystems and vibrant communities.
Workshop 5: Advancing NbCS through Collabration – Roles and Opportunities for the National Community of Practice		
Abstract No.	38	Nature-based coastal solutions (NbCS) that incorporate an in-depth understanding of natural coastal systems, features and benefits are increasingly being viewed as alternatives to purely structural or "grey" coastal protection including dikes, seawalls, revetments and rock armouring to address the vulnerability of coastal communities and shorelines exposed to flood hazards and erosion. Potential benefits include improvements in biodiversity, water quality, recreational opportunities, cultural values, and contributions to climate change mitigation and adaptation. Despite their benefits, the adoption of NbCS for coastal protection lags behind "grey" alternatives in most countries worldwide, including Canada. Barriers to wider implementation include difficulty in predicting responses to extreme storms, limited understanding of long-term system dynamics, lack of standardized methods and guidance for design, challenges quantifying cost-benefit ratios, weak coordination of coastal governance, challenges navigating access to funding and technical expertise, and lack of information regarding project performance. In 2018, Coastal Zone Canada Association launched a Community of Practice (CoP) to support and steward the effective use of NbCS ideas and principles in the context of a changing climate and across the diversity of Canada's coastline. In
Presenters	Phil Osborne; Neville Berard	
Authors	Phil Osborne; Enda Murphy; Alexandra Forsythe; Joseph Kim; Neville Berard; Jamie Sager; Becca Kordas; Jessica Wilson; Nora Parsa; David Forde	

Abstract Details		Abstract
		2022, the CoP established regional chapters in the Atlantic, Great Lakes, Arctic, and Pacific regions which have been successful in stimulating CoP activity, growth, and impact. This interactive presentation focuses on reviewing progress to date, and evaluating the role and opportunities for the CoP in advancing the understanding needed to overcome challenges with the implementation of NbCS in Canada. It will include a synthesis of feedback from a complementary session hosted at the NbCS and Ecological Restoration Symposium in Halifax in June 2024. The goal of the session is to develop a refined strategic roadmap to guide future action by the CoP and maximize its impact, which may include: • Identifying key national and Pacific initiatives to facilitate knowledge organization, dissemination and transfer; • Facilitating the creation and dissemination of regional resources to enhance the outcomes of regional network (chapter) activities; • Create a network of regional and national practitioners to facilitate capacity building for the identification and application of NbCS principles and implementation; • Determining new or improved ways in which the CoP can contribute to addressing identified barriers and knowledge gaps; • Defining the potential role of the CoP in advocacy and influencing policy.
Note: Session presentations marked with and asterisk (*) are rapid format (3 minutes presentation and 2 minutes for questions).		

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