CLIMATE CHANGE ADAPTATION AND NATURE-BASED SOLUTIONS IN THE CAPITAL REGIONAL DISTRICT

A RESILIENT COASTS FOR SALMON REPORT

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RESILIENT COASTS FOR SALMON

PACIFIC SALMON FOUNDATION

STEWARDSHIP CENTRE FOR BRITISH COLUMBIA

EXECUTIVE SUMMARY

The impacts of coastal climate change, such as sea level rise and erosion, are a direct threat to coastal communities and ecosystems. Utilizing Nature-based Solutions (NbS) for shoreline protection is one method that local governments and their communities can use to effectively adapt to coastal climate change. However, because NbS are a relatively new concept compared to their hard-engineered alternatives (e.g., seawalls, riprap, etc.), the ability of local governments to implement policies and projects that support these NbS are greatly dependent on government capacity and extent of knowledge on the subject. In this report, we first summarize recommendations from reputable guidance documents on the implementation of effective coastal climate change adaptations in local governments. We then review the policies, bylaws, and incentives utilized by the Capital Regional District (CRD) for coastal climate change, highlighting special projects by municipalities of the CRD that support coastal adaptations and NbS. We then discuss the challenges and barriers faced by local communities within the CRD to further coastal climate adaptations, as told by CRD staff through interviews. Finally, we discuss the differences between the recommendations for coastal climate change in guidance documents, and what is actually being implemented by the CRD. The identification of knowledge gaps in this last section is important to inform the Pacific Salmon Foundation what information or tools the Foundation may provide to communities to move past barriers.

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This report was written on the traditional territories of the Coast Salish peoples, including the qʼəy̓cʼəy (Katzie), qʼʷaːnƛ̓ʼənʼ (Kwantlen), and Semiahmoo First Nations (Surrey, BC), the Sḵwx̱wú7mesh Úxwumixw (Squamish), xʷməθkʷəy̓əm (Musqueam), and səlilwətaʔɬ (Tsleil-Waututh) First Nations (Vancouver, BC), and the W̱SÁNEĆ Peoples (Saanich, BC): the BOḴEĆEN (Pauquachin), MÁLEXEŁ (Malahat), SṮÁUTW̱ (Tsawout), T'Sou-ke, WJOŁEŁP (Tsartlip), W̱SIKEM (Tseycum)). We gratefully acknowledge that the authors live and work on these traditional territories, and we recognize the connection and care for these lands and waters by Indigenous Peoples since time immemorial.

This report is part of the Resilient Coasts for Salmon project, which is funded in part by the Government of Canada (Environment and Climate Change Canada) through the Climate Action and Awareness Fund (2021 – 2026), and we are grateful for this funding to reach our goals of raising awareness of the impacts of coastal modification, climate change, and how we can better adapt to sea level rise using nature-based solutions.

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CRD: *Capital Regional District*

NbS: *nature-based solutions*

OCP: *Official Community Plan*

SLR: *sea level rise*

See Appendix I for full glossary.

INTRODUCTION

As the threat of climate change continues to intensify, coastal communities and their respective governments have the immense task of altering their behaviours and practices to maintain community safety and protect shoreline habitat and culturally important places. The risk of coastal habitat loss is a concern not only for Pacific salmon, but for the economy, recreation, and cultural significance. Habitats such as estuaries, nearshore waters, and pocket beaches, are critical rearing habitat for juvenile Pacific salmon. Using these habitats, they grow and get stronger before beginning their great open ocean journey. The default approach for coastal protection and **sea level rise** adaptation has been hard-armouring coastlines with seawalls, bulkheads, and other coastal modifications. While these methods are commonly believed to work against flooding and erosion in some capacity, more recent studies (Gittman et al. 2016; Judd 2021; Gittman and Scyphers 2017) have found that hard armour alters the natural functions of shorelines, making it more difficult for coastal environments to adapt to these processes that will inevitably worsen with climate change. **Hard armour** (e.g., sea walls, rip rap) is also detrimental to biodiversity, disrupting the natural connectivity between land and water and contributing to coastal squeeze, where fixed structures on the coast prevent the shorelines from adjusting to rising sea levels. Alternatively, **Nature-based Solutions (NbS)** focus on restoration and protection of natural coastlines, ultimately addressing cultural, economic, and societal needs through conservation and care for biodiversity and the environment.

By reviewing adaptation strategies at the local government level, and identifying common barriers to nature-based adaptation, we can support adaptive management and identify effective strategies that can be shared with other communities, for the betterment and protection of coastal habitats. With this report, we hope to support informed decision making across local governments on the east coast of Vancouver Island to improve coastal ecosystems for the benefit of people and salmon.

COASTAL NATURE-BASED SOLUTIONS

Common coastal NbS include beach nourishment, native plantings on beach and riparian areas, and the addition of large woody debris to beaches. These methods are used to stabilize shorelines and provide natural habitats to support coastal biodiversity. NbS, such as rain gardens and green roofs, can also be used to manage runoff that would otherwise allow contaminants to enter coastal waters.

Natural shorelines are dynamic and able to shift with changing conditions. When we impose hard structures such as a seawall, we impede the shoreline's resilient nature. Shoreline NbS, on the other hand, work with nature, supporting natural processes like sediment transport that help beaches remain adaptive. The dynamic and constantly adapting character of NbS is a key reason for why

they can create more resilient habitats; ecosystems are most resilient when they can function naturally.

REGION OF FOCUS

The lands referred to as the **Capital Regional District (CRD)** in this report lie within the Traditional Territories of many Indigenous communities, including but not limited to the W̱SÁNEĆ Peoples: the BOḰEĆEN (Pauquachin), MÁLEXEŁ (Malahat), SȾÁUTW̱ (Tsawout), T'Sou-ke, WJOŁEŁP (Tsartlip), W̱SIKEM (Tseycum); the Lək̓ʷəŋən (Lekwungen) Peoples: the Songhees First Nation and the xʷsepsəm (Esquimalt) First Nation; as well as the P'a:chi:da?aht (Pacheedaht), Spune'luxutth' (Penelekut), Sc'ianew (Beecher Bay) First Nations.

The Capital Regional District (CRD) is comprised of 13 municipalities and three electoral districts throughout the southern tip of Vancouver Island (Figure 1). The CRD is a regional governing body created to provide coordinated services and decision-making for regional issues that supersede municipal authorities. This includes regional planning, management of regional parks, water supply, and more. The CRD also aims to work with First Nations to deliver services in an inclusive and sustainable manner within the region (Capital Regional District, 2013).

The proximity of the CRD to both British Columbia's old growth forests and the Salish Sea makes the region a popular location for outdoor tourism and recreation. While such tourism has economic benefits, regular use of beaches and waters can make coastal ecosystems in the CRD vulnerable to pollution, coastal erosion, and habitat destruction from increased demand for coastal development. Recreational boats can also pose a threat to marine and coastal ecosystems by disturbing important habitat and increasing marine pollutant concentrations through fuel and chemical use. Additionally, the numerous commercial fishing industries and shipping within the CRD have the potential to cause imbalances to marine food webs. These factors, coupled with the increasing threat of climate change-related hazards, can make coastal habitats and communities particularly susceptible to degradation.

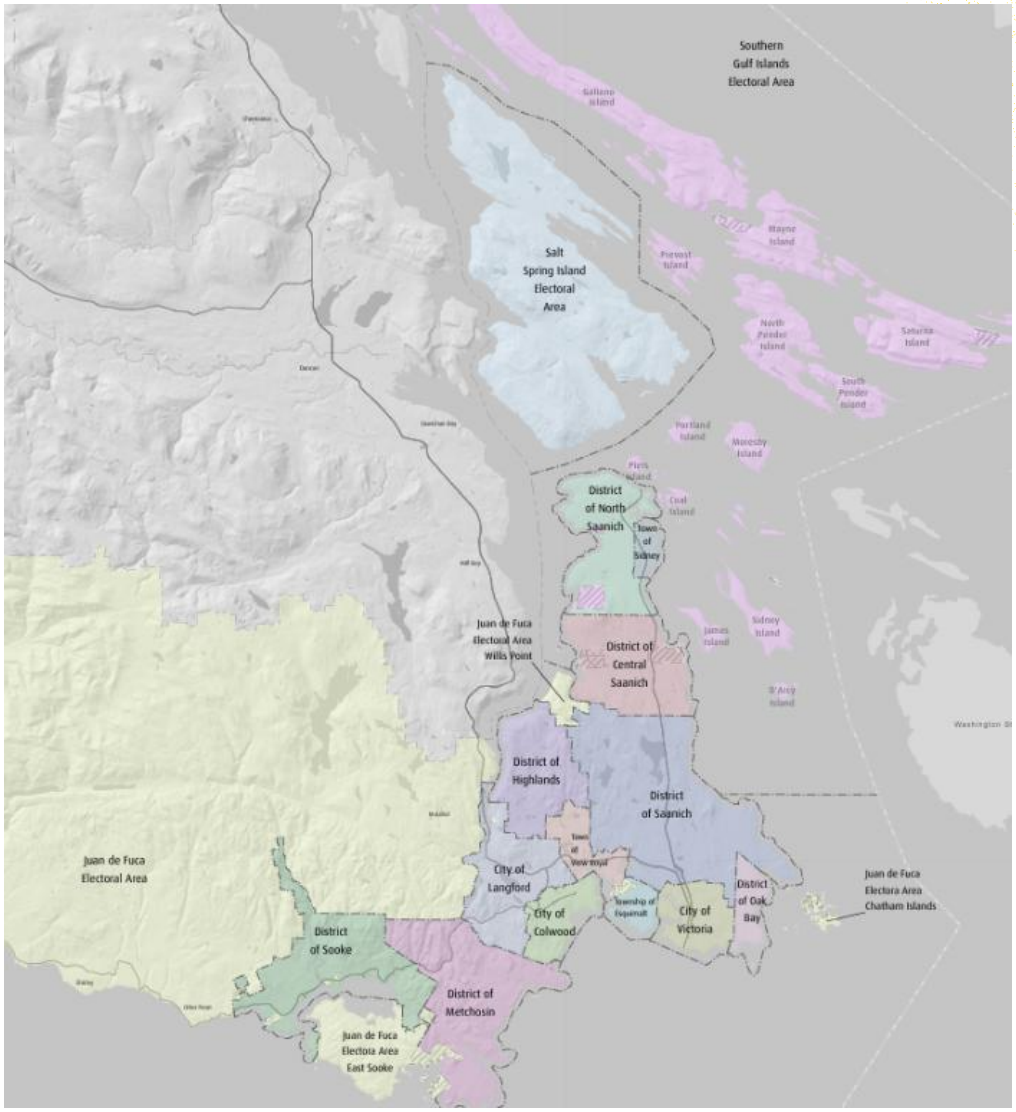

Figure 1 - Map of the Administrative Boundaries of the Capital Regional District (source: CRD, 2024a).

OBJECTIVES

This report has **three primary goals:**

1. **To identify the differences and knowledge gaps** between what is recommended for climate adaptation and NbS, and what has been implemented by local governments.
2. **To determine barriers to effective climate change adaptations** that are hindering coastal communities from addressing challenging issues such as SLR, flooding, and coastal erosion.
3. **To determine what information or tools are needed by local governments to move past these barriers**, so that the Pacific Salmon Foundation can provide help and resources where possible.

First, we provide an overview of recommendations from current climate adaptation guidance documents, including both general climate adaptation guidance and that specific to coastal environments. Next, we provide a summary of policies, bylaws, projects, and incentive programs specific to coastal climate change adaptations that are being used by local governments on the east coast of Vancouver Island in British Columbia. This report will be focused on the Capital Regional District (CRD) (Figure 1) and will be supplemented with information gathered from interviews with CRD regional and municipal government staff on climate change adaptation strategies within their jurisdiction(s).

By learning common barriers and providing resources or opportunities for collaboration, the Pacific Salmon Foundation hopes to assist local governments in facilitating conversations and actions on best practices towards shoreline and coastal management in hopes to better protect the future of Pacific salmon.

Note: While we acknowledge that stormwater and runoff management is related to coastal water and habitat protection, we have chosen to omit regulatory practices and policies related to these topics in our review.

REPORT STRUCTURE

This report is divided into two main sections. The first section focuses on guidance for local governments on adapting to coastal climate change. Figure 2 shows some examples of the documents that were reviewed for this section. The second section provides an overview of coastal management practices by the Capital Regional District (CRD), as well as barriers to further coastal climate adaptations based on a review of available materials and interviews with CRD regional and municipal staff. This report then highlights key recommendations for coastal adaptations and closes with a discussion on the CRD's climate adaptation strategies in comparison to recommendations from guidance documents. For more details on approaches used to create this report including the full list of guidance documents that were reviewed, see Appendix II. See Appendix III for a list of questions used in the interviews.

Figure 2 - Cover photos of four of the main guidance documents reviewed. Top left: International Union for the Conservation of Nature (IUCN). Top right: West Coast Environmental Law (WCEL). Bottom left: Managing Natural Assets. Bottom right: Climate Caucus.

1: GUIDANCE DOCUMENT SUMMARY

Successfully implementing NbS for climate adaptation requires multidisciplinary effort and thoughtful consideration of the environment and surrounding communities (Vouk et al., 2021; West Coast Environmental Law [WCEL], 2012). It also requires high levels of collaboration among parties such as municipal and regional government staff, Indigenous leaders, ecologists, biologists, engineers, and more, and should be done with the intention to strengthen environmental stewardship within communities. As such, it can be difficult for local governments to know where and how to begin the process. Several conservation-focused organizations, including West Coast Environmental Law (WCEL), and Nature Canada, have created guidance documents to support climate change adaptations and best practices for implementing NbS at the community level (Figure 2). This section aims to summarize the recommendations of these guidance documents, including general suggestions for implementing nature-based climate adaptation strategies into local government plans, as well as specific adaptations recommended for coastal communities. The full list of documents used in this review can be found in our methods document (Appendix II).

1.1: IMPLEMENTING NATURE-BASED SOLUTIONS AND CLIMATE ADAPTATIONS INTO LOCAL GOVERNMENTS

While the exact framework of NbS implementation differs between each guidance document that was reviewed, one key recommended activity typically remains the same: local governments must first assess the ways in which climate change will most likely impact its community at a broad scale to identify what goals and actions must be made a priority (Managing Natural Assets Initiative [MNAI], 2021; Vouk et al., 2021; WCEL, 2012). Coastal communities, for example, may choose to prioritize adaptations against flooding, shoreline erosion, sea level rise, and other processes impacting marine ecosystem health such as stormwater runoff. Such an assessment should be made by obtaining and reviewing current climate data and other relevant information for the region and can often be the impetus for governments to invest in further climate modeling for their communities (WCEL, 2012). Alongside climate modelling, governments are also recommended to fund research for other climate-relevant data, such as infrastructure vulnerability and water quality sampling, as well as public engagement meetings to address concerns. After using this information to identify where communities may be most vulnerable, local governments can begin the process of adapting current laws, policies, and government plans to account for climate change stressors while also supporting social and economic objectives.

1.1.1 Engagement, buy-in, and inclusivity considerations

NbS require contributions and collaboration from a wide array of stakeholders, representatives, and decision makers from many disciplines. It compels a **whole systems approach** that aims to provide a

more holistic, forward-thinking perspective to conservation, including shared goals among governments and members of the community, rather than being limited to particular jurisdictions or regulatory boundaries (Vouk et al., 2021). Taking this into consideration, projects regarding NbS climate change adaptations should:

- Involve and engage a multi-faceted team of representatives in relative fields (e.g., coastal biologists and geomorphologists, climate scientists, engineers, city planners, etc.) (MNAI, 2021; WCEL, 2012)
- Consider public consultation and outreach to clarify project goals, address potential concerns, grasp community needs, and develop community buy-in – a large factor in driving ongoing support for climate adaptation (WCEL, 2012)
    - Such public consultation can be supplemented with education and outreach to ensure understanding of NbS and clarify misconceptions
- Seek out early and continual engagement with affected parties to encourage active participation at each step of development (Vouk et al., 2021)

Engagement and inclusivity considerations are an important factor not only in the process of developing nature-based climate adaptations, but also ensuring public expectations are met. Local governments should strive to make both project and public consultation as inclusive as possible to help drive consensus and community buy-in.

1.1.2 Building capacity through integrating climate adaptation into community planning

It is important to consider that not all communities and their respective governments have the capacity to continuously adapt to climate change needs. Capacity can be influenced by factors such as funding restraints, staff numbers, and varying knowledge levels on NbS and climate change adaptation (WCEL, 2012). Local governments can manage adaptation needs by addressing climate impacts and environmental vulnerabilities in every government process of planning and decision-making. Documents such as **Regional Growth Strategies** and **Official Community Plans (OCPs)** can play a significant role in integrating NbS as they outline overarching plans for communities under their jurisdiction and can set the foundation for current and future regulations regarding land use. These documents can be used to:

- Highlight specific climate change goals or risks and reframe policies to account for them.

- Address the amount of capacity needed for certain policies or projects to be implemented.
- Give local governments a better understanding of how resources should be allocated to meet specific goals.
- Uphold regional/municipal/community standards for climate adaptation strategies.
    - Regional governments should develop a clear and streamlined standard for climate adaptation strategies that must be upheld by all municipalities within its jurisdiction. Municipalities can then choose to build on these standard as permitted by their abilities and local priorities (International Union for Conservation of Nature [IUCN], 2020; Vouk et al., 2021; WCEL,2012).

To help bridge the gap between climate-related activities, and non-climate related activities, climate issues can be mainstreamed into all government strategies and activities. By integrating considerations of the changing climate into community planning, local governments may better understand their priorities and work towards them (Nature Canada, 2022; WCEL, 2012).

1.1.3 Incentives

Incentive programs can be used to encourage stewardship and engage broad audiences on the principles of NbS (Vouk et al., 2021). While these approaches often require monetary investment from local governments, the long-term benefits outweigh the initial cost. Incentives can be offered in a variety of ways:

- Smaller scale resident or community initiatives.
    - **Example:** The City of Toronto provides grants of up to $100,000 for residents and property owners to build green roofs (City of Toronto, 2024; Sun, 2020).
- Larger funding programs for non-profit societies, grassroots organizations, and other smaller scale initiatives.
    - **Example:** The Grant in Aid program offered by many municipalities within B.C. provides funds for non-profit organizations that benefit the community. Beneficiaries can range from tourism, arts and culture, environmental services, and more.
- **Development Cost Charges (DCCs)** can be lowered to incentivize specific types of development like green infrastructure or other minimal impact developments.

- **Example:** In 2010, The City of Penticton lowered DCCs by 50% for all development projects that were verified to have been done sustainably (WCEL, 2012). This can be a driving force for companies to invest in climate-resilient infrastructure.

- Tax exemption programs.
    - **Example:** The Natural Area Protection Tax Exemption Program (NAPTEP) run by the Islands Trust Conservancy entails that private property owners that willingly donate their ecologically significant land to an Island's Trust conservation covenant, should be exempt from 65% of municipal property taxes (Islands Trust, 2024k).

1.2: NATURE-BASED CLIMATE ADAPTATION RECOMMENDATIONS FOR COASTAL COMMUNITIES

While it is essential for communities to adapt to every aspect of climate change, the focus of this report is to find nature-based climate adaptations applicable to coastal and shoreline communities throughout different regions of Vancouver Island. This section still accounts for the recommended procedures mentioned in the previous section, but further summarizes specific adaptation recommendations for coastal communities.

1.2.1 Softening shorelines

Hard armouring, such as seawalls and other coastal modifications, was not traditionally built with a comprehensive understanding of the long-term effects of climate change. As a result, coastal environments and communities can be severely negatively affected by a lack of resilience to heightened coastal hazards (e.g. SLR, erosion) (Bridges et al., 2021; Lamont et al., 2014; National Oceanic and Atmospheric Administration [NOAA], 2015). Recommendations are moving towards "softening" shorelines by replacing conventional hard infrastructure with NbS, either through maintenance or restoration of fully natural coastal ecosystems, or through hybrid options that blend green infrastructure and hard engineering (Lamont et al., 2014; Hilke et al., 2020). However, there is no definite framework for the full or partial removal and replacement of hard armour with soft alternatives. This can cause barriers concerning permitting, design, and lack of interest and awareness from the public (Hilke et al., 2020). To address these barriers:

- Local governments can follow mainstreaming procedures by outlining goals and objectives for coastal protection in an OCP or other similar community planning document and use these objectives to streamline a process for soft shoreline initiatives *and* their long-term maintenance.

- New policies, bylaws, permits, and DCCs can also be enforced to restrict or prevent the development of new hard armour (Hilke et al., 2020).
- Governments should also engage with the community through public hearings and educational events and bulletins, as construction or changes to publicly accessible shorelines (e.g., parks, walkways, roads) can affect a community's daily interactions with these spaces (NOAA, 2015).
    - Engagement should be done with private landowners to ensure that they are equipped with sufficient knowledge on coastal NbS and have a proper understanding of the policies, procedures, and recommendations in place when making decisions on how to protect shorelines on their properties (NOAA, 2015; Hilke at al., 2020).
- Reputable organizations such as NOAA and Nature Canada can provide guidance on the design, development, and maintenance of nature-based shoreline projects, but local governments should use their regulatory authority to create recommendations and rules specific to the regions under their jurisdiction.
    - A comprehensive and multidisciplinary team should be appointed for this to ensure that knowledge moving from government bodies to citizens will accurately reflect the ecology and needs of the region (NOAA, 2015).

Softening shorelines is a direct action that communities can take in response to current and future impacts of coastal climate change, both to the benefit of the environment and communities. Whenever possible, local governments should strive to use this as an option for coastal climate adaptation to promote healthy shorelines, habitat connectivity, and community resilience.

1.2.2 Natural Asset Inventory

Despite providing many services to communities, **natural assets**, such as coastal beaches, wetlands, and other natural ecosystems, are often overlooked in terms of their value as community assets. The development of a **natural asset inventory** can be beneficial in providing an economic value to natural resources, such that their services - and how they can be impacted by climate change - are considered in land-use decisions in the same way that **hard assets** are.

- Knowledge of coastal natural assets and their processes can help inform planning and actions needed to strengthen coastal resilience and contribute to habitat and biodiversity protection (MNAI, 2021).

- Natural assets may gain value over time, while engineered assets generally do the opposite. Having a complete natural asset inventory can help inform their unique management and valuation (Asset Management BC [AMBC], 2019; MNAI, 2021).

To develop a coastal natural asset inventory, a diverse team composed of representatives across many disciplines and levels of government must be assembled to assess existing ecosystem services and any issues in relation to them. Once all natural assets are considered, plans for their management can be made. For example, natural assets such as dunes, beaches, and shoreline vegetation can become a great baseline for the implementation of coastal NbS like dune preservation, beach nourishment, and shoreline plantings. Canada's Municipal Natural Asset Initiative (MNAI) provides a detailed guidance document on natural asset methodology, as well as a toolkit for coastal asset management and modelling (MNAI, 2021).

1.2.3 Adaptive management

Nature-based solutions and certain green infrastructure approaches often come with uncertainties because living components – such as vegetation that may take time to establish – are not predictable in the same way that traditional hard infrastructure may be (IUCN, 2020; Vouk et al., 2021). As such, it is essential that NbS are developed under the framework of adaptive management – an approach where adjustments can be made along the way as new information becomes available.

- Adaptive management is especially important when it comes to nature-based solutions, as restoration sites will be exposed to volatile elements such as storms, extreme wind, and other weather events and interactions with the environment.
- As with any kind of project, long-term monitoring plans are recommended for all projects that may undergo changes over time to ensure that they function as intended.
    - Developing a framework for long-term monitoring plans is recommended for consistency across projects. This can include details such as the timeline and frequency of monitoring, and the funding required for monitoring to occur (Vouk et al., 2021).

2: REVIEW OF THE CAPITAL REGIONAL DISTRICT'S POLICIES, BYLAWS, INCENTIVES THAT SUPPORT COASTAL ADAPTATION

While coastal management strategies vary between municipalities, concerns regarding coastal climate change, and thus, actions towards adaptations, have only become more apparent in these municipalities in recent years. This section explores current actions and measures taken by the Capital Regional District (CRD) and municipal governments within the region to protect the coast and adapt to coastal climate change.

2.1: COASTAL ADAPTATIONS IN THE CRD

As a regional governing body, the CRD has many roles to play in climate action and adaptation. Alongside their responsibilities in facilitating cross-disciplinary collaboration among their local governments, the CRD also lays out long-term climate goals and regional priorities, funds and leads climate research projects, and actively engages with climate and conservation-focused initiatives, such as the Stewardship Centre for British Columbia's Green Shores® program.

The CRD's 2023-2026 Board Priorities report outlines the region's long-term initiatives and goals under five main priorities: Transportation, Housing, Climate Action & Environment, First Nations, and Governance. This ties directly into initiative 3c under the Climate Action & Environment section: "Increase resilience, community and adaptation planning to address climate related risks and disasters (CRD, 2023a, p.7)." Illuminating climate issues at the forefront of planning allows for greater community resilience and adaptive capacity (WCEL, 2012).

The CRD also has a Corporate Plan for 2023-2026 which outlines specific actions and responses – including those for climate adaptation - that the CRD aims to act upon (CRD 2023b). This streamlined process of priorities to initiatives to actions can also be found in local government OCPs and Climate Action Plans, which will be discussed throughout this section.

The following documents are key initiatives that facilitate coastal climate change adaptation and management in the CRD:

- Climate Action Strategy (2021): This is a 5-year document in which the CRD states its intentions to support its municipalities by developing climate action plans and programs, facilitating partnerships between government and various non-governmental organizations, providing regional climate data (e.g., emission levels, projected climate impacts, etc.), and more. This document also provides information on leads, support, and resources available for specific action, as well as the timing at which actions are/should be put into practice (CRD, 2021a).
- Capital Region Coastal Flood Inundation Mapping Project (2021): This is an extensive and multidisciplinary mapping project developed to better understand the impacts of rising sea levels along the CRD's coasts, identify risks to coastal communities and infrastructure, and provide guidance to local governments on how to address coastal flood policy, protection, and adaptation (CRD, 2021b). An example of the data investigated from this project can be found in Figure 3, which shows the extent and depth of flooding in Victoria Harbour under a 0.5% Annual Exceedance Probability (AEP) event.
    - In an interview, Iain Bourhill – Director of Community Planning in the City of Colwood, recognized this project was significant in informing some of Colwood's coastal policy. He noted that as a smaller municipality, it would have been difficult to initiate the mapping and modelling necessary for their current projects, and that the city would not have gotten as far as it did in their coastal policy plans without such resources from the CRD (I. Bourhill, personal communication, February 12, 2024).

Figure 3 - Maximum Extent and Depth of Flooding in Local Area Victoria Harbour for 0.0 m RSLR Scenario, AEP = 0.5% (source: CRD, 2021c).

- **Victoria & Esquimalt Harbour Environmental Action Program (VEHEAP) and the Harbours Atlas:** The VEHEAP pilots projects to improve available data on the CRD core area harbours (Victoria and Esquimalt Harbours, the Gorge Waterway, Portage It and Esquimalt Lagoon). CRD's Harbour's Atlas is an information and mapping tool embedded into the CRD's Regional Map that provides users with highly detailed spatial data for core harbours and their watersheds (Figure 4, Figure 5).

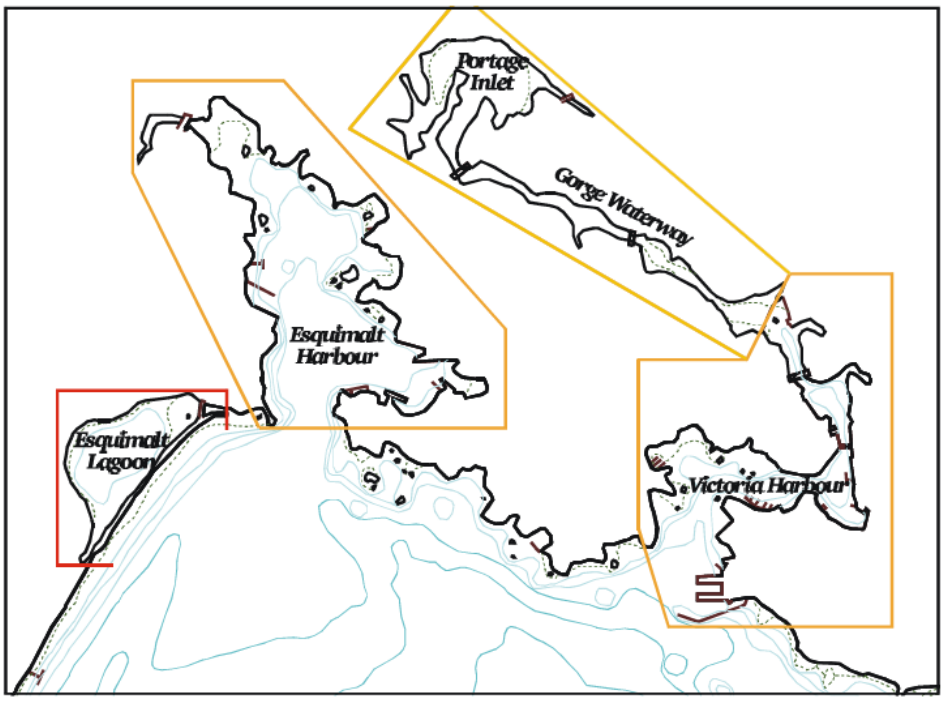

Figure 4 - Map of 5 core areas of the Victoria and Esquimalt Harbours and waterways (source: Archipelago Marine Research LTD., 2000).

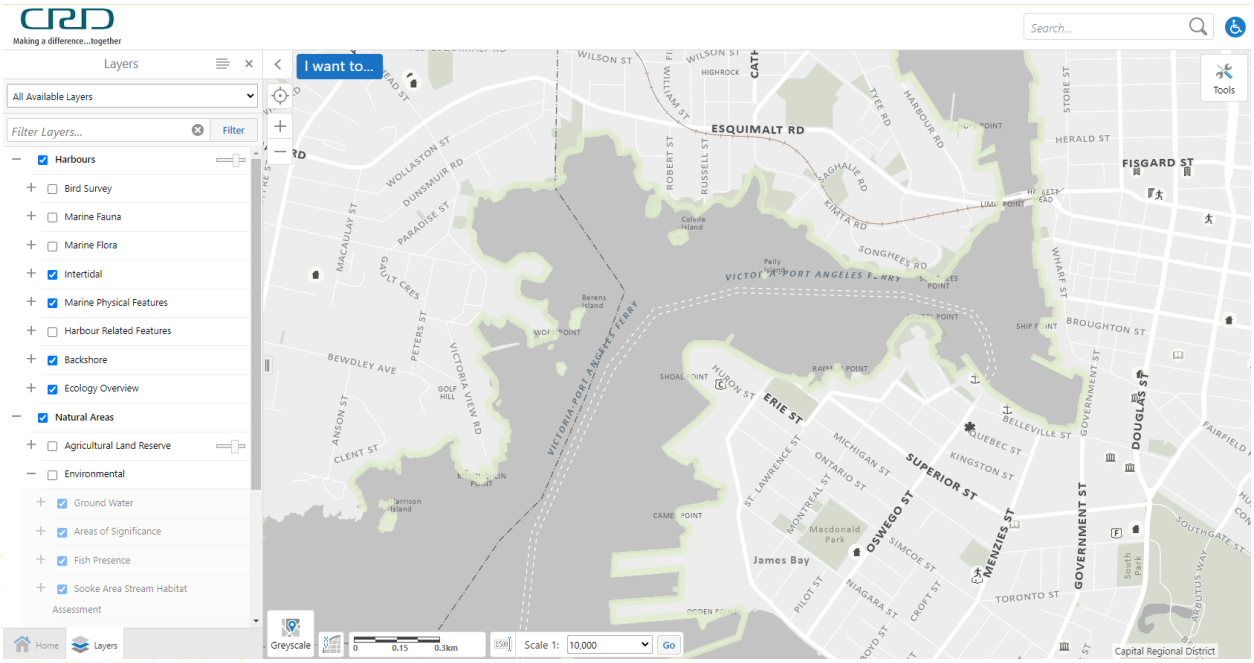

Figure 5 - Screenshot of the Harbour's Atlas Interactive Map, showing drop down menus of data that can be visualized on the map (source: CRD, 2018).

- **The Harbours Ecological Inventory and Rating (HEIR) Project:** The HEIR project is a comprehensive inventory of physical and biological features of the backshore, intertidal, and subtidal areas and their **ecological ratings**. This project is ongoing with aims to update spatial data for the benefit of its users – primarily community groups and municipalities that have jurisdiction on shoreline planning and land use. In 2021, the CRD initiated the process of updating the current ecological inventory and ratings of the intertidal and backshore zones covered under the HEIR Project. This project also includes a high-level assessment of areas most vulnerable to coastal squeeze, areas with high blue carbon potential, and areas that have higher potential for restoration (CRD Staff, personal communication, 2024). Its creation involved high levels of collaboration with biologists, GIS specialists, consultants to complete ecological surveys and many more. Investments into this multi-disciplinary and collaborative project shows that shoreline conservation is well prioritized in the CRD region (CRD, n.d.).

2.1.1 Grants for Community and Non-Profit Organizations

Climate-focused grants, incentives, and initiatives are valuable tools that governments can use to promote nature-based climate adaptation and community resilience (WCEL, 2012). In this policy review, no grants or incentives *specific to coastal adaptations* were found. However, there are several general grants and community initiatives within the region that may be used for smaller-scale adaptation measures and strengthen overall community resilience to climate change.

- The Grant in Aid Program is a funding opportunity offered by most local governments within the CRD that is intended to supply non-profit organizations with funds for projects and activities that benefit the community, including climate adaptation and community safety.
    - **Example:** Peninsula Streams and Shorelines received funding from both North Saanich and Colwood's Grant in Aid program in 2023 to fund help fund their activities in conserving the region's local watersheds and shorelines (City of Colwood, 2024b; District of North Saanich, 2024).
- Similarly, the District of Sooke and the Township of Esquimalt offer a Community Grants programs (District of Sooke, 2023; Township of Esquimalt, 2024). Amount received depends on the financial capacity of local governments and the budget allocated to such programs.

These grant programs are an effective way to set aside funds that will benefit the community through habitat restoration, environmental monitoring, and more.

2.1.2 Resident Initiatives

Climate change-related grants and incentives offered to residents are much more limited, which can be reflective of local governments' financial resources, legislative priorities, community need, and overall capacity to incorporate community-level climate action into its planning. Local governments within the CRD that do offer grants for its residents are more focused on neighbourhood resilience, which may be used for a variety of projects including climate action.

- The My Great Neighbourhood Grant offered by the City of Victoria is intended to support residents in the creation of public community spaces and community resilience projects. As per the My Great Neighbourhood Grant Policy document, projects can include resilience-strengthening activities "especially in regard to climate change, food security, and social connections" (City of Victoria, 2023a, p.7).
- The recently developed Neighbour to Neighbour Resilience Initiative offered by the District of Saanich provides Saanich residents with $500 grants for community resiliency projects at the neighbourhood scale (District of Saanich, 2024b).
    - According to Glenys Verhulst – Sustainability Specialist and lead of the Neighbor-to-Neighbor initiative – the program has so far completed one boulevard ecological restoration project near Saanich's Mystic Vale ravine and has approved other projects such as a hummingbird feeder assistance program (G. Verhulst, personal communication, March 12, 2024).
- Saanich's Naturescape Program intends to enhance biodiversity and wildlife habitat in both coastal and inland spaces (District of Saanich, 2024c; T. Munson, personal communication, February 14, 2024).
    - Thomas Munson, Senior Environmental Planner of Saanich, mentioned in an interview that Saanich's Biodiversity Conservation Strategy (2024) will include "an increased emphasis on public education and the importance of the Naturescape program on private properties" (T. Munson, personal communication, February 14, 2024). Munson also had this to say: "Simply educating isn't enough" "I think we need to broaden our thinking on that and look for more incentives as opposed to simply education."

2.1.3 Natural Asset Inventory and Management

- Within the CRD, the extent of natural asset management ranges from the inclusion of a fully developed **natural asset inventory**, to governing natural assets in a broader sense based on known and valued key assets (e.g., parks and trails).

- City of Colwood's Municipal Natural Assets Initiative (2022) According to the report, which outlines inventory results (i.e., inventory data), asset conditions, and recommendations for use and maintenance, Colwood aims to use its natural asset inventory to provide more sustainable services to its communities and incorporate its results into strategies such as Colwood's Stormwater Master Plan, and its Sustainable Infrastructure Replacement Plan (City of Colwood, 2022).
- The District of Saanich's Natural Asset Inventory project (projected completion in 2024): This project was done with the Municipal Natural Assets Initiative (MNAI) and funded through the Canada Community Building Fund (District of Saanich, 2024a).
- Municipal plans for Natural Asset Inventories

Both the District of Sooke and the City of Victoria note future actions in their OCPs to incorporate natural assets into their municipality's planning (District of Sooke, 2022, p. 94; City of Victoria, 2023b, p. 98). The District of Oak Bay also has a Natural Assets Master Plan "TBD" (Horan, 2021). While local governments within the CRD seem to vary greatly in their involvement in natural asset management, it is important to note that the concept of natural asset initiatives is fairly new (MNAI, 2024), and the CRD seems to be continuing its progression in the matter as a high priority.

2.2: SPECIAL PROJECTS:

The following are special projects initiated by municipalities within the CRD that specifically address coastal and shoreline climate adaptation and management.

2.2.1 Colwood: Waterfront Stewardship Plan

The City of Colwood's Waterfront Stewardship Plan integrates ongoing climate research with Colwood's existing policies (e.g., OCP, 2015 Transportation Master Plan, 2019-2023 Strategic Plan, and more) to provide guidance for the development and redevelopment of Colwood's waterfront (City of Colwood, 2024a). Following Colwood's OCP goals to protect its shoreline habitats through soft shore approaches (City of Colwood, 2022), this plan implements Green Shores principles with the aim to build shoreline resilience in a cost-effective manner (City of Colwood, 2024a, p.41). By using this plan to inform planning and decision-making for years to come, Colwood has created a commitment to the protection of its shoreline and the safety of its coastal communities.

2.2.2 Esquimalt: Gorge Park Demonstration Site

In partnership with the CRD and the Township of Esquimalt Parks and Recreation, the Resilient Coasts for Salmon team is working on an ongoing project to build a Green Shores for Shoreline Development Demonstration Site at Esquimalt Gorge Park. This site is located on the traditional territory of the ləkʷəŋən (Lekwungen) People on a portion of the Gorge Waterway - an important ecosystem in the Greater Victoria Region - and is intended to showcase nature-based approaches to shoreline management and provide community members with the chance to observe and understand their benefits. Following community engagement events, technical committee meetings, and design workshops, the project design – which includes the removal of hard armouring, shoreline sediment nourishment, and riparian and marsh plantings – is now finalized (Stewardship Centre for British Columbia [SCBC], 2022; Township of Esquimalt, 2023). Construction began in September 2024 and will be an important step forward in increasing resilience of the shoreline and reclaiming the site's ecological and cultural values (Figure 6).

Figure 6 - The map above shows the proposed project area of the Esquimalt Gorge Park Green Shores for Shoreline Development demonstration site. Image by LEES+ Associates.

2.2.3 Sidney: Flood Hazard Risk Reduction Project and Interim Flood construction policy

In preparation for expected SLR, the Town of Sidney has developed several projects to address land use and planning on the coasts.

- The Flood Hazard Risk Reduction Project is a newly initiated project comprised of three parts – wind and wave data collection from Sidney's coastline, regional flood mapping and modelling, and flood risk community education programming. The first and third tasks are ongoing as of September 2023, and regional modelling began in spring 2024 (Town of Sidney, 2024).
- Sidney's Interim Flood Construction Level Policy requires all construction work in areas at risk for flooding and storm surges to provide a report and a Flood Assurance Statement from a qualified professional engineer, ensuring that future development will be safe against future flood risk (Town of Sidney, 2019).

2.2.4 Saanich: Biodiversity Conservation Strategy

Saanich's policies and projects regarding the natural environment are the most diverse of the municipalities within the CRD. One ongoing policy of note is the Biodiversity Conservation Strategy. According to staff from Saanich, the Biodiversity Conservation Strategy, as an element of Saanich's developing Environmental Policy Framework titled "Resilient Saanich," will serve as a replacement for a previously rescinded Environmental Development Permit Area (EDPA) (T. Munson, personal communication, 2024). Despite backlash from concerned community members, the Saanich EDPA was annulled in 2017 due to increasing concerns from homeowners about lowered property values and restrictions to development (Depner, 2017). This strategy, informed by the State of Biodiversity report (2023), is proposed to be one method to take on the challenges of environmental protection and stewardship after the removal of the EDPA. In the State of Biodiversity report, coastal environments are identified as a highly sensitive due to abundant use by humans and animals, risks being overtaken by invasive species, and new development (District of Saanich, 2023, p. 21). Significantly, the report also notes that coastal sand ecosystems are very poorly protected, with only 1.8% of these ecosystems occurring within protected land. Not so far after, marine shorelines are also noted to need protection, with only 8.9% of these habitats within Saanich protected (District of Saanich, 2023). In using this report as a foundation for the Biodiversity Conservation Strategy, Saanich will be able to identify and prioritize best ways in to conserve and protect its natural environment (Figure 7).

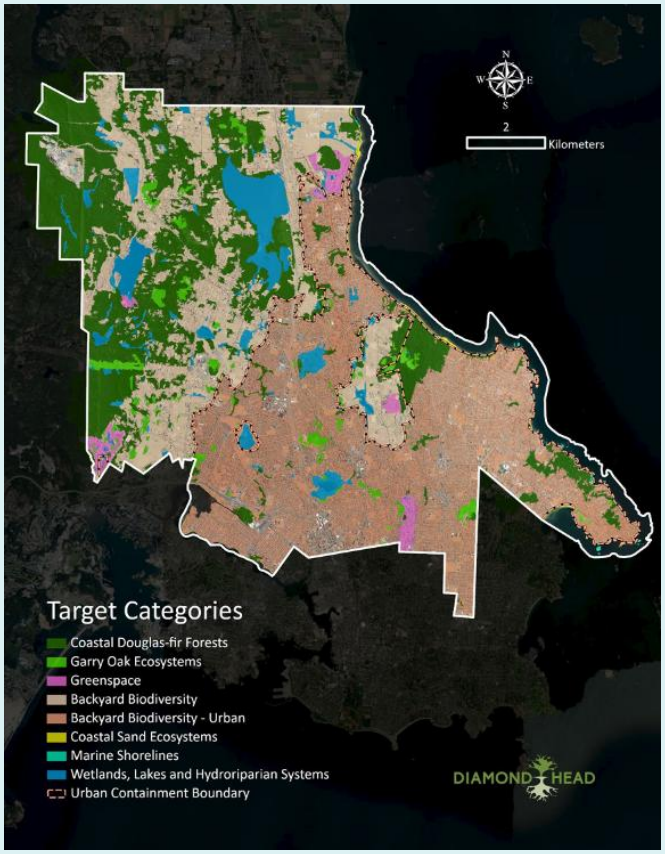

Figure 7 - Map of Saanich's Biodiversity Conservation Plan target categories (source: District of Saanich, 2023).

2.3 CHALLENGES AND BARRIERS TO CLIMATE ADAPTATIONS IN THE CRD

Despite significant progress by the CRD and its municipalities towards climate action goals, many barriers to further coastal climate adaptations still exist. In interviews with local government staff, it was found that most common barriers include:

- Availability of funding for implementation of projects,
- Lack of incentive programs,
- Staff capacity,
- Complex jurisdictional challenges,
- Lack of resources including locally relevant climate data and future scenario modeling,
- Lack of education and training for staff,
- Community resiliency, and
- Public buy-in.

The most common barrier iterated by all interviewees is difficulty in funding and budget constraints. Rebecca Newlove, Manager of Sustainability at the District of Saanich noted in her interview that, despite Saanich having a community and government council largely supportive of climate change adaptation, lack of funding is a barrier to the municipality's ability to carry out projects. Grants are also often oversubscribed (R. Newlove, personal communication, February 16, 2024). This sentiment of cost was echoed by Robbie Young of the Township of Esquimalt, who mentioned that an annual budget for shoreline development is "something worth putting into [their] budgeting process." (R. Young, personal communication, February 20, 2024)

"We're really hindered by the fact that we need more staff, and additional funding to be able to move forward on this climate adaptation work. *Even if we have the resources for consultancy support, we often don't have the staff capacity to lead the consultants or participate and input to the project development. We're delighted to see the increased federal and provincial grant funding for adaptation work. This additional funding, alongside our approach to collaborating on projects with regional partners is helping, but grant applications are very resource intensive and there's still a massive funding gap for climate adaptation."*

- Rebecca Newlove, District of Saanich

Another barrier of note is the complex jurisdiction of the shoreline. There are often complications over what groups have land ownership in certain areas of the shoreline, which can create issues for decision-makers. Depending on the area, responsibility for the shoreline may fall upon Fisheries and Oceans Canada, as well as different levels of government including First Nations (T. Munson, personal communication, February 14, 2024; R. Young, personal communication, February 20, 2024; CRD Staff, personal communication, February 20, 2024). As such, there is some difficulty in knowing what can and cannot be done on the shoreline.

"The challenge is that the shoreline is [involves] a complicated mixture of jurisdictions. There's municipal property, there's a high-water mark provincial law and there's DFO jurisdiction, so it becomes difficult to determine who actually should be taking some action." - Thomas Munsen, District of Saanich

Education and training for government staff is also a challenge. While the CRD has many available resources on climate data, local government staff must first learn how to use these data before integrating them into projects and policies. To build capacity, CRD staff must also budget time to train and provide guidance to local government staff (CRD staff, personal communication, February 20, 2024). Additionally, many approaches, such as the concept of "**retreat"** or when to advance large infrastructure or restoration projects can be difficult for planners and local government staff to understand (CRD staff, personal communication, February 20, 2024). As reflected in the municipal projects highlighted in the previous section, most initiatives specific to coastal adaptations are only just beginning or were initiated within the past few years. This signifies a shift in progress towards protection of Vancouver Island's coasts and shorelines, with hopefully more projects to come, as knowledge on coastal climate change impacts become more widespread and adaptation increases in priority. CRD staff also recognized the need for a larger *regional* or *sub-regional* conversation on best coastal climate change adaptations, especially considering that there are areas within the CRD more vulnerable to climate-induced risks that cross jurisdictional boundaries (CRD Staff, personal communication, February 20, 2024).

2.4 DISCUSSION: CRD STRATEGIES COMPARED TO THE GUIDANCE DOCUMENTS

Because of the breadth of this research, it is difficult to compare each local government and their existing policies, projects, and incentives to those of recommendations from guidance documents. The ability of local governments to implement these recommendations varies, depending on capacity for funding, allocation of staff and resources, as well as availability of educational resources. However, the CRD and municipalities within in it are moving forward with coastal climate adaptations. While it is true that some municipalities are further in this progression than others,

municipalities that are more limited in their capacity still have an abundance of coastal planning resources created by the CRD to guide their steps forward (e.g. Coastal Flood Inundation Mapping Project, Sea Level Rise Planning Project, etc.). As a regional government, the CRD has invested plenty of time and resources into creating modelling and mapping materials for the benefit of its municipalities. The regional government clearly has priorities in building capacity for climate action projects moving forward. As the threat of coastal climate change becomes increasingly apparent, it is likely that these materials will continue to be used by CRD local governments.

The implementation of natural solutions for shoreline management is relatively new both to government staff and to the public. Green Shores Demonstration Sites seem to be the most integrated option for the implementation of NbS at the local government level. Ability to initiate Green Shores for Shoreline Development projects is dependent on many factors, including funding, staffing, and availability of land. However, many municipalities have outlined goals to integrate NbS and Green Shores Principles into planning and infrastructure within their OCPs and climate action plans, which shows a very high potential for greater integration of NbS into communities. Nonetheless, these ideas are still new, and it is recommended that projects addressing potential NbS should also be coupled with education and outreach opportunities, as well as thorough public engagement to ensure that affected parties continue to have their voices heard in decision-making processes. This is especially true for projects that may consider the removal of hard-armouring, as such decisions – without proper education and knowledge - can cause community concerns for safety against floods and SLR.

The use of grant programs by the CRD are also an effective way to set aside funds for community restoration projects, climate resilience projects, and more. To encourage community members to use NbS, the CRD and its municipalities should consider creating incentive programs for green shoreline projects, especially for homeowners that are considering how to protect their properties from climate impacts such as SLR and erosion.

The CRD and its municipalities are clearly committed to coastal adaptation. From mainstreaming climate-related ideas into its OCP, to investing in climate data and research, to incorporating natural assets into planning, the regional district and many municipalities are already utilizing some of the key recommendations from the coastal adaptation guidance documents. Protection of the coasts and coastal communities is clearly an important priority within the CRD. Considering so many of the coastal climate adaptation projects are new and ongoing, there will likely be many more to look forward to in years to come.

2.4.1 - Key Take-Aways

- The CRD prioritizes data and information that helps inform coastal adaptation, as seen in their Coastal Flood Inundation Mapping Project (2021), as well as the Harbours Atlas and HEIR model.
- Both the CRD and many of its municipalities have been proactive in recently developing natural asset inventories.
- The CRD has an opportunity to use incentive programs to promote the use of nature-based approaches on residential shorelines.
- Further, meaningful action is restrained by the availability of funding for project implementation, as well as staff capacity and challenges with jurisdiction.

3: HOW THE PACIFIC SALMON FOUNDATION CAN SUPPORT COASTAL ADAPTATION IN YOUR COMMUNITY

The Pacific Salmon Foundation (PSF) is dedicated to supporting local communities with coastal climate change adaptation. Following is a list of resources that can support coastal adaptation:

- The Marine Data Centre's Marine Ecosystem Map is an interactive map platform that provides over 450 layers of geospatial data for ecological and human use. PSF collates and receives marine data from multiple databases and sources including researchers, stewardship groups, and Fisheries and Oceans Canada (DFO). The Marine Ecosystem map is a platform where users can visualize spatial coastal data to assess what is occurring in their community. These data can help inform planning decisions, including identifying areas for restoration.
    - The Pacific Salmon Foundation's Resilient Coasts for Salmon project spent five years mapping the entire coastline of eastern Vancouver Island to determine where the shoreline is natural and where it has been modified by structures like seawalls, and overwater structures like docks. They are also tracking the extent of log accumulation on shorelines in this area. The data collected will ultimately provide key insights about nearshore salmon habitat and SLR. With the Resilient Coasts data in the Marine Ecosystem Map, you will be able to visualize the extent of hard armour and other coastal modifications at local scales, and how this intersects with other data layers such as vulnerability to SLR, predicted pacific sand lance habitat, and countless other factors. The datasets will be available for download, or you can play around with the layers on the Marine Ecosystem Map itself to analyze whatever is of interest to your community. These data will be publicly available in 2025, and local community reports of the findings will be released in 2025 and 2026.
- **What data/modeling would help your community plan for the future and keep shorelines intact for the benefit of people and salmon? Could PSF help with collecting/finding existing data?** Reach out to Resilient Coasts for Salmon project manager Kyla Sheehan (ksheehan@psf.ca) for more information.
- The Pacific Salmon Foundation has written several articles that provide practical tips for reducing our impact on local waters by choosing green cleaning products, being an eco-friendly boater, and much more. The Resilient Coasts for Salmon project's Tool Kit and educational page are excellent resources for CRD residents, as well as staff looking to become familiar with nature-based solutions.

REFERENCES

Archipelago Marine Research LTD. 2000. *Subtidal Survey of the Physical and Biological Features of Esquimalt Lagoon*. Capital Regional District. Victoria and Esquimalt Harbours Environmental Action Program. https://www.crd.bc.ca/docs/default-source/initiatives-pdf/veheap-pdf/subtidal-survey-of-physical-and-biological-features-of-esquimalt-lagoon-1-report-2000.pdf?sfvrsn=883155cc_2

Asset Management BC (AMBC). 2019. *Integrating Natural Assets into Asset Management.* AMBC. https://www.assetmanagementbc.ca/wp-content/uploads/Integrating-Natural-Assets-into-Asset-Management.pdf

Bridges, T.S., King, J.K., Simm, D., Beck, M.W., Collins, G. Lodder, and Mohan, R.K. 2021. *International Guidelines on Natural and Nature-Based Features for Flood Risk Management.* U.S. Army Engineer Research and Development Center.

Capital Regional District (CRD). n.d. HEIR Report: Intertidal and Backshore. Capital Regional District. Victoria, BC, Canada. https://www.crd.bc.ca/docs/default-source/initiatives-pdf/veheap-pdf/heir-report-intertidal-and-backshore.pdf?sfvrsn=41839ec9_0

Capital Regional District. 2013. *What is CRD*. https://www.crd.bc.ca/about/what-is-crd

Capital Regional District. 2018. CRD Regional Map. https://maps.crd.bc.ca/Html5Viewer/?viewer=public&

Capital Regional District. 2021a. Climate Action Strategy, Taking Action on the Climate Emergency. Capital Regional District. Victoria, BC, Canada. https://www.crd.bc.ca/docs/default-source/crd-document-library/plans-reports/climate/crd__climate-action-strategy__2021.pdf?sfvrsn=5e9c31cd_8

Capital Regional District. 2021b. Capital Region Coastal Flood Inundation Mapping Project Summary. Version 2.0. Capital Regional District. Victoria, BC, Canada. https://www.crd.bc.ca/docs/default-source/climate-action-pdf/reports/2020-sea-level-mapping-project/coastal-flood-inundation-mapping-project-summary.pdf

Capital Regional District. 2021c. Task 2 – Sea Level Rise Modelling and Mapping Report. https://m214.syncusercontent1.com/mfs-

60:53e22f5f4b733f0ecccedb06e5881f93==========/p/Task%202%20Report%202021.pdf

Capital Regional District. 2023a. Capital Regional District 2023-2026 Board Priorities. Capital Regional District. Victoria, BC, Canada. https://www.crd.bc.ca/docs/default-source/crd-document-library/plans-reports/board-priorities-2023-2026.pdf?sfvrsn=356354ce_2

Capital Regional District. 2023b. Capital Regional District 2023-2026 Corporate Plan. Capital Regional District. Victoria, BC, Canada. https://www.crd.bc.ca/docs/default-source/crd-document-library/plans-reports/crd-corporate-plan-2023-2026.pdf?sfvrsn=9d545bce_5

Capital Regional District. 2024a. Administrative Boundaries. https://www.crd.bc.ca/docs/default-source/regional-planning-pdf/population/crd-area-map---colour.pdf?sfvrsn=e05c8ac9_3

Capital Regional District. 2024b. CRD Harbours Atlas. Capital Regional District. Victoria, BC, Canada. https://maps.crd.bc.ca/Html5Viewer/?viewer=Harbours

City of Colwood. 2022. *Official Community Plan Bylaw 2018 No.1700.* Colwood, BC. https://colwood.civicweb.net/document/131567/

City of Colwood. 2024a. *Colwood Waterfront Stewardship Plan Draft.* Colwood, BC. https://www.colwood.ca/sites/default/files/waterfront/21.11.18%20CWSP-Final-lagoonwest-apr2024.pdf

City of Colwood. 2024b. *Grants & Funding*. https://www.colwood.ca/city-hall/tenders-grants/grants

City of Toronto. 2024. Eco-Roof Incentive Program. Toronto, Ont. https://www.toronto.ca/services-payments/water-environment/environmental-grants-incentives/green-your-roof/

City of Victoria. 2023a. My Great Neighbourhood Grant Policy. Victoria, BC, Canada. https://www.victoria.ca/media/file/my-great-neighbourhood-grant-policypdf

City of Victoria. 2023b. Official Community Plan. Victoria, BC, Canada. https://www.victoria.ca/media/file/ocp-whole-book

Depner, W. November 6, 2017. Saanich News. https://www.saanichnews.com/news/rally-seeks-to-save-saanichs-edpa-246844

District of North Saanich. 2024. *Grants Provided to Organizations.* *https://northsaanich.ca/services/grants-in-aid/grants-provided-to-organizations/#:~:text=2023%20Grant%20in%20Aid%20Recipients%3A&text=British%20Columbia%20Aviation%20Museum,of%20Dominion%20Brook%20Park%20Society*

District of Saanich. 2023. *District of Saanich State of Biodiversity.* Saanich, BC. https://www.saanich.ca/assets/Parks~Recreation~and~Community~Services/Documents/State%20of%20Biodiversity%20Report%20-%20FINAL.pdf

District of Saanich. 2024a. Natural Asset Management. *https://www.saanich.ca/EN/main/local-government/asset-management-program/natural-asset-management.html*

District of Saanich. 2024b. *Neighbour to Neighbour Resilience Initiative.* *https://www.saanich.ca/EN/main/community/neighbour-to-neighbour-project.html*

District of Saanich. 2024c. *Saanich Naturescape Program.* *https://www.saanich.ca/EN/main/community/natural-environment/naturescape-program.html*

District of Sooke. 2022. District of Sooke Official Community Plan. Sooke, BC. https://sooke.ca/wp-content/uploads/2022/04/Picture-Sooke-OCP-Updates-FINAL_v4-1.pdf

District of Sooke. 2023. Community Grants Program. Sooke, BC. https://sooke.ca/i-want-to/apply/community-grant/

Gittman R., Scyphers S., Smith C., Neylan I., and Grabowski, J. 2016. Ecological Consequences of Shoreline Hardening: a Meta-analysis. BioScience 66(9): 763–73.

Gittman, R.K., and S.B. Scyphers. 2017. The cost of coastal protection: A comparison of shore stabilization approaches. Shore and Beach 85(4): 19–24.

Hilke, C., Ritter, J., Ryan-Henry, J., Powell, E., Fuller, B., Stein, B., and Watson, B. 2020. *Softening Our Shorelines: Policy and Practice for Living Shorelines Along the Gulf and Atlantic Coasts.* National Wildlife Federation. https://www.nwf.org/-/media/Documents/PDFs/NWF-Reports/2020/Softening-Our-Shorelines.pdf

Horan, D. 2021. *Asset Management Program Update.* Powerpoint slides. Director of Engineering & Public Works, District of Oak Bay. https://oakbay.civicweb.net/document/59908/Presentation%20-%20Asset%20Management%20Program%20Update%20-%202.pdf?handle=691DE23CF685405AB0683AE47AC6F4BF

Islands Trust. 2024. *Natural Area Protection Tax Exemption Program (NAPTEP).* *https://islandstrust.bc.ca/programs/natural-area-protection-tax-exemption-program/*

International Union for Conservation of Nature (IUCN). 2020. *Guidance for using the IUCN Global Standard for Nature-based Solutions. A user-friendly framework for the verification, design and scaling up of Nature-based Solutions. First edition.* https://portals.iucn.org/library/sites/library/files/documents/2020-021-En.pdf

Judd, A. 2021. Damage and Repairs Could Make B.C. Floods Canada's Most Expensive Natural Disaster. Global News – November 19, 2021. https://globalnews.ca/news/8388250/bc-floods-damage-cost-repairs-insurance-most-expensive-natural-disaster-canadian-history/

Lamont, G., Readshaw J., Robinson, C., and St-Germain, P. 2014. *Greening Shorelines to Enhance Resilience, An Evaluation of Approaches for Adaptation to Sea Level Rise.* SNC-Lavalin Inc. https://www.stewardshipcentrebc.ca/PDF_docs/greenshores/Resources/Greening_Shorelines_to_Enhance_Resilience.pdf

Municipal Natural Assets Initiative (MNAI). 2021. *Managing Natural Assets to Increase Coastal Resilience: Guidance Document for Municipalities.* https://mnai.ca/media/2021/11/MNAI-Coastal-Asset-Guidance-Doc-cover-101-combined.pdf

Municipal Natural Assets Initiative. 2022. *Toward natural asset management in the City of Colwood, British Columbia. Summary of inventory results and recommendations.* https://www.colwood.ca/sites/default/files/planning/documents/Natural%20Asset%20Inventory.pdf

Municipal Natural Assets Initiative. 2024. *The path to scale.* https://mnai.ca/the-path-to-scale/

National Oceanic and Atmospheric Administration (NOAA). 2015. *Guidance for Considering the Use of Living Shorelines.* https://www.habitatblueprint.noaa.gov/wp-content/uploads/2018/01/NOAA-Guidance-for-Considering-the-Use-of-Living-Shorelines_2015.pdf

Nature Canada. 2022. *Top 10 Municipal Actions to advance nature-based climate solutions.* *https://www.naturalinfrastructurenb.ca/wp-content/uploads/2022/12/NBCS-Top-10-Municipal-Actions.pdf*

Stewardship Centre for British Columbia (SCBC). 2022. *Esquimalt Gorge Park Demonstration Site.* https://stewardshipcentrebc.ca/esquimalt-gorge-park-gs-demonstration-site/

Sun, V. 2021. *Climate Caucus Councillor's Handbook: Nature-Based Solutions Executive Summary.* Climate Caucus. https://sustain.ubc.ca/sites/default/files/2020-083_Councillors%27%20Handbook%20of%20Nature%20Based%20Solutions_Sun.pdf

Town of Sidney. 2019. *Interim Flood Construction Level.* https://www.sidney.ca/wp-content/uploads/DV-014-Interim-Flood-Construction-Level.pdf

Town of Sidney. 2024. *Sea Level Rise.* https://www.sidney.ca/planning-building/climate-action-and-sustainability/sea-level-rise-climate-adaptation/

Township of Esquimalt. 2023. Green Shores at Esquimalt Gorge Park. https://www.esquimalt.ca/municipal-services/sustainability-environment/green-shores-esquimalt-gorge-park

Township of Esquimalt. 2024. *Community Grants.* https://www.esquimalt.ca/government-bylaws/taxes-grants/community-grants

Vouk, I., Pilechi, V., Provan, M., Murphy., Enda, 2021. *Nature-Based Solutions for Coastal and Riverine Flood and Erosion Risk Management.* https://www.csagroup.org/wp-content/uploads/CSA-Group-Research-Nature-Based-Solutions-for-Coastal-and-Riverine-Flood-and-Erosion-Risk-Management.pdf

West Coast Environmental Law (WCEL). 2012. *Preparing for Climate Change: An Implementation Guide for Local Governments in British Columbia.* https://www.wcel.org/sites/default/files/publications/WCEL_climate_change_FINAL.pdf

APPENDIX I – GLOSSARY

Development Cost Charges (DCCs): fees on new developments that are collected and regulated by local governments to help fund growth-related infrastructure.

Ecological rating: a classification of biological and physical features based on criteria such as ecological value and vulnerability.

Hard armour: traditional approaches towards shoreline protection. Includes manmade structures such as seawalls, bulkheads, dikes, etc.

Hard assets: tangible or physical resources with value, such as buildings, roads, sewage systems, etc.

Natural assets: natural features such as lakes, forests, and beaches, that provide services to humans and are managed, or could be managed by the government.

Natural asset inventory: an assessment of all natural assets within a community whereby an economic value is attributed to those natural assets/resources based on their ecological services, so that their value is considered in land-use decisions in the same way that **hard assets** are.

Nature-based solutions (NbS): management actions that harnesses nature's resiliency to tackle pressing environmental and societal challenges in a sustainable, mutually beneficial way, using the most natural methods possible for the site.

Official Community Plan (OCP): a local government plan that outlines the long-term visions of communities.

Regional Growth Strategy (RGS): a comprehensive plan created by governments that provides an overarching framework, as well as objectives, goals, and actions for the long-term growth of a region.

Retreat: an adaptation to sea level rise in which settlements, infrastructures, and communities, are strategically and permanently relocated to non-risk locations.

Sea level rise (SLR): the increase in the water level of the world's oceans due to climate change.

Whole Systems Approach: a strategy for conservation, where topics like nature-based solutions (NbS) are integrated throughout the community rather than being limited to a particular jurisdiction or regulatory boundary. This is a holistic, forward-thinking approach that involves all rightsholders and stakeholders, and strives to achieve shared goals among governments and members of the community.

APPENDIX II – METHODS

GOAL

The purpose of this report is to be an educational piece for the Resilient Coasts for Salmon project that will be included in community mapping reports. This report represents a review of bylaws, policies and incentive programs that have been implemented in some east coast Vancouver Island (ECVI) communities to support the uptake of nature-based approaches to climate adaptation. The websites of select ECVI communities will be reviewed for bylaws, policies, funding and incentive programs that support the uptake of nature-based solutions, and address climate adaptation related to concerns with sea level rise, storm surge and coastal flooding. The reviewer is seeking any bylaw, policy, incentive/rebate program or otherwise that supports

1. the implementation of nature-based solutions (NbS);
2. proactive planning for Sea Level Rise (SLR); and
3. the removal of hard armour, or prevention of new armouring being constructed.

This report highlights strategies implemented by ECVI local governments to address coastal climate change impacts, as well as identify common barriers to implementation of nature-based adaptation strategies.

Note: this is not a systematic review. There may be some inherent biases in documents that were chosen and reviewed.

PROCEDURES FOR SECTION 1: GUIDANCE DOCUMENTS

1. Document collection

Guidance documents were found through Google search or by recommendation of colleagues and were chosen for review by relevancy to coastal climate change adaptation and NbS. No strict set of search terms were used to find these guidance documents, but included terms such as coastal climate change guidance, sea level rise guidance, coastal management, green infrastructure guidance, and more. Each guidance document was reviewed briefly (through examination of abstract, overview, and/or table of contents) to ensure relevancy of content to report topic. Most of the guidance documents used were specific to Canada, with a few resources from the USA and International organizations (table 1).

The following is a full list of the guidance documents chosen and used for the reports:

Table 1 - List documents used for the Guidance Document Review (section 1 of report).

Title	Published by	Year published
Climate Caucus Councillor's Handbook: Nature-Based Solutions	Climate Caucus	2021
Greening Shorelines to Enhance Resilience: An Evaluation of Approaches for adaptation to Sea Level Rise	Stewardship Centre for British Columbia	2014
Guidance for Considering the Use of Living Shorelines	National Oceanic and Atmospheric Association (NOAA)	2021
Guidance for using the IUCN Global Standards for Nature-based solutions: a user-friendly framework for the verification, design and scaling up of Nature-based Solutions	International Union for Conservation of Nature (IUCN)	2020
International Guidelines on Natural and Nature-Based Features for Flood Risk Management	Engineering with Nature	2021
Managing Natural Assets to Increase Coastal Resilience: Guidance for Municipalities	Managing Natural Assets Initiative (MNAI)	2021
Nature-Based Solutions for Coastal and Riverine Flood and Erosion Risk Management	Canadian Standards Association (CSA)	2021
Preparing for Climate Change: An implementation guide for local governments in British Columbia	West Coast Environmental Law (WCEL)	2012
Softening our Shorelines: Policy and Practice for Living Shorelines Along the Gulf and Atlantic Coasts	National Wildlife Federation	2020
Top 10 Municipal Actions to advance nature-based solutions	Nature Canada	2022

2. Document review

Each guidance document was thoroughly reviewed for relevant information to coastal climate change and NbS. Comprehensive notes were taken on each guidance document in preparation for writing the report.

PROCEDURES FOR SECTION 2:

Regional and municipal government documents (policies, bylaws, incentive programs, projects, etc.)

1. Document collection methods

Documents from this section were collected from the Capital Regional District (CRD) website, as well as the websites of each municipality within the jurisdiction of the CRD (i.e., City of Victoria website, City of Sooke website, etc.). Webpages on each website were thoroughly reviewed for information and documents relevant to coastal climate change and shoreline management. For example, the CRD's Projects & Initiatives page was checked for initiatives regarding coastal management and NbS, the Bylaws page was checked for relevant shoreline bylaws Official Community Plans (OCP), and Land Use Bylaws (LUB), and so on. In some cases, documents were found by searching of specific terms in a website's document library (e.g., Coastal Development Permit Area, Nature-based Solutions, Coastal climate change, etc.). Documents such as Regional Growth Strategies, Official Community Plans, Climate Adaptation Strategies, as well as relevant bylaws, projects, and programs were noted in an Excel spreadsheet and reviewed. The same process was repeated for the websites of each municipal government under the jurisdiction of the CRD. All documents collected were then put in an excel spreadsheet to be kept track of.

Note: while stormwater and runoff management are relevant to coastal resource and habitat protection, we have chosen to omit regulatory practices and policies related to these topics in our review.

2. Document review

Documents compiled into the excel spreadsheet were filtered for relevancy to coastal climate change adaptation and NbS. Comprehensive notes were then taken on each document in preparation for writing the report.

3. Staff interviews

A list of staff from the CRD and municipalities of the CRD were contacted for interviews with the report author so as to gain further insight into their local government's coastal management methods and learn about barriers to coastal adaptation. Staff contacted were based on their roles within their respective government, the relevancy of their department to coastal and climate issues. This includes planners, engineers, staff in climate action, sustainability, and parks departments, and more. Staff may also have been contacted due to already-established partnerships with the Pacific Salmon Foundation, or by recommendation by other government staff.

A total of eleven staff members from various CRD local governments and in various positions were interviewed, with one contacted solely through email. Interviews were booked through Doodle, conducted over Zoom, and ranged from 15-45 minutes long. With the staff's permission, interviews were recorded over Zoom and transcribed through OtterPilot AI. The interviewer also recorded notes during the interview.

For the full list of interview questions asked, see Appendix III.

APPENDIX III - INTERVIEW QUESTIONS

1. What measures are in place to address coastal climate change adaptation? What kind of projects do you have on the go? (e.g. green projects, community planning for sea level rise, removal of hard armouring)
2. What protections are currently in place for shoreline habitats? Does your community initiate restoration and ecological monitoring, or mapping/modeling? Are shoreline assessments conducted? If so, when?
3. Are you/your department developing any resources for internal or external use related to shoreline development or climate change adaptation? (e.g. climate data/modeling, educational materials)
4. How involved are community members in climate adaptation work? Have there been polls or public engagement sessions to understand the needs and priorities from the community members' perspective? Do you have a sense of what the community wants in terms of coastal adaptation and shoreline management?
5. What bylaws are in place that are relevant to shoreline protection or construction on the shoreline?
6. Do you know of any initiatives or incentives that are currently offered within your community to residents to promote nature-based climate change adaptations or the removal or prevention of hard armouring? How and why were they initiated?
7. Do community members contact you with concerns and for guidance on sea level rise? Do you feel you have enough knowledge to answer their questions about sea level rise and coastal resilience?
8. What are some barriers that you have experienced or witnessed when dealing with climate change related issues? What information or resources do you/communities/governments need to move past these barriers and support the implementation of climate adaptations/nature-based solutions?

Note: some questions may not have been asked and/or changed during the interview.

PACIFIC SALMON FOUNDATION

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