AGENDA
RESILIENT SAANICH TECHNICAL COMMITTEE
March 9, 2023, 6:30– 8:30 PM
Held virtually via MS Teams

In light of the Saanich Communicable Disease Plan related safety measures, this meeting will be held virtually via MS Teams. Details on how to join the meeting can be found on the committee webpage – Resilient Saanich Schedule, Minutes & Agendas. Please note that individuals participating by phone are identified by their phone number, which can be viewed on screen by all attendees of the meeting.

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1. **Territorial Acknowledgement**

2. **Approval of Agenda**

3. **Adoption of Minutes**
   - February 16, 2023, meeting

4. **Receipt of Correspondence**

5. **Review of DHC State of Biodiversity Report Draft (1.5 hrs.)**
   - Lead: Tory Stevens

6. **Review of Environmental Policy Framework Draft (30 min.)**
   - Lead: Judith Cullington

*** * Next Meeting: April 20, 2023**

To ensure quorum, please email megan.macdonald@saanich.ca if you are not able to attend.

MINUTES
RESILIENT SAANICH TECHNICAL COMMITTEE

Via Microsoft Teams
February 16, 2023 at 6:30 p.m.

Present: Tory Stevens (Chair); Councillor Zac de Vries, Kevin Brown; Tim Ennis; Purnima Govindarajulu; Stewart Guy; Jeremy Gye; Chris Lowe; Brian Wilkes; and Bev Windjack

Guests: Mike Coulthard, Alison Kwan, and Aubrey Butcher of Diamond Head Consulting (DHC); Judith Cullington, Secretariat

Staff: Eva Riccius, Senior Manager of Parks; Thomas Munson, Senior Environmental Planner; and Megan MacDonald, Senior Committee Clerk

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TERRITORIAL ACKNOWLEDGEMENT & DIVERSITY, EQUITY AND INCLUSION STATEMENT

Councillor Z. de Vries read the Territorial Acknowledgement and the Diversity, Equity and Inclusion Statement.

APPROVAL OF AGENDA

MOVED by C. Lowe and Seconded by B. Wilkes: "That the Agenda for the February 16, 2023, Resilient Saanich Technical Committee meeting be approved."

CARRIED

ADOPTION OF MINUTES

MOVED by C. Lowe and Seconded by S. Guy: "That the minutes of the January 19, 2023 Resilient Saanich Technical Committee meeting be adopted."

CARRIED

REVIEW OF DIAMOND HEAD CONSULTING DRAFT STATE OF BIODIVERSITY REPORT

A. Kwan of Diamond Head Consulting (DHC) gave an overview of the Draft State of Biodiversity Report (Powerpoint on file). Committee members were given the opportunity to provide feedback on the draft report, the following was noted during committee discussion:

- The level of detail provided in the document is not what members had hoped for, specifically the quantification. An example of the data available for salmon counts in local streams was given, although the data is available, it is not included in the report.
- The report is a foundational document which will enable staff and the public to monitor progress. It would be preferable to have a scale to rate areas excellent/good/fair or poor.
- Information is widely available, and it would be preferable to use more of the resources that are out there, such as GIS data and iNaturalist.
- Many groups in the region publish data that could be better incorporated in the report.
- The report needs to be detailed enough to enable the community to monitor progress.
- Stewardship and restoration efforts need to be quantifiable, the report should include data to know where we currently stand.

- A list of species should be included, even if the quantities are not currently available.
- Having the report set up in a way that data can be added in future would be beneficial.
- The Provincial data which was included is out of date. Much more effort is needed to gather current information to form the baseline.
- Having a table of current conservation measures and targets would be useful.
- Understanding the current trends and conditions is the crux of understanding the state of biodiversity. There should be more focus on quantifiable metrics.
- It will be difficult to articulate trends without a proper baseline. The report could include data such as impervious surfaces, daylighting and many other metrics that are currently available. Inclusion of this data is integral to develop a baseline and monitor trends.
- The Comox Valley was recently able to use Land Satellite data to back cast carbon sequestration for the past 40 years, this was only possible because of past monitoring.
- The ground truthing on page 7 and 8 does not include data, conditions or trends.
- Deeper results from the ground truthing would be preferred. More focus on analysis of the conditions and trends. GIS also has great information which could help inform this.
- Ideally the baseline would be detailed enough to changes in the future.
- Many sites were in poorer condition than what previous data implied. Site visits may inform changes that have taken place over time.
- Further work is required to determine where species are located.
- A better definition of phrases used should be included. An example of the use of “natural areas” was given. Another example was “threatened species” – the designation is not clear, phrases need to be more clearly defined.
- Adding a glossary to the report would be extremely helpful.
- Key ecological features are missing from the report, quantifying aspects such as impervious surface coverage and forest canopy coverage is necessary to fully understand the state of biodiversity in Saanich. Understanding how changes in these metrics influence other aspects of biodiversity is necessary.
- The report does not define what the state of biodiversity is in Saanich. The committee would like to better understand what will come from the report. Strengthening the connection between the State of Biodiversity and the Biodiversity Strategy is important.
- A summary of what data exists as a table in an appendix would be helpful. Making the reasons why the existing data was not used in the report is also necessary. This could include links to fish counts, or other field biologist findings in the region.
- The rational for the ranking of biodiversity hot spots is mysterious, there needs to be an explanation on how these areas were ranked. iNaturalist data could be skewed as there are more people that visit parks than areas outside the Urban Containment Boundary, however many privately owned areas are likely much higher in biodiversity than parks.
- Stewardship programs are not fairly represented. There needs to be balance as Pulling Together is mentioned however they are only one of many stewardship groups.
- Metrics on the biggest threats to biodiversity would be helpful, including how much is spent per capita on maintaining natural areas or other quantifiable figures is needed.
- Metrics need to be set to ensure that changes to the State of Biodiversity can be measurable and clearly shown year over year.
- The executive summary references metrics and directions, these need to be more articulated than just one paragraph. The document needs stronger wording to address the fact that it will lead into the Biodiversity Strategy and form the base line.
- A number of statements are made in the document (such as “support populations of healthy wildlife”), which have no data to demonstrate they are true.
- The information on invasive species is provided to Saanich on a self-reported basis, there could be gaps in the data due to the fact that not everybody reports invasives.

The following was noted in response to committee member comments:

- The State of Biodiversity Report is intended to be a high-level public facing document, highlighting the important aspects about the state of biodiversity.
- Information can be added regularly to further the level of detail. An example was given of Whistler, who has decades of information available based on ongoing research.
- Determining what species exist and the quantity of them will take time.
- The ground truthing produced samples of data that can be used to monitor change.
- There are limitations on what can be included. The Biodiversity Strategy will include more information about what to do moving forward.

The consultant will take the feedback from the committee into consideration and send an updated report to staff. Once the finalized State of Biodiversity Report is submitted, Staff will forward a report with recommendations for Council to consider. The committee expressed interest in reviewing the updated report and providing feedback prior to Council consideration. Given the short timeline and opportunity for the committee to provide Council feedback, the March meeting date was moved ahead one week for the committee to review the updated report.

ADJOURNMENT

On a motion from J. Gye, the meeting adjourned at 8:48 p.m.

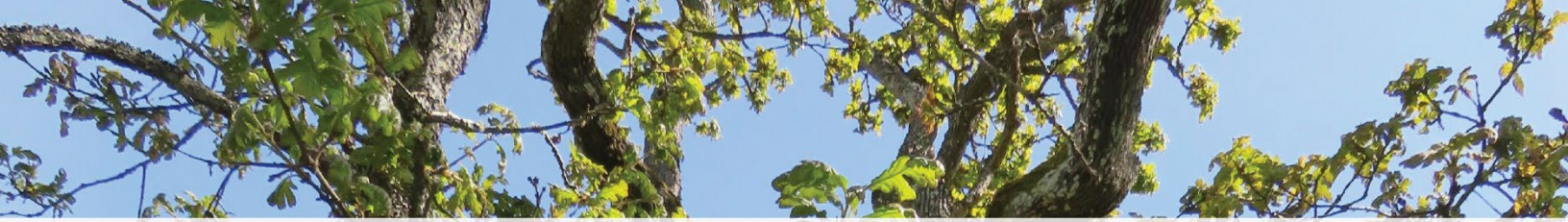
NEXT MEETING

The next meeting is scheduled for March 9, 2023 at 6:30 p.m.

_____
Tory Stevens, Chair

I hereby certify these Minutes are accurate.

_____
Committee Secretary



District of Saanich

State of Biodiversity Report

February 2023 - DRAFT

DIAMOND HEAD

Saanich

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Land Acknowledgement

The District of Saanich lies within the territories of the lək̓ʷəŋən peoples represented by the Songhees and Esquimalt Nations and the W̱SÁNEĆ peoples represented by the W̱JOŁEŁP (Tsartlip), BOḴEĆEN (Pauquachin), SȾÁUTW (Tsawout), W̱SIḴEM (Tseycum) and MÁLEXEŁ (Malahat) Nations. The First Peoples have been here since time immemorial and their history in this area is long and rich.

The District of Saanich is proud that our name is derived from the W̱SÁNEĆ peoples. Saanich Council is committed to taking a leadership role in the process of healing wounds of the past and becoming a more just, fair, and caring society.

Acknowledgements

The District of Saanich would like to thank all involved in the process of developing the State of Biodiversity Report. This includes community members who volunteered their time to participate in the online StoryMap, technical experts for reviewing preliminary mapping layers, and volunteers on the Resilient Saanich Technical Committee (RSTC).

Current and former RSTC members and their specialities include:

Kevin Brown, Terrestrial ecology
Brian Emmett, Marine Ecology
Tim Ennis, Conservation Planning and Management
Purnima Govindarajulu, Conservation and Restoration Ecology
Stewart Guy, Conservation Planning and Management
Jeremy Gye, Urban Forestry
Tiffany Joseph, W̱SÁNEĆ Steward
Chris Lowe, Marine Ecology
Kear Pottris, Indigenous Knowledge
Tory Stevens, Terrestrial Ecology
Brian Wilkes, Aquatic Ecology
Bev Windjack, Landscape Architecture

In addition, District staff & council played an invaluable role in working with committee members and the project consultants. Council Liaisons included Rebecca Mersereau (2020-2022) and Zac De Vries (2023-ongoing).

The State of Biodiversity report process was led by consultants from Diamond Head consulting including:

Cassandra Cummings, Project Manager, RPBio, PPP
Aubrey Butcher, Biologist, RPBio
Nguyet-Anh Nguyen, GIS Technician
Alexandra Welch, Junior Biologist
Mike Coulthard, Principal-in-Charge, RPBio, RPF
Alison Kwan, Biologist, RPBio
Vlad Romanescu, Senior GIS Technician
Austin Tahiliani, Junior Biologist, Arborist, BIT

Executive Summary

The District of Saanich is home to some of the rarest ecosystems in Canada. These include a long and rich marine foreshore, large productive lakes and wetlands, long river systems and a diversity of plant communities that support healthy wildlife populations. The natural areas in Saanich provide unique ecological characteristics and are home to many rare and threatened species. Saanich is characterized by these natural areas and its citizens are committed to protecting them for future generations.

The Resilient Saanich program was initiated by council in 2017 and will develop a policy framework for environmental protection in Saanich. This process will also result in a Climate Plan, Biodiversity Conservation Strategy, and an Enhanced Stewardship Program. This State of Biodiversity report provides an understanding of the current state of the District's natural areas and the elements that threaten their integrity, and will be the foundation of the Biodiversity Conservation Strategy. Natural areas and their characteristics have been mapped and analyzed using existing spatial layers and current technologies which will be shared with the public on SaanichMap and should be updated on a regular basis.

Key Takeaways from the State of Biodiversity Assessment:

Saanich is home to some of BC's most unique and rare ecosystems and species. Coastal Douglas-fir forests are regarded as the province's smallest and most at-risk climatic zone, and are some of the most biodiverse areas in Saanich. Garry oak ecosystems are a subset of this zone and support some of the most at risk plant communities and species in BC; however, **remaining Garry oak ecosystems ranked lower in the biodiversity ranking when compared to large intact Coastal Douglas-fir forests**. This is largely due to development, fragmentation, and historic and ongoing degradation.

Historic and ongoing development has resulted in declines in the size and distribution of many of Saanich's natural ecosystems. Many of the remnant ecosystems which remain were once much more abundant in Saanich and in the region.

Historic logging removed most of the original old growth forests. The majority of forests are less than 150 years old. Only 2% of old-growth forests remain in Saanich.

Natural areas cover 38.5% of Saanich. Collectively these provide a rich mosaic of habitats and ecosystem types, many of which are rare or unique.

43% of Saanich is classified as "Backyard Biodiversity". This includes areas that are not in a natural state but provide some habitat value. It includes a diversity of areas such as private backyards (37.1%), agricultural fields (36.3%), boulevards, and street trees (12%), among others. The extent of these areas highlights Saanich's opportunity to enhance biodiversity throughout the district.

Many valuable natural areas are protected in Saanich, however, a majority remain unprotected and at risk. Coastal sand ecosystems are the least protected target category in Saanich, with only 1.8% occurring in protected areas.

Biodiversity in Saanich is becoming increasingly threatened. Some of these threats include development, loss of indigenous culture and practices, pests, and recreational pressure. **Invasive species are an ongoing threat which threaten natural areas with or without legal protection.** Climate Change will continue to cause dramatic changes to the natural environment which will cause plant community composition and wildlife population dynamics to change.

Many of the detailed characteristics of Saanich's natural areas are not fully understood or ground truthed. The mapping of natural areas and their canopy extent has been greatly improved but would be further improved through additional ground assessments. The level of disturbance and impacts of invasive plants is not well documented across the District.

Larger urban parks such as PKOLS (Mount Douglas Park), Swan Lake, and Rithet's Bog stand out as highly ranked areas of biodiversity within the Urban Containment Boundary. These parks and other similar parks provide important refuge for wildlife within the UCB.

The second phase of this initiative is to develop a Biodiversity Conservation Strategy which will provide a roadmap to protect and enhance natural assets through policy, operations, and public stewardship. Decisions for the future of Saanich will depend on how the district balances protecting and enhancing biodiversity while meeting the needs of citizens and providing access to nature. This can include looking at ways to increase connectivity between natural areas to help restore the functionality of ecosystems in Saanich. The findings from this assessment will inform the Biodiversity Conservation Strategy and act as a baseline description to guide future planning and policies.

Photo 1: View of the District of Saanich from Mount Tolmie.

Acronyms

BCCDC – British Columbia Conservation Data Centre
BEC – Biogeoclimatic Ecosystem Classification
CDF – Coastal Douglas-Fir
CRD – Capital Regional District
CRISP – Capital Region Invasive Species Partnership
DEM – Digital Elevation Model
DHC – Diamond Head Consulting
EDRR – Early Detection Rapid Response
ESA – Environmentally Significant Areas
GIS – Geographic Information System
ISMS – Invasive Species Management Plan
LiDAR – Light Detection and Ranging
MOF – Ministry of Forests
QEP – Qualified Environmental Professional
RSTC – Resilient Saanich Technical Committee
SAR – Species at Risk
SEI – Sensitive Ecosystem Inventory
TEI – Terrestrial Ecosystem Information
TEIS – Terrestrial Ecosystem Information System
TEM – Terrestrial Ecosystem Mapping
UCB – Urban Containment Boundary

Glossary

Biodiversity	Biodiversity is a term used to describe the variety and variability of life on Earth. Biodiversity encompasses all living species and their relationships to each other. This includes the differences in genes, species and ecosystems.
Biodiversity Target Categories	The eight types of habitat elements that the Resilient Saanich Technical Committee has identified which will be targeted in biodiversity planning in Saanich.
Biogeoclimatic Ecosystem Classification (BEC)	An ecosystem classification system developed specifically for BC's ecosystems. BEC classifies specific ecosystem types in the province based on climate, soils, and ecology.
Early Detection Rapid Response (EDRR)	A management approach used to find, identify, and systematically eradicate, contain, or control new invasive species before they can widely reproduce beyond their initial entry.
Ecosystem Services	The many and varied benefits to humans provided by the natural environment and from healthy ecosystems. Carbon sequestration, recreation potential, shade, water filtration, and pollination are all examples of ecosystem services associated with the urban forest.
Environmentally Significant Area	An area identified as having features which are of ecological or environmental significance and are vulnerable to disturbance or degradation by human activities or developments.
Invasive Species	A species which is not native or is outside of its natural distribution and which is negatively impacting the environment, people and/or the economy.
LiDAR	Acronym for 'light detection and ranging'. An active remote sensing technology which can measure vegetation height and elevation using laser scanning.
Mixed forests	Forests where neither coniferous trees, nor deciduous trees account for over 66% of the stand canopy.
Native Species	A species which is present without direct or indirect human intervention, and which is present within its natural range and limited by its natural dispersal.
Natural Area	Any physical area that contains sufficient native species, ecological communities, or habitat features to support native biodiversity.
Protected Areas	Lands which have legal protections or with limitations on use, specifically safeguard the natural environment, such as natural state covenants, conservation areas and parkland. For this assessment, all parkland was included as a protected area, regardless of park use.
Protected Areas	Lands which have legal protections or with limitations on use, specifically safeguard the natural environment, such as natural state covenants, conservation areas and parkland. For this assessment, all parkland was included as a protected area, regardless of park use.

Resilient Saanich	Saanich's process to develop an environmental policy framework to current policy gaps in natural environmental objectives by developing plans, policies, bylaws, and strategies to support the vision of an environmentally conscious future.
Resilient Saanich Technical Committee	A volunteer committee consisting of local environmental industry professionals supporting District staff, council, and consultants in developing the framework.
Sensitive Ecosystem Inventory (SEI)	A standardized mapping approach and an associated dataset specifically designed for mapping sensitive ecosystems.
Species and Ecosystems at Risk	A specific species or group of species which have been identified as extirpated, endangered, threatened, or of special concern.
Terrestrial Ecosystem Mapping (TEM)	A standardized mapping approach and an associated dataset providing site-specific classifications and descriptions of ecosystem units in BC.
Threatened	Likely to become endangered if limiting factors are not reversed.
Tree	For the purposes of this report, a tree is any woody plant with a height of at least 2 m, including all native and non-native species

1.0 Introduction

The District of Saanich is situated at the southern tip of Vancouver Island along the Pacific Ocean with a long marine foreshore. It contains numerous freshwater rivers and lakes, a diversity of forests and is home to some of the rarest ecosystems in Canada. It is also home to over 117,000 people, making it the most populous municipality on Vancouver Island. The citizens of Saanich value these natural assets and are committed to protecting them for future generations, while also providing housing and related infrastructure for a growing population.

The Resilient Saanich program aims to coordinate the development of an environmental policy framework. This includes considering existing and potential future options to address gaps and produce a more coherent body of plans, policies, bylaws and strategies in support of a more resilient Saanich[1]. This State of Biodiversity report provides a baseline understanding of the current state of the District's natural areas and the threats to their integrity. Natural areas have been inventoried and mapped using existing datasets augmented by current technologies, providing a foundation for their management. The report focuses on native biodiversity, however, it also includes information on backyard biodiversity which represents an important opportunity for enhancement. The second phase of this initiative is to develop a Biodiversity Conservation Strategy which will provide a roadmap to protect and enhance natural assets through policy, operations, and public stewardship.

Photo 2: The District of Saanich is situated along the Pacific Ocean with a long marine foreshore.

1.1 What is Biodiversity and Why is it Important?

Biodiversity is a term used to describe the variety and variability of life on Earth. It encompasses every living thing on the planet, ranging from microorganisms to plants, animals, fungi, and even entire ecosystems. Biodiversity is typically interpreted as the number of species that inhabit an area and their abundance. This can be used as an indicator of ecosystem health and integrity.

Photo 3: Biodiversity is the variety and variability of life on Earth and encompasses every living thing.

The natural areas in and surrounding the communities of Saanich are complex and provide many ecosystem services that benefit both humans and the broader community of living organisms. Protecting and enhancing these natural assets ensures they will continue to provide these services and makes them more resilient to the threats of urban development and climate change. Natural areas provide visual barriers to infrastructure, reduce pollution, dust, and noise. Trees and shrubs capture and store atmospheric carbon dioxide through photosynthesis, sequestering carbon in the process. These trees and shrubs provide shade which can help cool nearby buildings and paved surfaces, thereby reducing indoor and outdoor air temperatures. This has been shown to decrease heat-related hospitalizations.[2] It has also been shown that access to natural areas is correlated with improved mental and physical health.[3] Collectively, maintaining and enhancing these ecosystem services helps to stem biodiversity loss and support adaptation to climate change.

Vegetation intercepts rainfall, reducing overland flow and the stress on stormwater management systems during heavy rainfall events. Watercourses and wetlands purify and retain water and provide critical habitat for terrestrial and aquatic species. They also act as reservoirs which can reduce flood impacts by retaining excess water during high rainfall events. Slowing and retaining rainfall through infiltration also serves to recharge groundwater which is a critical source of drinking water for many rural residents.

The State of the Urban Forest Report (currently in development) found that three-quarters of the District's tree canopy coverage is provided by natural areas.[4] Protecting these areas will ensure that they continue to provide these important services as the District continues to grow.

1.2 Stewardship in Saanich

The District of Saanich is within the territory of the Lək̓ʷəŋən peoples, known today as Songhees and Esquimalt Nations, and the W̱SÁNEĆ peoples. Collectively, these First Peoples have been caring for the land since time immemorial. Their role as protectors of the land continues to be vital today. The District of Saanich recognizes that importance, entering into a Memorandum of Understanding (ÁTOL,NEUEL, "Respecting One Another") with the W̱SÁNEĆ Leadership Council formalizing their commitment to reconciliation and pursuing opportunities for collaboration.[5] In the spirit of this MOU, W̱SÁNEĆ (SENĆOŦEN) place names are placed in brackets after the English name, where names could be found in a published source.

Photo 4: Stewardship efforts have removed invasive species, replanted with native species, and set up fences to protect the plantings. Vegetation outside the fence show signs of heavy predation before establishment.

District staff, volunteers, and residents have been working together to reduce the presence of invasive species for the past two decades on private and public land. Awareness and stewardship have increased exponentially during this time, leading to successful initiatives such as the Saanich Pulling Together Volunteer Program, the Garry Oak Restoration Program, and the Capital Region Invasive Species Partnership (CRISP), among many others. For example, Saanich's Pulling Together group volunteers in more than 45 different parks and natural areas removing invasive species, planting native vegetation, planning and monitoring the progress of ecological restoration work, and educating others on the efforts being made to improve wildlife habitat while increasing biodiversity.[6] There are a variety of stewardship programs in the District of Saanich. For more information, see their website: https://www.saanich.ca/EN/main/community/natural-environment/resilient-saanich-environmental-policy-framework/resilient-saanich-environmental-stewardship-programs.html.

1.3 Resilient Saanich

The District of Saanich has embarked on a program to create an environmental policy framework, called 'Resilient Saanich'. The intent of the Framework is to "produce a more coherent body of plans, policies, bylaws and strategies in support of a more resilient Saanich"[7]. A Resilient Saanich Technical Committee (RSTC) was created to provide independent analysis and provide recommendations to help inform the development of Resilient Saanich. This volunteer committee consists of local environmental industry professionals which support District staff, council, and consultants with the framework.

The Resilient Saanich process began in 2020 with Milestone 1: Initiate, which focused on public engagement and the development of the project's principles, goals and objectives. Public engagement for this phase included a virtual public open house which introduced the Resilient Saanich process, outlined the draft vision, principles, goals and objectives, and provided a feedback form. Stakeholders and partners were also targeted through focus group sessions. The process has now proceeded to Milestone 2: Assess, which includes the development of a Biodiversity Conservation Strategy and Enhanced Stewardship Program.

This State of Biodiversity report serves as the foundational technical document for developing the Biodiversity Conservation Strategy. Its purpose is to provide Saanich with a District-wide overview of the state of biodiversity. The next phase of this project will be to identify and prioritize ways to protect flora and fauna. This will be done by engaging Saanich citizens and staff, local experts, and First Nations.

Photo 5: Resilient Saanich Technical Committee members met with biologists from Diamond Head Consulting to visit key locations across Saanich.

2.0 Methodology

The information presented in this State of Biodiversity Report is based primarily on existing provincial, regional, and municipal datasets, and includes data collected by the public, such as through iNaturalist or provided by committee members. This information was supplemented and updated using LiDAR, recent orthophotos, and field visits to a representative sample of natural areas and watercourses. This data is presented on a series of maps. The main classification system used for natural areas is called Biodiversity Target Categories. These were determined by the RSTC following the Conservation Standards,[8] and are described in greater detail in Chapter 5.0 Biodiversity Target Categories. When possible, terminology from the Conservation Standards or the Standard Lexicon for Biodiversity Conservation was used to align with the methodologies used or recommended by the RSTC.[9;10]

2.1 Data Sources

A variety of spatial data sources were used for this analysis (Table 1). The spatial layers were sourced from provincial, regional, municipal, and volunteer datasets.

Table 1. Spatial layer data and respective source.

Municipal (Saanich)	Regional (CRD)	Provincial
Orthophoto (2021)	LiDAR-derived DEM (2019)	Terrestrial Ecosystem Mapping (TEM, 2010)**
Orthophoto (2019)	LiDAR-derived DSM (2019)	Sensitive Ecosystem Inventory (SEI, developed in 1997, published 2010)**
Municipal Boundary (2003)	LiDAR-derived Hillshade (2019)	BC Conservation Data Centre (CDC, 2022)***
Parcels (2022)*	Land Cover (2019)	
Invasive Species (known occurrences, 2022)*	Regional Parks (2019)	
Waterbody (2022)*	Canopy cover (2019)	
Watercourse (2022)*		
Storm Water (2022)*		
Streets (2022)*		
Trails (2022)*		
Parks (2022)*		
Zoning (2022)*		
Environmentally Significant Areas (ESA) (2014)		

** Municipal data first published in 2003 and has been updated in 2022.*
***Provincial data is from individual inventories conducted across the province from the 1980s to present (GeoBC, 2022, https://catalogue.data.gov.bc.ca/)*
**** B.C. Conservation Data Centre information is dynamic – it's updated regularly (https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/conservation-data-centre/explore-cdc-data)*

Data available from all sources were compiled into one geodatabase and analysed using ArcGIS Pro. This geodatabase was used to stratify natural ecosystems into polygons with similar plant community characteristics. The initial basis for these polygons was the provincial Terrestrial Ecosystems Management (TEM) data which is the most complete and consistent dataset covering the District of Saanich. These polygons were refined using the other datasets, LiDAR canopy analysis, and data collected during field assessments.

2.1.1 Municipal Datasets

The District of Saanich provided important spatial data that was absent in the regional or provincial datasets. While regional and provincial datasets can provide complete and consistent information across the District, they lack the more detailed information that is best provided by the municipality and at a finer level of detail. The municipal spatial layers incorporated into this analysis include the most recent orthophoto (2021) as well as cadastral layers such as the municipal boundary, urban containment boundary, parcels, streets, trails, parks, and land use zoning. The District also provided detailed environmental layers including the spatial location of all freshwater waterbodies (e.g. creeks, ponds, and lakes) and municipal storm system connections across the District. Where available, the watercourse layers provided information on the characteristics of the watercourse. This includes whether it is natural or manmade, whether it is a constructed ditch or a natural creek, its sensitivity (red, yellow, or green coded), and the condition of engineered structures.

Between 2011 and 2014, the District completed a mapping initiative to increase the inventory of habitat in Saanich. This was done through an Environmentally Significant Areas (ESAs) initiative which identifies and maps areas in Saanich that are believed to contain sensitive ecosystems, the marine shoreline, species at risk, and also includes remnant rare and endangered ecosystems and linkages between these areas.[11] This data was used to refine ecosystem polygons. The District also provided information on the distribution and abundance of invasive plant species which was used to understand the condition of natural areas.

2.1.2 Capital Regional District Datasets

LiDAR (Light Detection and Ranging) technology provides detailed spatial terrain and vegetation information. This is collected by emitting light through lasers from planes to determine the vertical and horizontal location of features. The CRD acquired raw LiDAR data from the provincial coastal zone LiDAR project which is available as open source data. This LiDAR data was then used to run a land cover analysis to develop a variety of spatial layers. Spatial layers developed and provided by the CRD include a Digital Elevation Model (DEM) and Digital Surface Model (DSM) which show accurate ground and surface features. LiDAR data from the CRD was also used to determine accurate tree canopy extents across the district. This data was used to identify the edges of forests and individual open grown trees. The canopy dataset also provides information on the composition of coniferous and deciduous trees and their heights.

2.1.3 Provincial Datasets

Three provincial datasets, the Sensitive Ecosystems Inventory (SEI) and Terrestrial Ecosystem Mapping (TEM), and BC Conservation Data Center (BCCDC), were used for this analysis. TEM is a standard used for medium to large scale mapping projects in British Columbia.[12] The TEM dataset provides stratification of a landscape into biogeoclimatic units, ecosystem units, and site units or site series. The TEM provides high-level information on a combination of ecological features including climate, physiography, surficial material, geology, soil, and vegetation. This information was available for all of the larger natural ecosystems in the District and was used as the foundation of this analysis. The primary information used from the TEM datasets include the BEC unit, site series, site codes (ecosystem type), and stand structure.

The SEI for East Vancouver Island and Gulf Islands is the first sensitive ecosystems inventory developed in British Columbia and was completed in 1997[13]. The SEI systematically identifies and maps ecologically significant and relatively unmodified sensitive terrestrial ecosystems. The purpose of this study was to support sustainable land use decisions and encourage wildlife conservation. As the Eastern Vancouver Island and Gulf Island SEI was the first to be developed in BC, the project methods predates provincial mapping standards. The SEI provides data on ecosystem types, dominant tree species, and approximate forest age. Since this is an inventory of potentially sensitive ecosystems, it did not cover the entire District of Saanich, however, the information in this inventory was used to inform the stratification of ecological polygons.

The BCCDC is a provincial program dedicated to conserving biodiversity and sharing scientific data and information on animals, plants, and ecosystems across BC. This program has a compiled list (based on current literature and expert advice) of species and ecosystems with occurrences in BC. The BCCDC also contains a spatial database of where the location of at-risk species and ecosystems have been confirmed.

2.1.4 New Datasets

New spatial layers were derived using those that were available. A combined dataset of all protected areas was developed which includes local and regional parks, as well as natural state covenants. It does not distinguish between natural area parks and urban parks.

A flow accumulation model was used to identify watercourses using the LiDAR-derived Digital Elevation Model (DEM) and hillshade layers from the CRD. This flow model was used to identify previously unmapped watercourses, ditches and other potential areas of overland flow and remnant creeks. It was also used to refine the locations of known watercourses. This dataset was also used to identify connected and disconnected lakes, wetlands, and pond features on a broad scale.

2.2 Ground Truthing

Ground-truthing was completed by registered professional biologists (RPBios) to review the accuracy of the spatial data and to better understand the ecological characteristics in the District. Site visits were completed from May 8th to May 10th and May 30th to June 3rd, 2022, under warm, dry conditions. This study did not allow for comprehensive field assessments. A sample of locations were identified and visited to understand and create a representative understanding of biodiversity in Saanich. While this report includes all public and private lands within the District, only public lands were visited. Approximately 8% of ecosystem polygons were visited to assess either terrestrial and/or aquatic features (Figure 1). This also included some ground-truthing of watercourses identified through the flow accumulation model. The majority of these watercourses were not assessed.

Photo 6: Natural areas throughout the District were visited by Registered Professional Biologists to confirm their site characteristics and to collect additional relevant information.

Qualitative attributes such as condition or restoration opportunities were recorded in consultation with the RSTC and District Staff, using predetermined categories to maintain consistency. The majority of the natural areas in the District are forested, however, additional terrestrial habitats including coastal bluffs, rock outcroppings and sparsely vegetated sites were also included in the inventory. Inventory data compiled included:

- Terrestrial habitat type
- Stand structural stage
- Tree species composition
- Average and maximum tree height and diameter
- Tree densities for each structural layer (stems/ha)
- Crown closure
- Soil texture, moisture, and nutrient regime
- BGC units to the site series level
- Dominant ground vegetation and cover
- Invasive species and coverage
- Stand condition
- Restoration opportunities
- Wildlife habitat features and observations
- Garry oak ecosystem characteristics
- Species at Risk observed
- Evidence of excessive deer browse
- Stand health concerns

The District of Saanich is home to a large range of wildlife species; however, a detailed wildlife survey was not conducted as part of the field verification and assessment. Detailed wildlife surveys require trapping and extended observation and could not be conducted in the scope of this project.

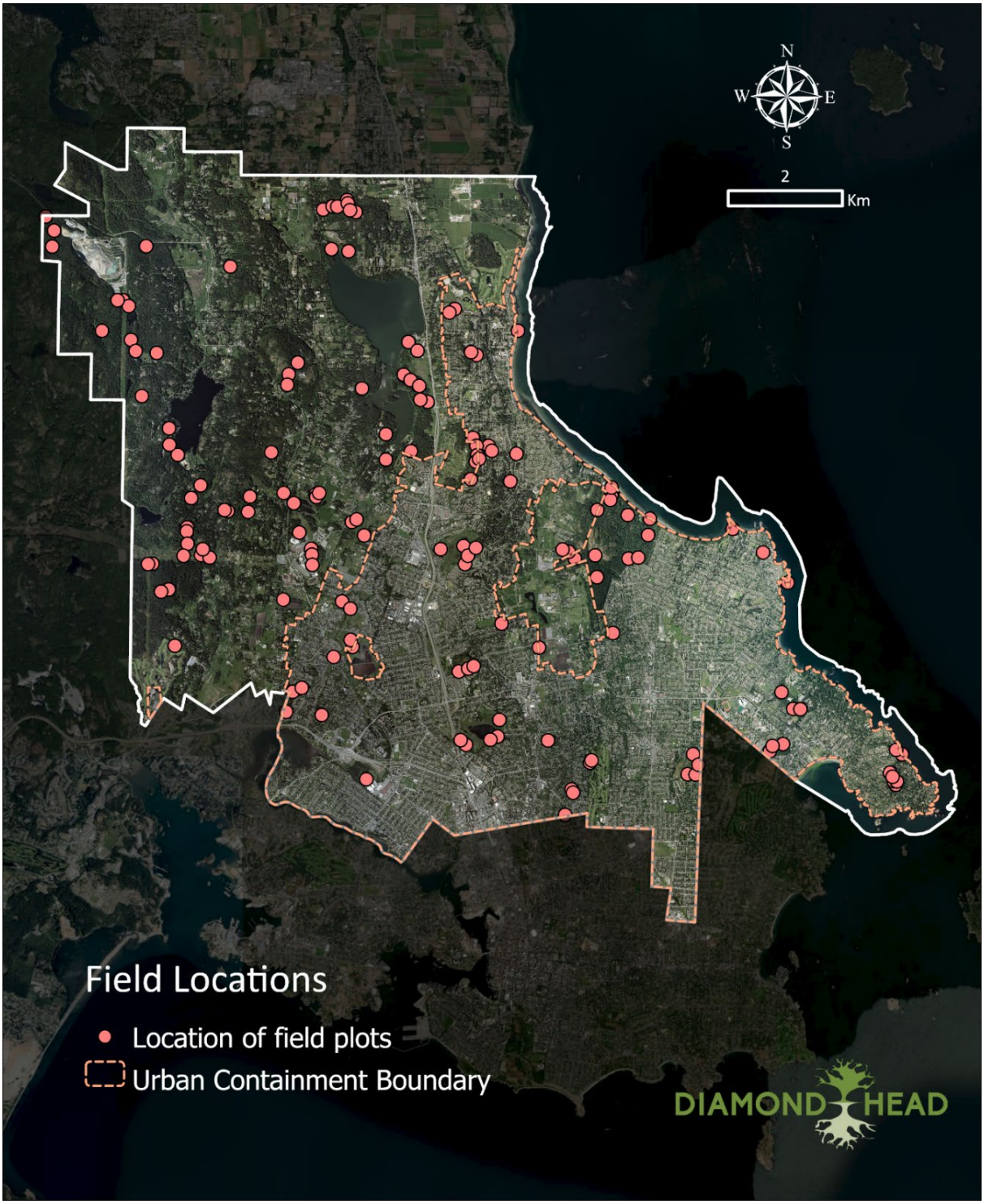

Figure 1. Location of field plots visited by 3 Registered Professional Biologists from Diamond Head Consulting. Site visits were completed from May 8th to May 10th and May 30th to June 3rd, 2022.

2.3 Expert Review

District Staff, RSTC, and technical experts from the District of Saanich reviewed the spatial layers using an ArcGIS Online web application (webapp, Figure 2). Through this webapp, reviewers were able to access a variety of spatial layers (i.e. Provincial TEM/SEI, Saanich's ESA, LiDAR, orthophotos, and DHC field verification plots). Webapp access was provided to District Staff and RSTC members directly. Technical experts were provided access at the discretion of the RSTC.

To focus on comments and feedback that could be used to update the spatial data, a list of recommended topics was provided to the reviewers. The comments and feedback were incorporated into the spatial data, where applicable. While comments outside of recommended topics were accepted, their incorporation into the project could not be guaranteed as the topic may not be covered in this report. Any comments relevant to the Biodiversity Conservation Strategy will be reviewed during the next stage of the project.

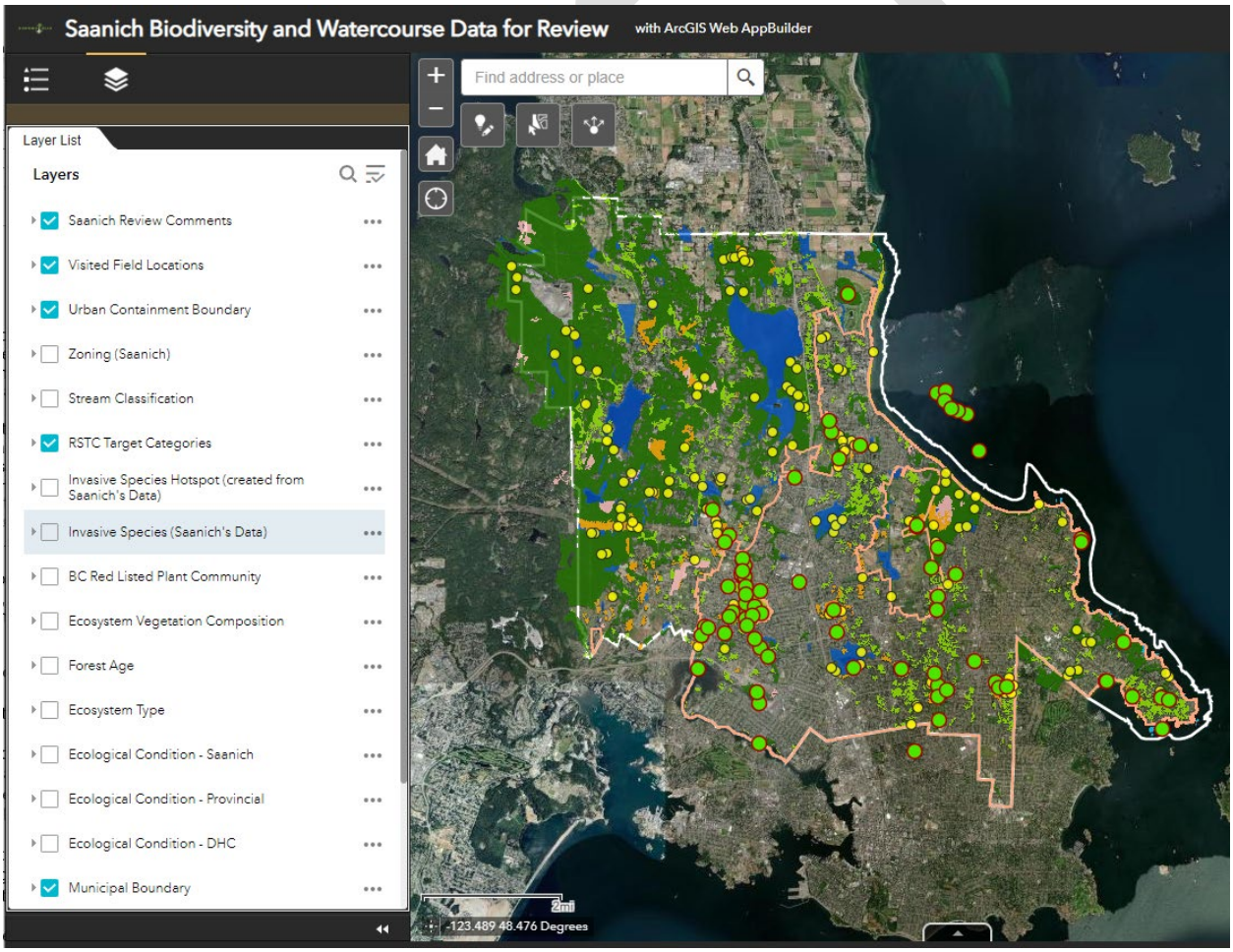

Figure 2. ArcGIS web application was used to collect feedback from District Staff, RSTC members, and selected experts.

2.4 Ecological Condition Assessment

An ecological condition assessment was planned by the RSTC to be a part of this assessment. It was intended to follow the methods of the Standard for Mapping Ecosystems at Risk in British Columbia. This methodology uses a set of criteria to assign a condition rating to a natural area. The criteria for each condition rating is summarised in Appendix 1. Ecosystem polygons are assigned a class of excellent, good, fair, or poor based on the age and type of vegetation found on site, level of anthropogenic disturbances and artificial structures, soil disturbances, cover of invasive (alien) species, and fragmentation.[14]

While some of the necessary spatial data was available for this classification, it was not consistently available for all areas of the District. The location of some invasive species have been mapped across the District but not for all areas. It has mainly been recorded on a site-by-site basis, such as when staff identifies invasive species and records it with the District. Soil disturbances and understory vegetation cover data are not consistently available, and so using existing spatial data may underestimate the degradation in some areas. In addition, there was some concern that the Standard for Mapping Ecosystem at Risk in British Columbia methodology is less relevant in an urban context, where site degradation can be higher, and understanding specific site conditions may be more useful on a less stringent scale to better differentiate between the condition of different locations.

Given these concerns with the consistency of available data, how to modify the methods to address this lack of consistent data, and the category definitions, an ecological condition assessment was not finalized as part of this project. However, aspects of a condition assessment were incorporated into the biodiversity ranking (see section 2.5). This helps to reach the goals stated in the RSTC terms of reference to understand current biodiversity, help direct future protection and restoration efforts, and develop a baseline to understand future conditions.[15] This report also identifies data gaps that can be addressed through future studies in section 0, to further these goals through future projects.

Photo 7: Fairy slippers (*Calypso bulbosa*) is a flower found on the forest floor in Douglas-Fir forests.

2.5 Biodiversity Analysis

The refined spatial data was analysed to understand the relative state of biodiversity in Saanich. A GIS based ranking methodology has been developed by DHC and has been used for other municipal projects in the southwest BC. This analysis focuses on terrestrial species and was developed based on some basic principals that influence biodiversity. The intent of this analysis is to understand at a district wide level how different areas compare to each other. It is not meant to be used to evaluate exactly how many species can be expected to be found in a specific area.

The level of biodiversity that a natural area can support is difficult to measure as it is affected by many complex and dynamic factors. In general, areas that support high levels of biodiversity include those that are large, connected to other natural areas, and provide a variety of habitat features including cover habitat, forage, and water.

Measuring the exact number of species that inhabit an area is impossible as the vast majority of them are small, such as insects and microbiota which are often undescribed. To compare areas and understand the relative levels of biodiversity across the District, a list of higher-order wildlife was analysed. A species guild was compiled and lists the wildlife that could potentially inhabit Saanich if the District was in a natural state. The species guild process assumes that the larger and more visible species are indicators that the species lower on the food chain also exist. This list includes 251 species of mammals, birds, amphibians and reptiles. It is assumed that the presence of these species is an indicator of the numerous species lower on the same food chain. Each natural habitat type was ranked out of 100 relative to each other based on the number of these species that would be expected to inhabit them (**Table 2**). The final ranking was rounded out to the closest multiplier of 5. Urban habitat types were designated a baseline ranking based on professional judgement and experience from previous biodiversity projects.

Table 2. Baseline Biodiversity Ranking for each Habitat type.

Habitat	Baseline Biodiversity Rank
Broadleaf forest	100
Mixed forest	100
Wetland	100
Lake	100
Marine	100
Shrub	70
Coniferous forest	55
Urban trees	30
Agriculture	30
Grass	10

To account for the influences of urban development (such as fragmentation, noise, invasive species, edge effect, and disturbance), modifiers were applied to this base ranking within each habitat polygon. Patches of habitat that are closely connected and considered continuous with each other were grouped together to calculate their collective patch size. This provides a measure of the size of the natural area that species can inhabit. The baseline ranking of these habitat areas was then modified to reflect the size and fragmentation of each patch area (**Table 3**).

Table 3. Biodiversity ranking multiplier based on patch size.

Patch Size (ha)	Multiplier
>50	1.0
25-50	0.9
10-25	0.8
2-10	0.6
0.5-2	0.5
0.1-0.5	0.2
<0.1	0.1

The interface zone that links aquatic and terrestrial ecosystems is known as riparian habitat. These areas are known to support higher levels of biodiversity due to their proximity to water. These riparian areas were identified in GIS based on the updated streams, ditches, wetlands and lakes inventory. These were 30 m for streams, lakes, wetlands and the marine foreshore and 5 m for urban ditches. Riparian areas within each habitat type were identified and multiplied by a modifier to reflect their influence on biodiversity (**Table 4**).

Table 4. Biodiversity ranking multiplier based on proximity to riparian habitat.

Watercourse Classification	Width of Influence	Multiplier
Streams, Lakes and Wetlands, Marine foreshore	30 m	1.5
Ditches	5 m	1.2

The final biodiversity ranking is a calculation based on habitat quality, patch size and connectivity and the availablilty of water. It provides a relative measure of which areas in the District likely support the greatest diversity of species. This analysis is intended to illustrate at a District wide level how areas compared to each other. It is not intended to refelct the exact number of species that can be expecetd to be found in each area.

3.0 Natural features of Saanich

3.1 Climate

The Biogeoclimatic Ecosystem Classification System (BEC) provides a framework for understanding how ecosystems develop in BC. At the regional level, BEC zones classify the province into areas with similar climatic conditions. The District of Saanich is within the Coastal Douglas-fir (CDF) zone. It has the driest and mildest climate and is considered the most at-risk BEC zone in BC.[16] This growing environment, productive soils and access to freshwater and marine environments has made Saanich home to some of BC's most rare and unique plant communities. It is largely considered a hotspot for biodiversity.

3.2 Topography

The topography of Vancouver Island was shaped by glacial processes during the last ice age. The retreat of glaciers over the last 14,000 years has created the distinct mix of scoured rocky knolls, undulating hills, and flat lowlands common across Saanich today.[17] These topographical features are distinct components of Saanich's landscape, including PKOLS (Mount Douglas), Mount Tolmie, and Mount Work. Elevations on the Saanich peninsula range from 449 m at the summit of Mt Work,[18] to sea level along the east boundary of the District along the Salish Sea. Glacial retreat has left behind 350 ha of freshwater lakes, the largest of which is Elk/Beaver Lake (XEOL,XELE~~K~~) at 229 ha. As a coastal community, Saanich is also characterized by 46.9 km of coastline which features a mix of sandy and pebble beaches and exposed sedimentary rock. Figure 3 illustrates the topography of Saanich through a digital elevation model (DEM).

Photo 8: The retreat of glaciers over the last 15,000 years has created the distinct mix of scoured rocky knolls, undulating hills, and flat lowlands common across Saanich today.

Figure 3. Digital Elevation Model of Saanich. This model can be used to develop contours and shows elevation across Saanich. It was derived from LiDAR and provided by the CRD.

3.3 Aquatic Systems

Water is a critical element for all life on Earth. Whether it is flowing through Beaver Lake or passing over a rocky outcrop on its way into the headwaters of the Colquitz River, water, or lack there of, shapes our landscapes and the ecosystems that have evolved there. The District is home to a number of important freshwater and marine ecosystems which provide habitat for aquatic life and for terrestrial life that rely on this valuable resource. Aquatic ecosystems range in scale from small, ephemeral wetlands and seasonally flooded fields to lakes and rivers that meander through urban areas. These water systems support some of the highest levels of biodiversity in the region and are among the most susceptible to change. The importance of water in Saanich is highlighted by the W̱SÁNEĆ concept of ÁTOL,NUEL, mutual respect for the rights of others with life, including water.

A watershed is a specific geographic area which collects rainfall and snowmelt and channelizes that water through watercourses. These watercourses direct the water into the ocean or into smaller bodies of water such as lakes. Within Saanich, watersheds can be small, like the Revan's Creek watershed, or large such as the Colquitz Creek watershed (Figure 4). While water flowing down a river can be seen and mapped, complicated networks of subsurface flow can be more challenging to quantify. This can include vast stores of water stored within aquifers. Streams and rivers can also carry considerable amounts of underground water through hyporheic flow. The above and below ground flow and storage of water is critical for supporting biodiversity in the District.

Figure 4: Stylized illustration of Saanich's many watersheds. Illustration drawn by Kristi Bridgeman.[19]

There are several aquifers which lie beneath the District including the Wark-Colquitz, Karmutsen, Cordova Bay and the North Central Saanich Aquifers.[20] The province has records of nearly 3,000 wells on these aquifers, though this extends to neighbouring municipalities and districts as well. These aquifers and wells have been mapped by the Province. An examination of the complex relationship between these stores of groundwater, their interface with the above-ground flow, and anthropogenic impacts on these was not included as part of this assessment. Groundwater upwellings, through springs and wetlands can be important sources of freshwater for wildlife and can sustain wetland and stream health through dry periods of the year. These underground sources of water can be threatened by the landscape level loss of permeable surfaces, overuse, changes to groundwater flow such as through earthquakes or drilling, and climatic shifts resulting in less rainfall to recharge these aquifers.

3.3.1 Freshwater lakes and wetlands

Saanich has approximately 318 ha of lakes, ponds and reservoirs, and 31 ha of wetlands (Table 5, Figure 5). These water features provide habitat for aquatic and terrestrial species and are significant contributors to Saanich's overall biodiversity. Large lakes like Elk/Beaver Lake (XEOL,XELE~~K~~), Prospect Lake, and Swan Lake support open-water habitat for mergansers (*Mergus merganser*), buffleheads (*Bucephala albeola*), and Canada geese (*Branta canadensis*), while wetlands in the transition zone between the shore provide space for beavers (*Castor canadensis*), river otters (*Lontra canadensis*), and western-painted turtles (*Chrysemys picata bellii)* to thrive. Predatory birds such as great blue herons (*Ardea heroidas*), bald eagles (*Haliaeetus leucocephalus*), and even red-winged blackbirds (*Agelaius phoeniceus*) feed on small mammal, fish and/or insect prey living amongst shoreline reeds and shrubs.

Table 5. Total sum of area for wetlands; lakes, ponds and reservoirs in Saanich.

Class	Area (ha)
Wetlands	31
Lake, pond, reservoir	318

Photo 9: Wetlands are home to high levels of biodiversity.

The ecological significance of these aquatic habitats in Saanich shouldn't be underestimated. Up to 1/3 of all bird species ever recorded in British Columbia have been observed at Panama Flats, a unique old-field floodplain, over a period of two years.[21]

As urbanization fragments Saanich's natural landscape, smaller aquatic ecosystems have become significant contributors to preserving biodiversity. These spaces act as refuges for small mammals, amphibians, insects, and birds that need to rest and feed while they travel. Even smaller waterbodies in neighbourhoods and on golf courses act as linkages supporting the greater aquatic ecological network in Saanich.

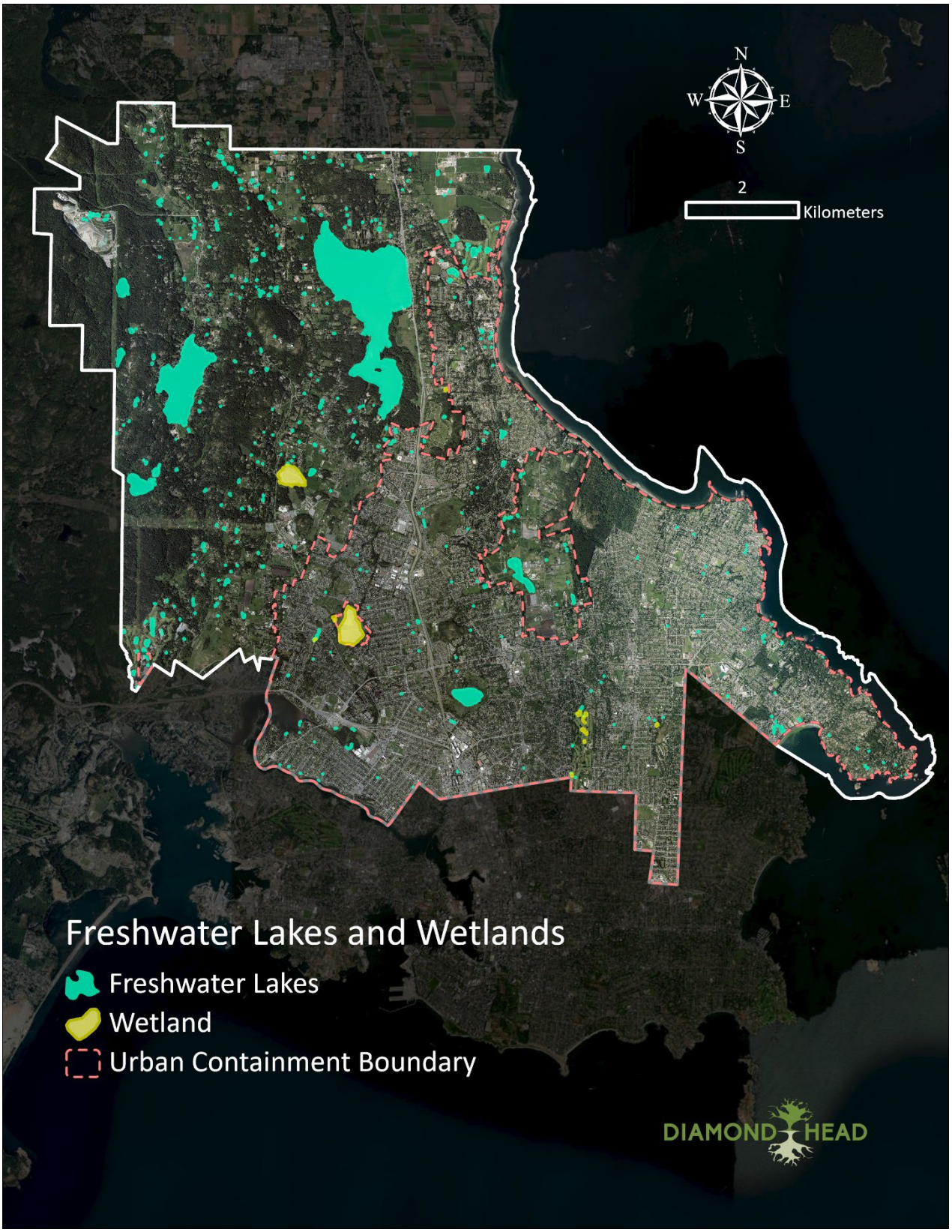

Figure 5. Map showing freshwater lakes and wetlands in Saanich.

3.3.2 Watercourses

As a lowland coastal community, Saanich is home to a vast network of watercourses (Figure 6). It has over 300 km of verified rivers, streams, ditches, creeks and brooks and another 93 km of unverified watercourses identified using LiDAR (Table 6). These watercourses have been shaped over time, by both natural processes as well as by farmers of the 18th and 19th centuries. In the western half of the District, the bulged rocky slopes of Mount Work create channels for rainfall to collect and flow downstream into creeks, lakes, and eventually, the ocean. These watercourses are generally non-linear with numerous smaller tributaries. In the east, many watercourses in Saanich's rich farming areas have been historically channelized and culverted for drainage and irrigation.

Table 6. Output from combining CRD watercourse data with LiDAR predicted streams.

Class	Constructed length (km)	Natural length (km)	Total length (km)	Sum of occurrences
Brook (CRD data)		6.5	6.5	69
Creek (CRD data)		57.7	57.7	612
Ditch (CRD data)	171	-	170.8	4594
River (CRD data)		10.5	10.5	65
Stream (CRD data)	1.3	64.3	65.6	901
LiDAR predicted	2.3	90.4	92.7	1384
Total	**174.6**	**229.4**	**403.8**	**7625**

Today, most of the creeks in the urbanized parts of Saanich have been lost to development or consolidated as part of the District's stormwater network, with over 550 km of culverts. There are several creeks including Bowker Creek, Douglas Creek, Swan Creek, Durrance Creek, Tod Creek, Noble Creek, and Durrell Creek that provide high value habitat for fish populations and provide connectivity through Saanich's urban areas. Many of these flow within the Colquitz Watershed, a basin that covers nearly all of Saanich.

The Colquitz River is fed by Elk/Beaver Lake (XEOL,XELE~~K~~) and flows south before outflowing through Culbert Holmes Park and into the Gorge. These fish-bearing creeks and their tributaries provide valuable fish habitat features such as large woody debris, eddies and pools, and natural substrates that support protected salmonids like Coho (*Oncorhynchus kisutch*), rainbow trout (*Oncorhynchus mykiss*), and cutthroat trout (*Oncorhynchus clarkii*), as well as prickly sculpin (*Cottus asper*) and three-spine stickleback (*Gasterosteus aculeatus*). While these watercourses support important native fish, invasive and non-native fish such as smallmouth bass (*Micropterus dolomieu*) and brown and black catfish (*Ameiurus nebulosus, Ameiurus melas* respectively) also inhabit these waters.

Photo 10: Recent channel restoration in Cuthbert Holmes Park.

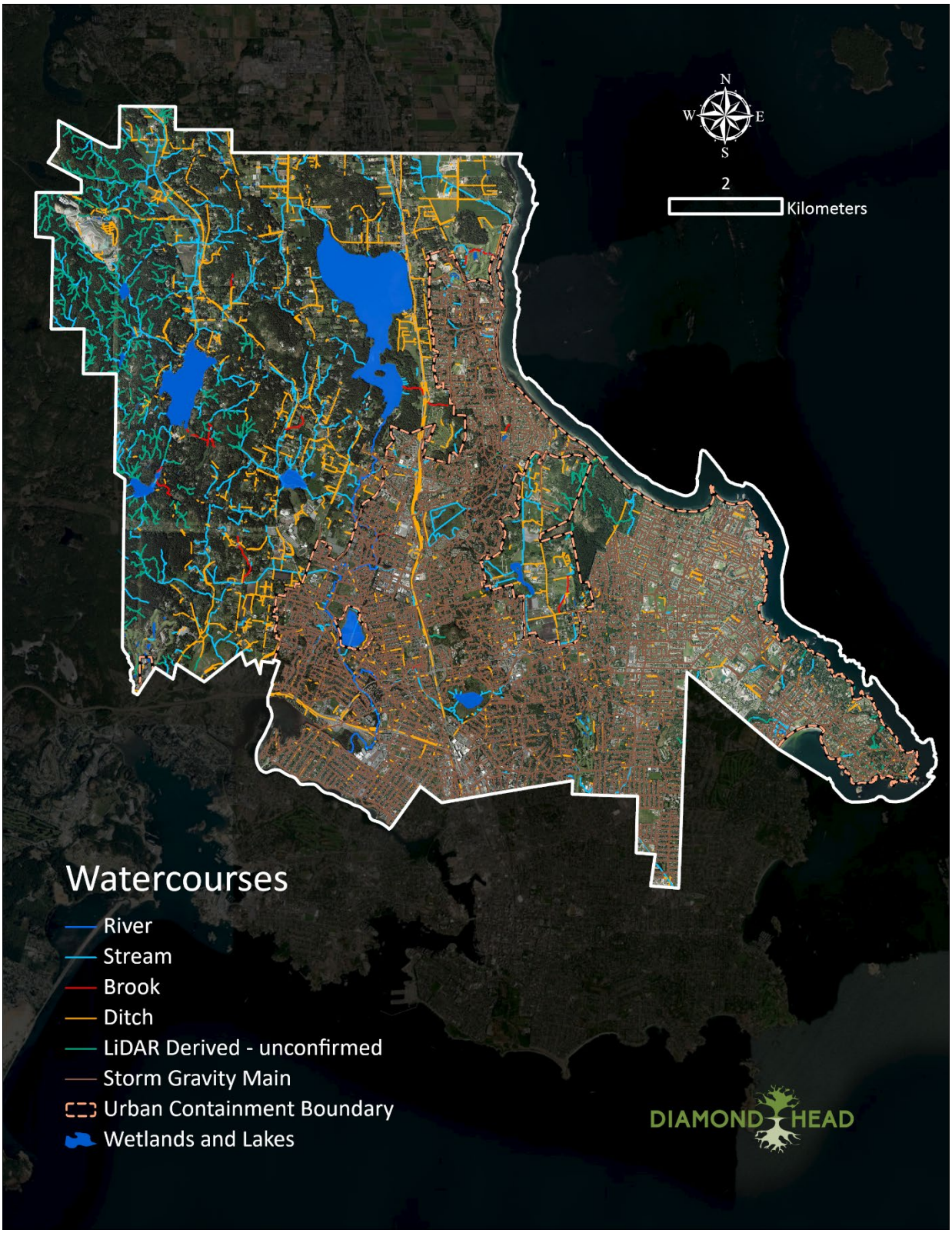

Figure 6. Location of known and predicted watercourses within the District of Saanich, as well as stormwater infrastructure within the urban containment boundary.

3.3.3 Marine Shoreline

The District's 46.9 km[22] of marine shorelines are some of the most popular natural places in Saanich. Locals flock to these areas on warm summer days to enjoy the beaches and scenery. However, humans are not the only ones who treasure these places. Numerous species, including several species-at-risk and migratory birds, inhabit the coastal sand, rocky bluff, and intertidal ecosystems that line Saanich's marine shoreline.

These shorelines are rich and dynamic areas that attract species from, terrestrial, marine, and freshwater environments (Figure 7). Saanich's marine shorelines are highly diverse, ranging from coastal sand ecosystems inhabited by silky beach pea (*Lathyrus littoralis*) and large-headed sedges (*Carex macrocephala*) to sparsely vegetated rocky bluffs populated by mosses and herbs. The intertidal ecosystems are inhabited by sea stars (*Asteroidea* spp.), sea asparagus (*Salicornia* spp.), sugar kelp (*Saccharina latissimi*), black oyster catchers (*Haematopus bachmani*), as well as large marine mammals like sea lions (*Otariinae* spp.). The complex interactions that occur over this ecological gradient make the marine shoreline one of the most biodiverse areas in Saanich.

High recreational use, development, and invasive species threaten the integrity of these highly sensitive ecosystems. The popularity of coastlines in Saanich cause humans and dogs to trample over sensitive vegetation that can take years to recover. Macoun's meadowfoam (*Limnanthes macounii*), and bearded owl clover (*Triphysaria versicolor*) are both examples of small, red-listed species which grow on vernal maritime meadows. These habitats frequently overlap with high value recreation sites and are susceptible to tramping. Invasive species like English ivy (*Hedera helix*), Himalayan blackberry (*Rubus armeniacus*), and gorse (*Ulex europaeus*) outcompete native plants in these sensitive areas. Other common invaders of coastal sand ecosystems include the European (*Ammophila arenaria)* and American (*Ammophila breviligulata*) beachgrasses, which quickly establish deep roots and inhibit the movement of sand in this naturally dynamic environment. This can encourage nearby forest vegetation to establish which can eliminate coastal sand ecosystems entirely.

Photo 11: A variety of terrestrial and marine species are found across the biodiverse gradients of shorelines.

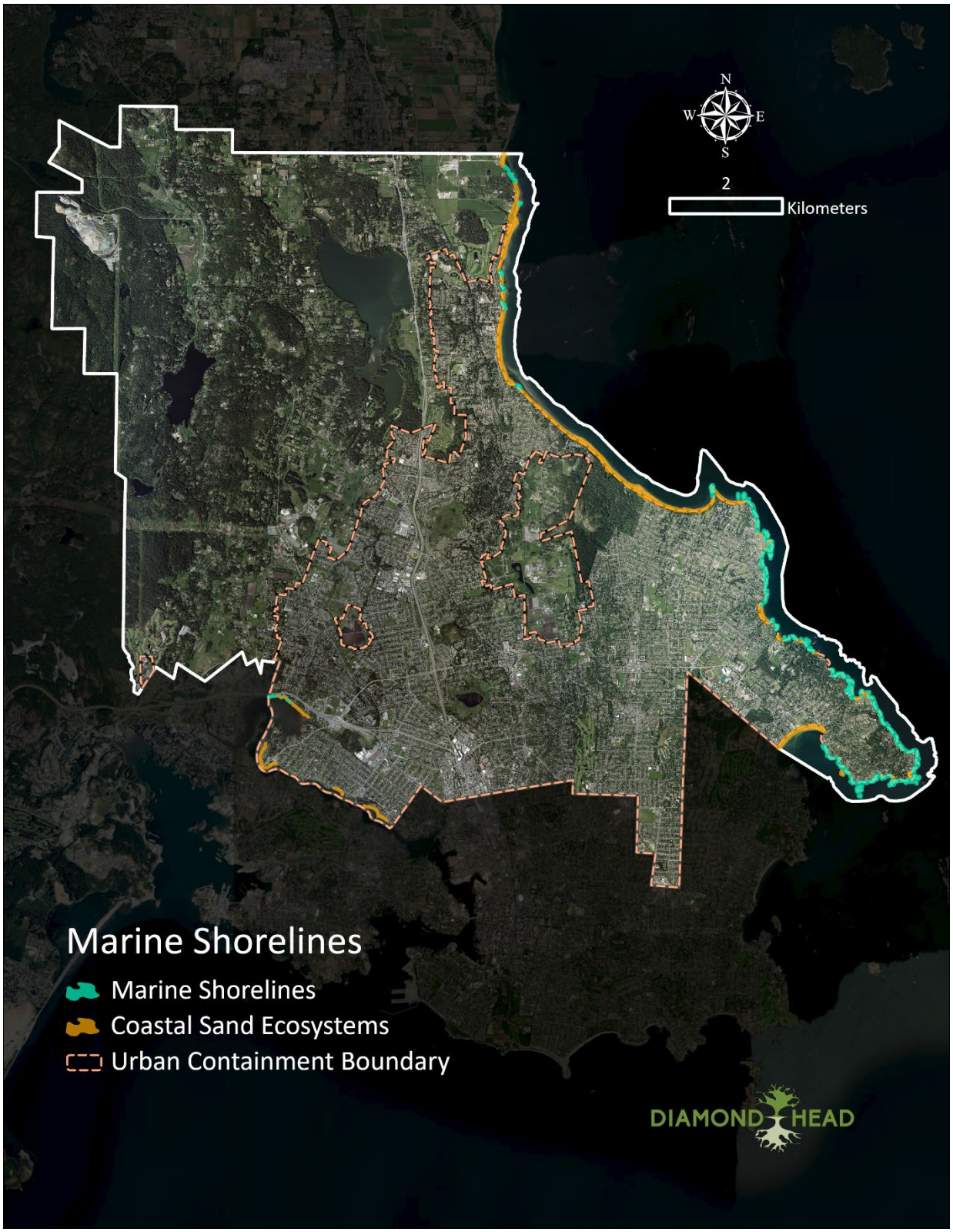

Figure 7. Map showing coastal sand ecosystems and other marine shorelines in Saanich.

3.4 Terrestrial Systems

3.4.1 Forests

Forested stands were defined as contiguous tree stands with a minimum patch size of > 0.5 ha. These forests cover approximately 30% of the land in Saanich. Intact areas are scattered across the District and broken up by urbanized areas, farmland, and infrastructure. Most forests in Saanich are less than 150 years old, owing to a long history of logging that has eliminated nearly all old-growth trees in the District. Approximately 2% of forests still contain trees that are old growth, >250 years old (Figure 8). Many of these old growth trees are located in protected areas such as PKOLS (Mount Douglas Park), Elk/Beaver Lake Regional Park, and Mount Work Regional Park (Figure 9). Stand age classifications are based on TEM data.

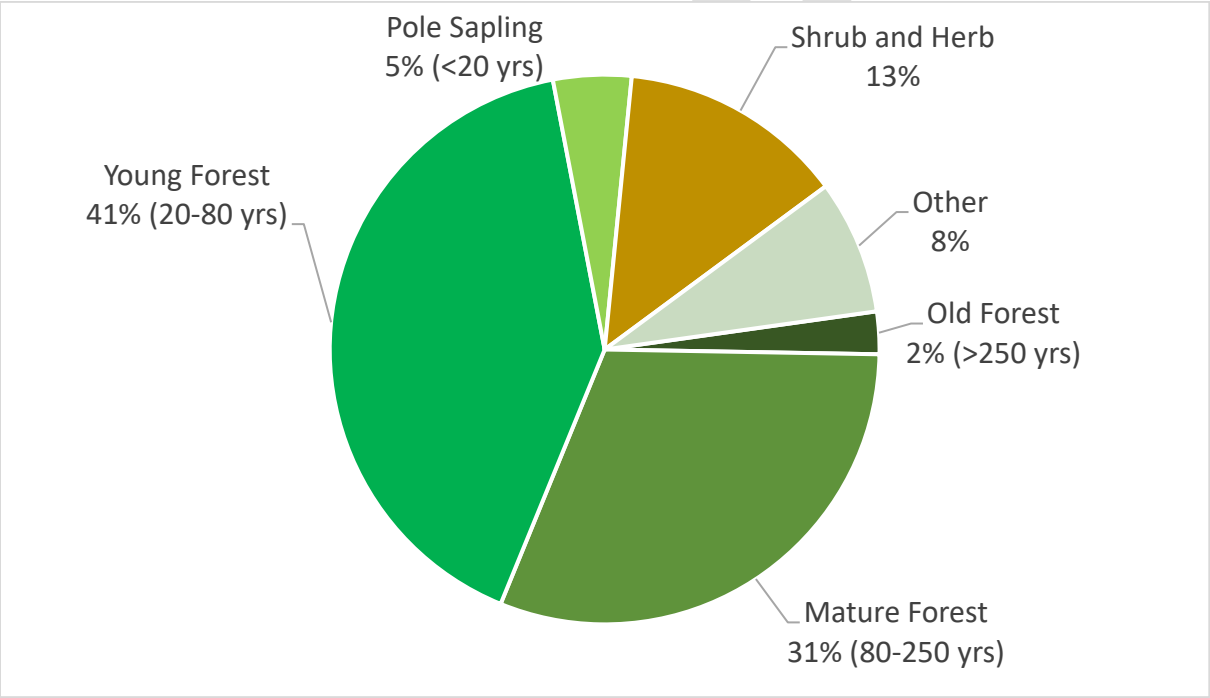

Figure 8. Natural area breakdown by stand age.

This logging history also contributes to the large proportion of mature and young forests across the District. These remaining mature forests (31%) and young forests (41%) are a significant portion of the forests and trees many residents see across the District today. Logged areas that are left to naturally regenerate into forests begin as very dense and uniform pole sapling forests with very limited understories. As these trees age, the structure of the forest canopy becomes more diverse. Understory vegetation establishes, some trees decay and fall, and new trees begin to grow. Together, these features create a complex forest structure and habitats that support high levels of biodiversity.

Shrub and herb ecosystems are characterized by irregular tree canopies and well-developed shrub and herbaceous layers. Many of these shrub and herb ecosystems are located within highly productive marsh and wetland areas such as Rithet's Bog and Swan Lake, and in portions of Garry oak ecosystems

such as on PKOLS (Mount Douglas). However, some are attributed to frequently disturbed utility rights-of-way.

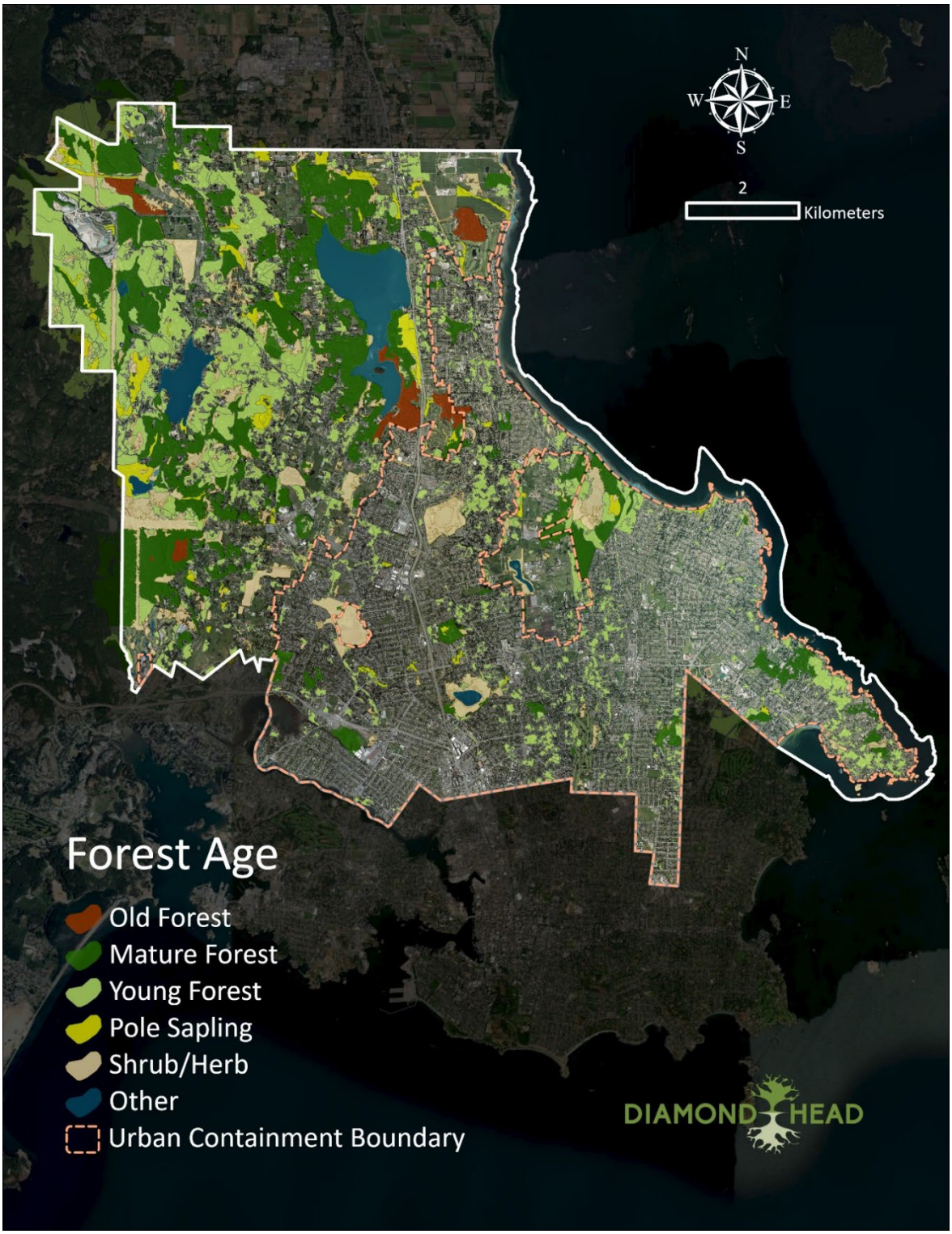

Figure 9. Forest age categories ranging from pole sapling (~<20 years old) to old forest (>250 years old). Non forested shrub and herb are included, which have the potential to become forests in the future.

Forests have been separated into similar areas based on the composition of tree species. The most common forest type found in Saanich are mixed stands of both coniferous and deciduous species which cover 15.6% of the District's total area. These stands are varied and include a mix of native tree species. Common coniferous species include Douglas-fir (*Pseudotsuga menziesii*), western redcedar (*Thuja plicata*), grand fir (*Abies grandis*), and lodgepole pine (*Pinus contorta*) with few sightings of western hemlock (*Tsuga heterophylla*). Common deciduous species include black cottonwood (*Populus trichocarpa*), red alder (*Alnus rubra*), Garry oak (*Quercus garryana*), arbutus (*Arbutus menziesii*), bitter cherry (*Prunus virginiata*), trembling aspen (*Populus tremuloides*), and cascara (*Rhamnus purshiana*). High concentrations of mixed forest are found in Cadboro Bay, Blenkinsop, and in rural Saanich between Prospect and Elk/Beaver Lakes (XEOL,XELE~~K~~).

Photo 12: Most coniferous stands in Saanich are composed of a tall, single-aged, codominant layer of Douglas-fir.

Coniferous forests are the second most common forest type in Saanich, covering 11% of Saanich's total area. Most of these forests are composed of a tall, single-aged canopy of Douglas-fir with western redcedar and western hemlock growing in below them. Due to historic dry conditions, western hemlocks have not become well established in Saanich. Western redcedars, grand firs, and Douglas-firs have historically thrived but are suffering from prolonged droughts in recent years. All three have

experienced crown dieback, while Western Redcedars and grand fir have seen higher removal rates due to death and increased susceptibility to pests. While grand firs are a prominent species that are establishing under Douglas-fir in many nutrient-rich areas, they are also struggling to establish in many Saanich parks. The remaining coniferous stands are largely composed of lodgepole pine, a climate-resilient species that will continue to occupy dry and nutrient-poor sites. Significant coniferous stands in Saanich are found in PKOLS (Mount Douglas) Park, at the south end of Elk/Beaver Lake (XEOL,XELE~~K~~), and along the west side of the District on Mount Work.

Photo 13: Young deciduous stands play a significant role for wildlife as they mature.

Forests dominated by deciduous tree species make up 3.2% of Saanich's total land cover and are referred to as broadleaf forests. These stands are found across both the urbanized and rural areas of the District. About one third are younger in age and composed of pioneer species that readily establish on disturbed sites including red alder, black cottonwood, bitter cherry, paper birch and cascara. These young stands tend to be dense and mature quickly providing valuable organics and woody debris to these ecosystems. Approximately two thirds of these are Garry oak ecosystems which are considered at risk. These forests are typically more open with a mix of other tree species including arbutus (*Arbutus menziesii*). They are often found associated with drier sites but can have rich ground vegetation. Broadleaf stands are commonly found surrounding riparian areas at Swan Lake, Rithet's Bog, and Blenkinsop Lake, among many other smaller lakes, ponds, and streams. Southwestern Vancouver Island icons – Garry oak and arbutus, can be found in clusters or individually on dry, rocky outcrops at Vic Derman Park, Cedar Hill Park, Knockan Hill Park, and Mount Tolmie Park.

3.4.2 Urban Forests

In addition to natural forest stands, trees growing within urbanised areas provide a sizable contribution to the District's overall canopy cover (Figure 10). Urban trees cover 1,613 ha or 14.2% of the District's land base. They are found along streets, on private property, and in otherwise unprotected greenspaces across Saanich. Urban trees are highly variable in species, age, and size. Many have been planted and managed by landowners or the District while others have established naturally. In the urban landscape, the canopies of trees are rarely contiguous. They are fragmented by streets and buildings, and often surrounded by impervious surfaces that limit their growth. These trees however are a valuable component of the overall urban forest landscape. They act as important linkages to the natural ecosystems found across the landscape. Wildlife use these urban trees to rest, gather food and nesting material, and travel from one place to another. Urban trees are being addressed as part of an ongoing Urban Forest Strategy renewal process.

The State of the Urban Forest Report presents information about trees and forests in the District of Saanich to support the renewal of the Urban Forest Strategy. First prepared in 2010, the Urban Forest Strategy is the document that guides the District's urban forest management over time. Since the adoption of the Strategy, the District has implemented many of its recommendations and continues to advance others. A decade of change is making it important to review the Urban Forest Strategy to ensure it continues to support the community's goals and values. The 2010 Urban Forest Strategy included 7 strategies and 14 actions. Three actions have been completed, ten are still in progress, and one was not started.

While Saanich scores fair on the urban forest report card for its overall urban forest management, analysis of CRD data determined an overall decrease in canopy cover from 2008 to 2019. Using an accurate, high resolution LiDAR methodology, Saanich's canopy cover was estimated at 43% in 2019. This method applied machine learning to detect trees from other objects in LiDAR, and was manually reviewed to correct errors. Over 742,000 trees are within the municipality, of which approximately 205,000 are on Saanich-owned property. Several native tree species are experiencing declines in health and vitality connected to climate, including Western Redcedar, Grand Fir, and Arbutus. The District values the unique natural ecosystems of Saanich and has recently increased native tree planting in parks and natural areas to help meet Climate Plan goals. In more urbanized areas, native tree species are often unsuitable because they fail to thrive in small soil volumes around lots of buildings and pavement. While the 2010 Urban Forest Strategy provided guidance for forest management over the past 13 years, the 2023 rating of *Fair* for the District's urban forest management shows improvement is needed for the long-term health and sustainability of the urban forest.

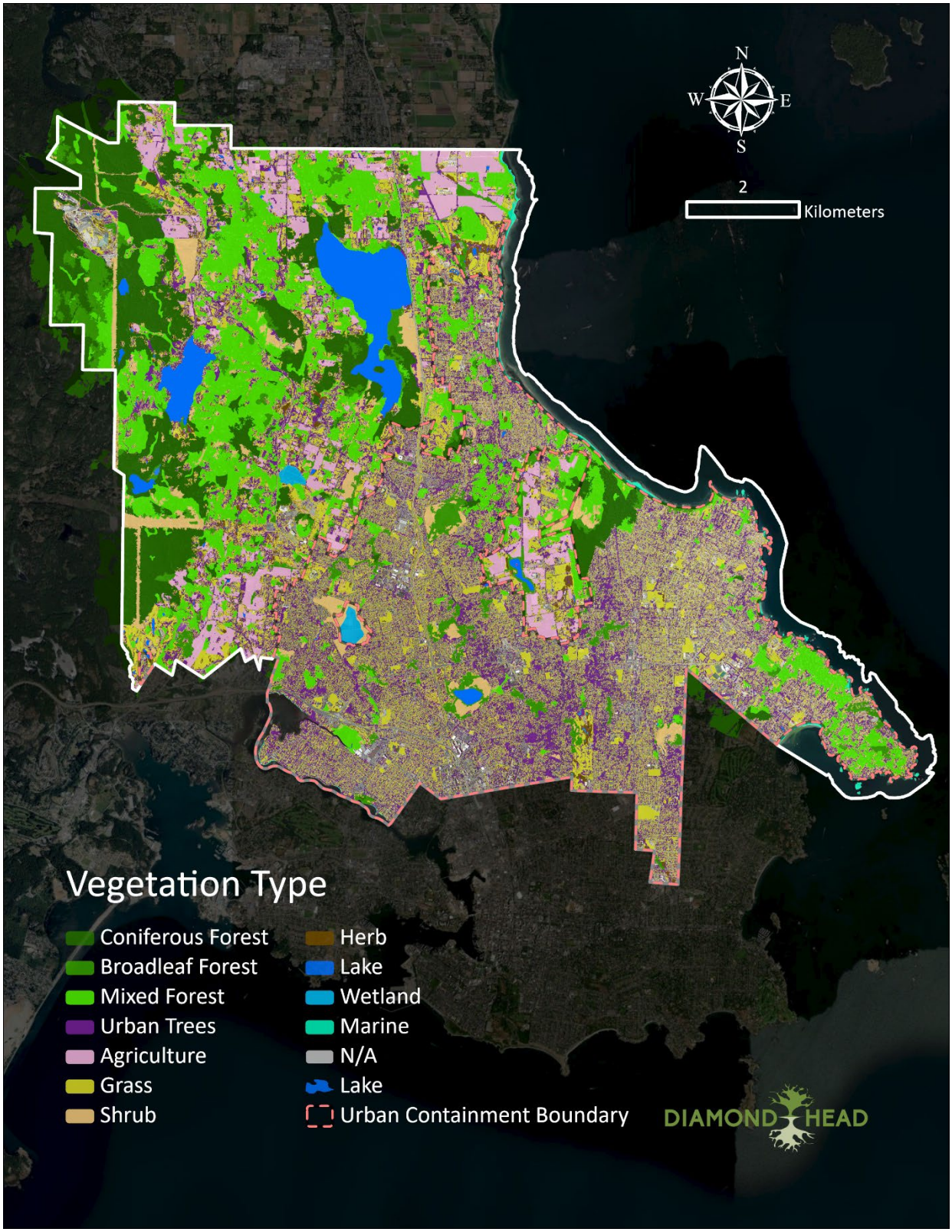

Figure 10. Forest and vegetation types found across Saanich.

3.5 Species and Ecosystems at Risk

Saanich is home to many rare and threatened species and ecosystems. These species are tracked by the BC Conservation Data Centre (BCCDC), which maintains a colour-coded list of species and ecosystems which are at risk of being lost (Red), of special concern (Blue), or secure or not at risk (Yellow). The federal *Species At Risk Act* also ranks species as extirpated, endangered, threatened, or not of concern. Natural areas in Saanich provide unique ecological characteristics. Many of the plant communities are considered at risk of being extirpated, threatened, or endangered (Figure 11). Formally endangered species are protected federally through the *Species At Risk Act*, but this registry is non-exhaustive, has limited applicability outside of federal lands (only applying to migratory bird species at risk and aquatic species on private lands), and does not protect ecosystems at risk. Some of these ecosystems are protected through parks and land covenants; however, many remain unprotected by legislation.

3.5.1 Coastal Douglas-Fir ecosystems

The Coastal Douglas-fir (CDF) biogeoclimatic zone is the province's smallest climatic zone and considered the most at-risk[23]. The CDF is restricted to low elevations along coastal areas of the Salish Sea. It lies within the rain shadow of Vancouver Island and Olympic Mountains, resulting in a unique combination of warm, dry summers and mild, wet winters. The CDF zone faces strong pressures from urban development due to its terrain and favorable weather conditions. This pressure is continuing to threaten the integrity of its natural ecosystems. Where natural areas remain, they are often disconnected from one another and unprotected by formal means. The protection of these CDF ecosystems is important to preserve the ecological and cultural values not only in the Salish Sea, but on a global scale.

Photo 14: A young coniferous forest surrounds a mature Douglas-fir tree in Mount Work Regional Park.

Of the 48 distinct plant communities found growing in the CDF zone, 45 are classified as being Red- or Blue- listed by the BCCDC. This illustrates the extent to which this zone has been degraded. Of these 45 plant communities, 22 red-listed and 5 blue-listed plant communities are found in Saanich (Figure 11). These plant communities are highly diverse and include Douglas-fir forests, Garry oak woodlands, rocky arbutus outcrops, herbaceous meadows, and coastal sand ecosystems. The variety of habitats in these ecosystems attracts thousands of wildlife species, making the CDF the most biodiverse biogeoclimatic zone in the province. These ecosystems host over 280 provincially listed species, 24 of

which are imperilled worldwide. Unfortunately, only 11% of the CDF is protected by provincial, regional, or municipal parks,[24] leaving many of these important natural areas at risk of being degraded further.

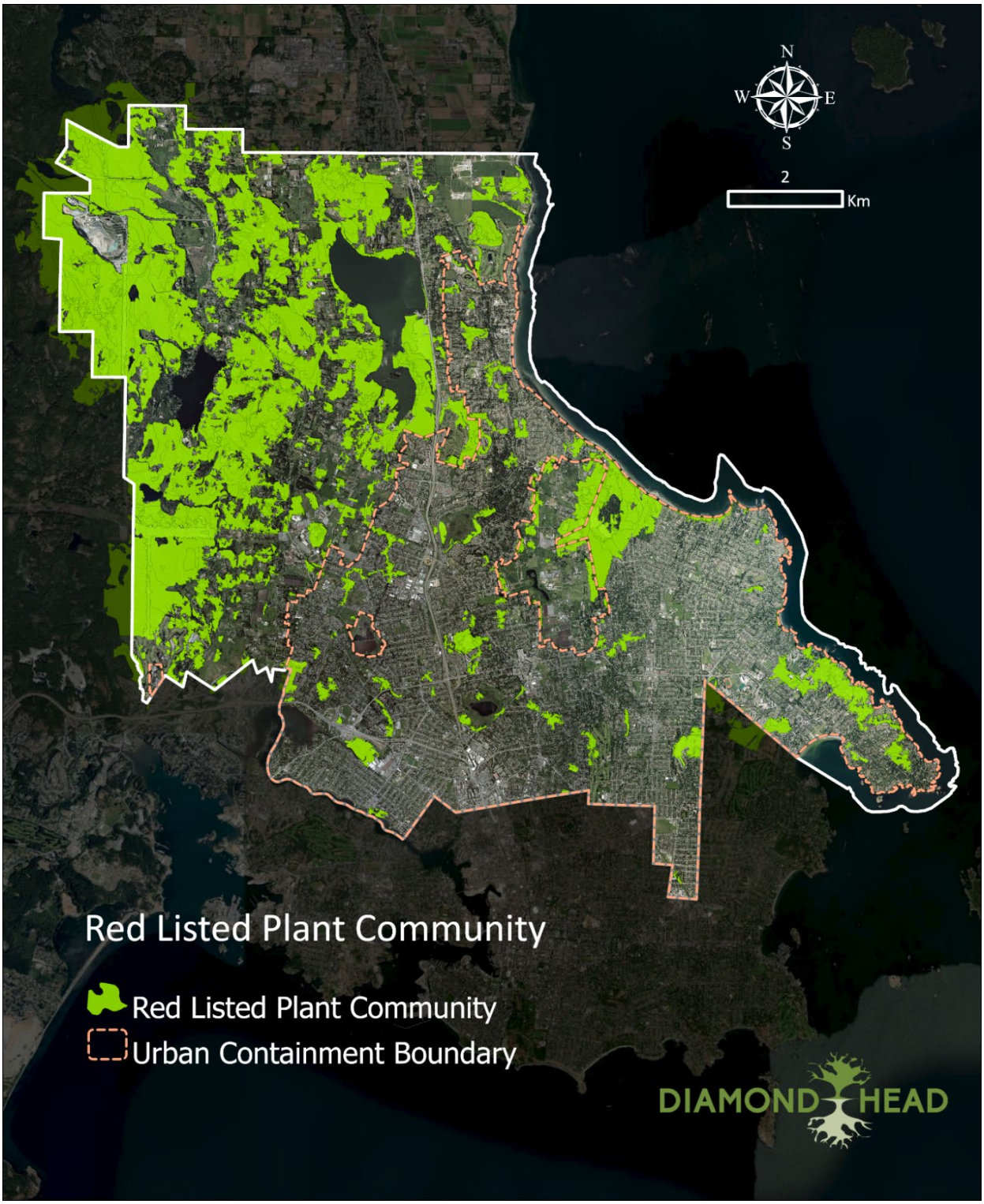

Figure 11. Distribution of red-listed plant communities in Saanich. Mapping is based on the TEM with polygons updated based on CRD canopy cover and orthophoto.

Beyond the ecological significance of these ecosystems, there is a rich history of use by Indigenous peoples in coastal Douglas-fir ecosystems. Coast Salish nations have traditionally used these lands and relied on the diversity of culturally significant plants that they provide. Plants like camas (*Camassia leichtlinii*) are a cornerstone of many Coast Salish nations' traditions and are a key component of their current and historical ways of life.

3.5.2 Garry Oak Ecosystems

Garry oak ecosystems are some of Saanich's most treasured natural places. They are a reminder of the bounty this landscape once provided, a reflection of human relationships with the land, and a window into what successful conservation and stewardship can look like.

Garry oak ecosystems were once much more plentiful. Historical climate records show that the extent of their distribution was greatest around 8,000 years ago,[25] when they covered much of the land on southeastern Vancouver Island. Changes in the climate since then have favoured the encroachment of Douglas-fir forests. Indigenous peoples relied heavily on a variety of food, medicines, and tools harvested from Gary Oak forests. They made use of small-scale fires to clear underbrush and competitor species to maintain these open woodland meadows and the services they provided. These ecosystems would not have been as widespread without this repeated burning and careful management by Indigenous peoples.

Studies show that these areas were burned as frequently as every six years[26]. Wildfires caused by lightning occur on average every 90-145 years[27]. Mature Garry oak trees have deep roots and thick bark that help them to survive surface fires which help to control the younger encroaching Douglas-firs. Native Garry oak-associated plant species like camas, sea blush, and buttercup (among many others) have also evolved and adapted to this regular occurrence of low intensity surface fires. Their presence today is a reminder of their historic connection with First Nations people.

Photo 15: Camas is a one of the most recognizable flowers in Garry oak ecosystems and has a long history of use by Indigenous peoples.

Garry oak trees and their associated ecosystems are home to more plant species than any other in coastal British Columbia. Many of the plants found there occur nowhere else in Canada. These plant communities support over 150 animal species and over 800 known insect species which are specifically associated with Garry oak trees.[28] These ecosystems once blanketed southern Vancouver Island, though only small pockets now remain. Garry oak ecosystems cover only 250 ha or 2.2% of Saanich, with only 40% of them protected as parkland or under a covenant. Significant examples can be found at Knockan Hill Park, Christmas Hill Nature Sanctuary, and Mount Tolmie Park.

Photo 16: Garry oak meadows are some of Saanich's most treasured and unique natural spaces.

Since the 1850s, pressures from land development, the invasion of non-native plant species, and fire suppression and, more recently, the herbivory of hyperabundant deer, have restricted Garry oak ecosystems to fringe areas and continue to threaten their existence today (Figure 12). These ecosystems are now mostly found on dry rocky outcrops where the terrain is less suitable for urban development.

Rapidly spreading invasive species like Scotch broom, daphne, Himalayan blackberry, English ivy, and orchard grass pose serious threats to these sensitive ecosystems. In addition to outcompeting native species for light, space, and water, invasive species can also change the chemical composition of the soil, which can make the restoration of these Garry oak ecosystems challenging. Fire suppression has played

a role in allowing these plants to invade Garry oak ecosystems. Over 100 Garry oak ecosystem species are at risk of extinction, which emphasizes the need to protect and restore these ecosystems where they still exist. Dedicated volunteers like those of the District of Saanich's "Pulling Together" program have helped care for these delicate places since 1999 through the removal of invasive species, planting of native trees and shrubs, and educating the public about ecosystem restoration.

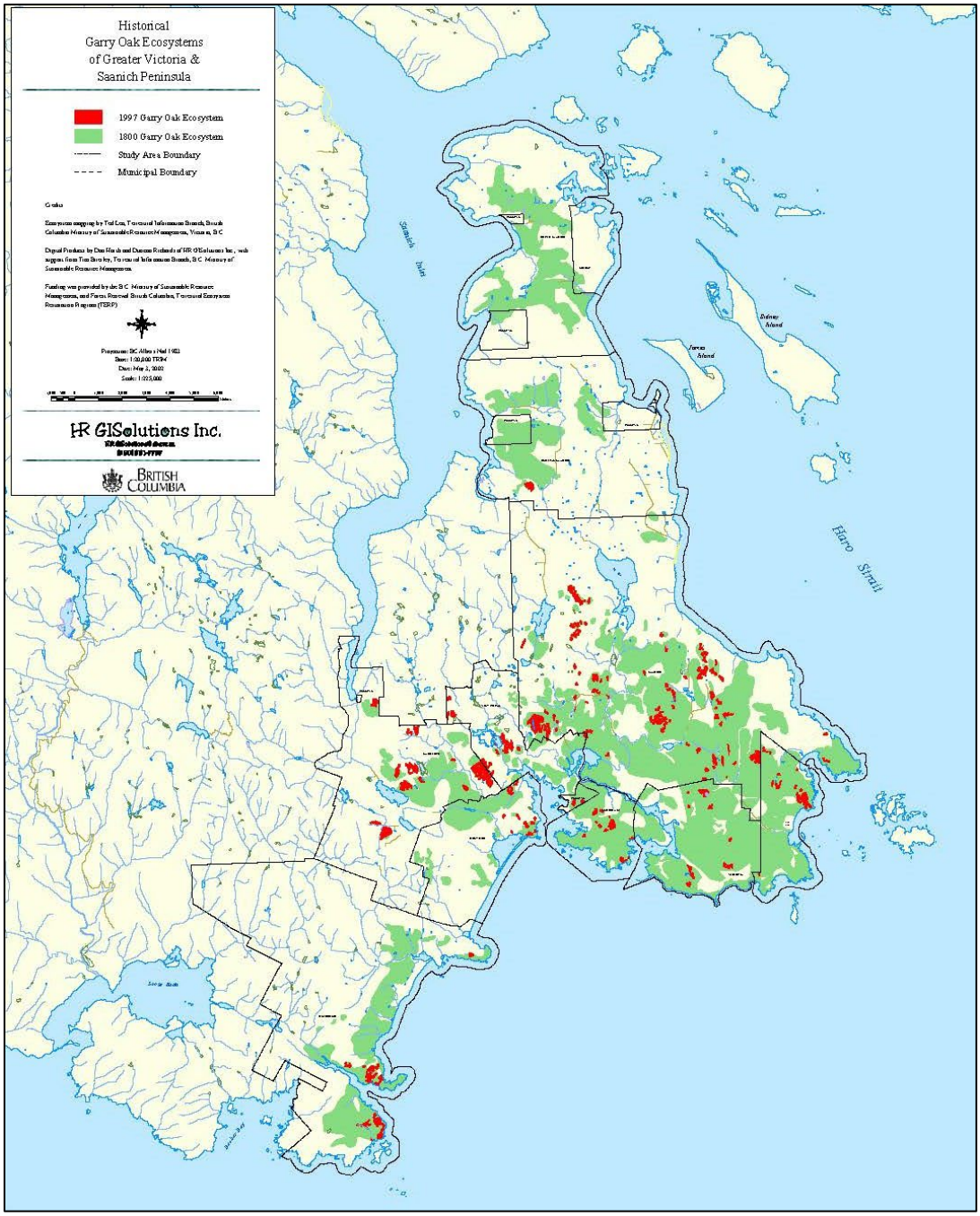

Figure 12. Map of historic (1800) and recent (1997) occurrences of Garry oak in the Saanich. This map was developed for Garry Oak Ecosystem Restoration Team (GOERT).[29]

3.5.3 Species at risk

The District of Saanich is home to many rare animals and plant species. Maintaining biodiversity requires that these endangered species have the habitat they require to survive on the landscape. There are numerous and often compounding reasons for a species to become endangered. Some species at risk (SAR) may have naturally occurred in low numbers. Others may be living at the edges of their survivable range. Many populations have been reduced by human caused impacts such as habitat loss for land development and climate change. There are 150 occurrences of red or blue listed plants, animals, macrofungi, and lichens that have been recorded by the BCCDC in Saanich (Table 7).

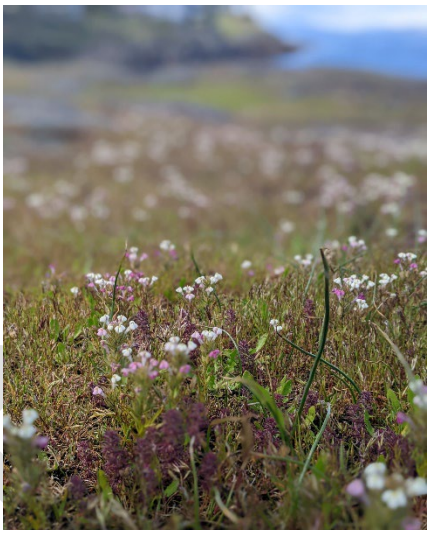

Photo 17: Bearded owl clover is a small, red-listed plant found in Saanich.

Table 7. Examples of plant and animal species at risk that have been confirmed to live in the District of Saanich.

Common Name	Species Name	Clade	BCCDC Listing	Typical Habitats found within the District	Major Threats
Bearded owl clover[30]	*Triphysaria versicolor ssp. Versicolor*	Vascular Plant	Red, COSEWIC Endangered	Habitat specialist- occupies vernally moist meadows and seeps in maritime regions. Restricted to shallow soils over bedrock along coastal areas. Seven known populations in Canada, all in Saanich or Victoria.	• Habitat loss, degradation • Exotic plant invasion • Grazing
Oregon (Western) branded skipper (*Oregonia* subspecies)[31]	*Hesperia Colorado oregonia*	Invertebrate	Red, COSEWIC Endangered	Occupies sparsely vegetated areas, including coastal sand and gravel spits, and Garry oak habitats. Exposed ground, dry, and well drained soils, or short turf grass and bunchgrasses. Historical occurrence in Rithets Bog, last recorded 1956.	• Pesticides (i.e. Btk spraying for gypsy moths) • Habitat loss, degradation • Fire suppression • Invasive species

Purple sanicle[32]	*Sanicula bipinnatifida*	Vascular Plant	Red, COSEWIC Treatened	Occurs in open Garry oak meadows, at low elevations (generally <30 m above sea level). 20 verified populations in BC, majority in parkland.	• Recreational impacts (trampling, fragmentation) • Invasive species • Development
Sharp-tailed snake[33]	*Contia tenuis*	Reptile	Red, COSEWIC Endangered	Inhabit open canopy woodlands dominated by Arbutus and/or Garry oak. Eight populations are known in BC, three on the Saanich Peninsula.	• Climate/range limited (northern limit of its range) • Habitat loss, degradation • development
Threaded vertigo[34]	*Nearctula sp.*	Invertebrate	Blue, COSEWIC Special Concern	Moist deciduous and mixed-wood forests at low elevations. Older riparian forests containing groves of large maples with ferns and shrubs in moist and rich sites.	• Habitat loss, fragmentation and degradation • Development • Hydrology drainage changes • Climate change • Invasive species
Western screech owl (*Kennicotti* subspecies)[35]	*Megascops kennicottii kennicottii*	Bird	Blue, COSEWIC Threatened	Found in lower elevation wooded environments, often along riparian areas. 11 breeding territories were known in the Cadboro Bay area in 1979, no records are available since.	• Habitat loss • Potential intraspecific interactions with barred owls (*Strix varia*) which have expanded their range into southwestern BC.
Yellow montane violet (*Praemorsa* subspecies)[36]	*Viola praemorsa ssp. Praemorsa*	Plant	Red, COSEWIC Endangered	Garry oak woodlands and maritime meadows. Low elevation (<30 m) herb dominated ecosystems	• Invasive species • Altered fire regimes • Human activity (e.g. trampling)

3.5.4 Migratory Birds

The Saanich peninsula is within the Pacific Flyway – one of the most important migration routes for migratory waterfowl in North America. This migratory route extends from southern Mexico to the arctic, along the Pacific coast of North America. Millions of waterfowl congregate in deltas, lakes, and wetlands, taking up temporary residence or stopping to rest during migration. Seasonally flooded wetlands provide abundant seasonal habitat.

Many of Saanich's birds travel back and forth from Mexico, Central, and South America. These neotropical migrants include warblers, swifts, nighthawks, thrushes, vireos and many more. Saanich also plays host to many species which breed in the Arctic and travel south to overwinter. This includes sea ducks, loons, grebes, raptors and owls. Just north of Saanich, the Sidney Channel is recognized as an Important Bird Area in Canada for its global significance in supporting species that congregate during the winter.[37] Protecting habitat for these migratory species, whether neotropical, arctic, or locally migrant is of international importance as these birds depend on stable conditions throughout their range.

Saanich was the ninth city in Canada to be designated a 'Bird Friendly City' due to ongoing efforts to implement bird-friendly policies and actions. Research programs such as the Rocky Point Bird Observatory collects extensive data on bird populations and observations in southern Vancouver Island. A list of species recorded during annual Christmas bird count is outlined in Appendix 5.

Photo 18: Snow Goose (Asner caerulescens) breeds in Canada's arctic and migrates south to overwinter.

3.5.5 Arthropods

Insects, spiders and crustaceans, collectively known as arthropods, are the most diverse group of animals on Earth. This phylum accounts for over 80% of the known animal species. Its diversity is so immense that accurate species numbers cannot accurately be determined. In British Columbia, the estimated number of terrestrial arthropods ranges from 40,000 to 50,000 (as of 1998)[38]. Many of these arthropod species play a crucial role in pollination, nutrient cycling, food web interactions, and may also be indicators of changes in the environment[39].

Photo 19: Autumn meadowhawk (*Sympetrum vicinum*).

Global declines in insect populations are being documented worldwide, which raises concerns about the impact this will have on biodiversity and ecosystem health. The decline of insect populations could have dramatic and cascading effects on other species and the ecosystem function. There are 168 species of freshwater and terrestrial invertebrates that are endemic to British Columbia and a total of 203 species that are potentially rare and endangered in the province[40]. This data was derived from a compilation of information from publications and systematic experts in 1994 but is now likely out of date. It is unknown how many rare and endangered species are currently in the province or on Vancouver Island; however, the global declines are a significant concern and it is crucial to protect and conserve habitat for arthropods to support biodiversity in Saanich.

4.0 iNaturalist data

iNaturalist is an online social network application that allows people to share information about the types and locations of species they identify. The mission of iNaturalist is to engage the public with nature, generate high-quality biodiversity data, and synthesize that data into tools such as their computer vision model. iNaturalist is available as a website accessible by computer or as an application for phones and tablets. Users can record their own observations, get help with species identifications, collaborate with others to collect biodiversity information for a common purpose, or access the observational data collected by other iNaturalist users.

Data stored on the site are mainly utilized by the public, scientists and experts, and teachers. Users can assess observations and recommend, confirm, or dispute a species identification. The more information (time, location, photos) given in an observation will allow it to be eligible for 'Research Grade' status. This high-quality data status means that multiple users have confirmed an observation's species identification and the data is accurate enough to be used for scientific research.

Within iNaturalist, over 4,115 different species of plants, fungi, and wildlife have been observed in Saanich. This includes 1,426 species of plants, 1,187 species of insects and arachnids, 245 species of birds, and 30 species of mammals. The following subsections shows areas with the highest number of iNaturalist observations in the District. All species are not equally represented by this data. Observations are likely biased towards species that are most common, colourful, charismatic and visible during daytime. These maps represent the areas that are open to the public and most frequented by nature enthusiasts.

4.1 Native Species

PKOLS (Mount Douglas Park) and Mount Tolmie Park are some of Saanich's most popular natural parks. iNaturalist observations of native plants in these two parks is much higher than other areas in Saanich. Common observations here reflect the most ubiquitous and eye-catching trees and plants of our region, including Garry oak, licorice fern, arbutus, sword fern, Douglas-fir, white fawn lily, and dull Oregon-grape. Outside of PKOLS (Mount Douglas Park) and Mount Tolmie Park, recorded species are generally concentrated in other protected and publicly accessible areas such as Swan Lake and Christmas Hill.

Photo 20: Spotted towhees are among Saanich's most common birds.

The unique blend of a freshwater lake, wetland, and forest habitat at Swan Lake makes it a popular spot for viewing local wildlife (Figure 13). This park is evidently a hotspot for birdwatching

as 74 of the 91 animal species observed there are birds. The most common species include mallards (*Anas platyrhynchos*), golden-crown sparrows (*Zonotrichia atricapilla*), Anna's hummingbirds (*Calypte anna*), American coots (*Fulica americana*), and spotted towhees (*Pipilo maculatus*). This park is dog-free, likely increasing the parks use by ground nesting birds. Similarly, the wetland and old field habitat found at Panama Flats is another common place for birdwatching. 90% of the animal species inventoried there are birds. Observations of native animal species are more commonly made In parks compared to developed areas. This highlights the important role that parks play for providing access to nature.

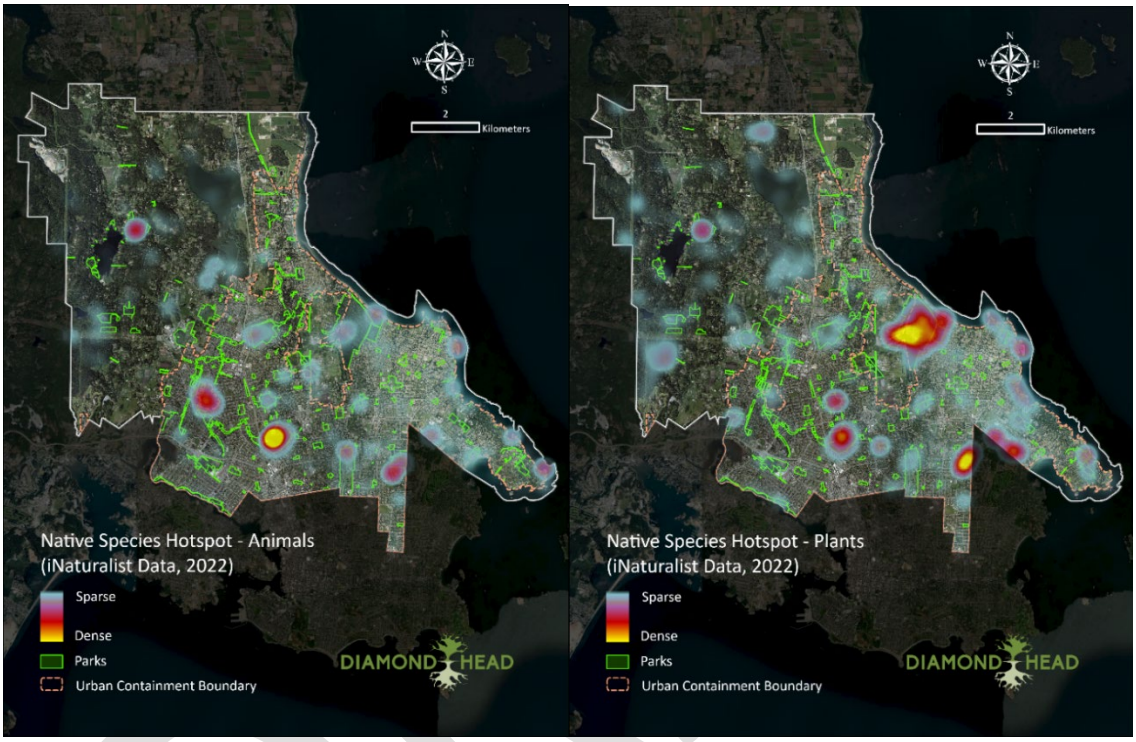

Figure 13. Native animal (left) and plant (right) species observation hotspots from iNaturalist data.

4.2 Threatened Species

Saanich is home to many threatened plant and animal species, many of which have been observed and recorded in iNaturalist (Figure 14). A significant portion of the threatened animal species observed in Saanich are great blue herons, which are a familiar and easily recognized bird in the region. This species has been most commonly observed in the aquatic habitats at Swan Lake, Panama Flats, and Glencoe Cove-Kwatsech Park. Saanich is also home to many other threatened animal species, including trumpeter swans, barn swallows, and western painted turtles.

Plant species such as Pacific yew (*Taxus brevifolia*) are declining across the west coast, whereas black/beach knotweed (*Polygonum paronychia*) is a blue-listed species with only one iNaturalist observation from 2022, and no records in the BCCDC in Saanich. Pressures from land development, competition, and climate change threaten the longevity of these species in Saanich. High concentrations of Pacific yew for example have only been recorded in Saanich at PKOLS (Mount Douglas Park). This

species grows slowly in the understory of mature coastal forests. Its bright red berries provide an important food source for wildlife. This population in PKOLS (Mount Douglas Park) is critical for keeping this species present in the District.

A small population of the red-listed yellow montane/canary violet (*Viola praemorsa*) exists in among the Garry oak meadows at Playfair Park. This species has only been observed here and at Bear Hill Regional Park and relies on these protected areas for its survival in the District. Along the foreshore, a population of the red-listed bearded owl-clover was identified at Glencoe Cove-Kwatsech Park. Both of these species live among the grassy meadows and are found in multiple parks across Saanich. However, in both cases these are the only populations identified in iNaturalist. This further illustrate the bias of the iNaturalist data, which only detects species that the public knows how to identify, and only identifies them in places frequently visited by the public.

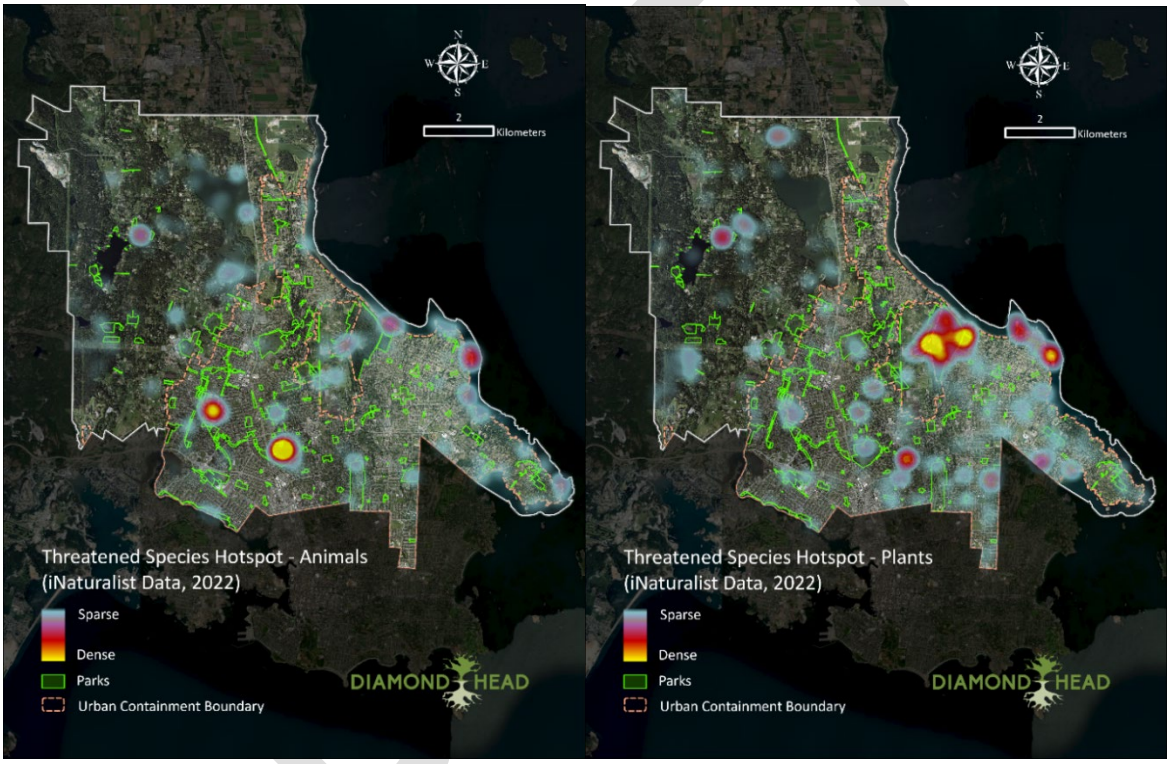

Figure 14. Threatened animal (left) and plant (right) species observation hotspots from iNaturalist data.

4.3 Invasive Species

Invasive species of plants and animals are pervasive throughout Saanich but concentrated mainly in urbanized areas. Many observations of invasive animal species have been made at Swan Lake, illustrating this habitat's suitability for eastern gray squirrels, European wall lizards, and American bullfrogs (Figure 15). As a foraging species, eastern gray squirrels take advantage of the diverse habitat types surrounding Swan Lake and have made themselves long-time residents of the park. Similarly, European wall lizards can be found basking in the pockets of rocky habitat. Swan Lake also boasts the highest concentration of American bullfrogs, likely due to extensive wetland habitat found there.

Photo 21: Wall lizards are a commonly found invasive animal in Saanich.

Panama Flats is another wetland complex with many observations of common non-native animal species including house sparrows and eastern cottontail rabbits. Further east, European wall lizards are well established between Cedar Hill Road and Shelbourne Street, likely owing to a mix of greenspace and paved surfaces in this neighbourhood. Visitors to Mount Tolmie Park and the University of Victoria have catalogued many introduced species, which include commonly observed occurrences of eastern gray squirrels, Indian peafowl and eastern cottontail rabbits.

Mount Tomie Park has the greatest number of iNaturalist observations of invasive plant species in Saanich. Of the 66 species observed here in 2022, Scotch broom, red deadnettle, and spurge laurel were the most commonly recorded. Similarly, PKOLS (Mount Douglas Park) is a hotspot for Scotch broom observations, having over double the number of observations compared to English holly, orchard grass, creeping buttercup, and English ivy. At Swan Lake, the showy bittersweet nightshade is the most commonly recorded invasive species, followed by creeping buttercup, English hawthorn, and red deadnettle.

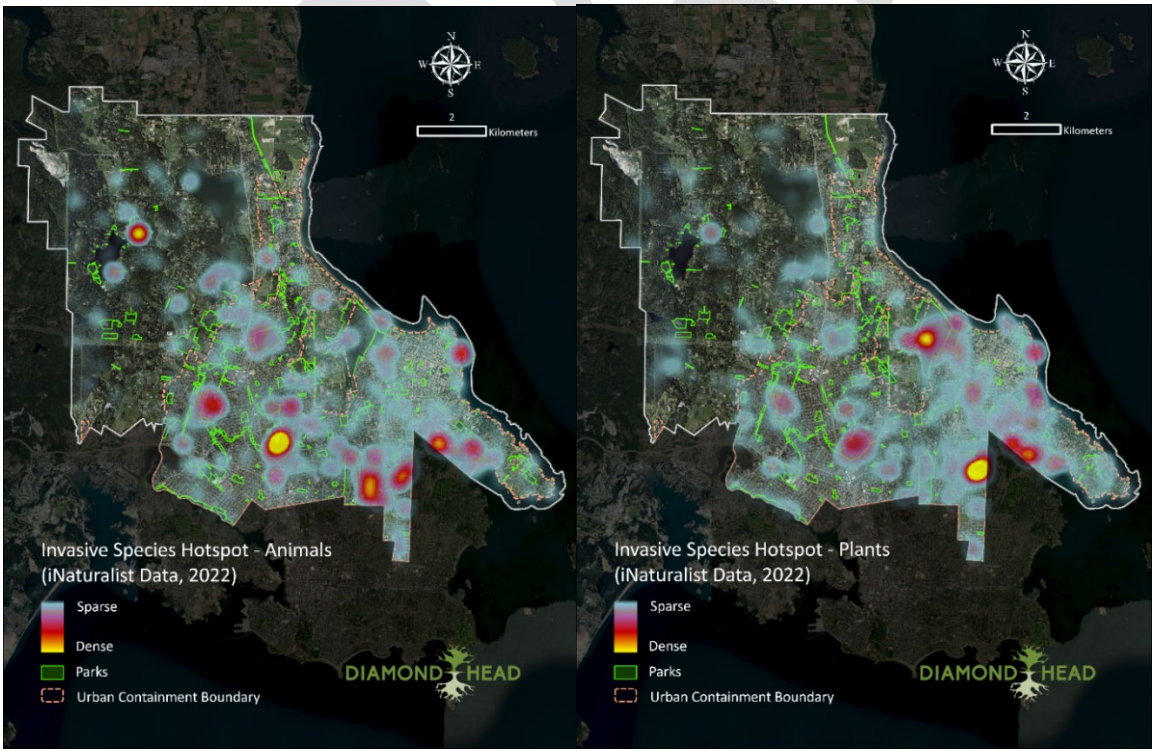

Figure 15. Location of invasive animal (left) and plant (right) species observations from iNaturalist in Saanich.

5.0 Biodiversity Target Categories

The Resilient Saanich Technical Committee's Biodiversity Working Group has identified eight types of habitat elements that will be used when discussing biodiversity conservation in Saanich. These are called "Target Categories" but are not meant to relate to a goal or objective. These Target Categories have been applied to all pervious areas of the District and include habitats ranging from sensitive natural areas to backyards and playing fields (Figure 16). While conservation methods and ecological sensitivities vary across these Target Categories, each plays a role in conserving and enhancing biodiversity across the District.

These target categories were identified through a process led by the RSTC Biodiversity Working Group. First, a series of "fine-filter targets" were identified. These commonly refer to species or habitat elements that are significant to an area. In this case, the working group reviewed every rare-listed ecological community known to occur or potentially occurring in Saanich as well as every rare-listed species known to occur, historically occurring or potentially occurring in Saanich and compiled a list of fine-filter targets. From there, the group refined the list through a peer-review with experts, adding missing species that have been found in Saanich and removing ones that haven't been found. From there, these fine-filter targets were aggregated into "course-filter targets" to identify the eight biodiversity target categories used here. The following sections define the eight target categories.

5.1 Coastal Douglas-fir Forests

Coastal Douglas-fir forests (described in detail in section 3.5.1) are part of the smallest and most at-risk forest type in the province.[41] Expansive human development across this forest type's range has led to dramatic declines in its distribution. In Saanich, most of these remaining forests are within parks and protected areas, though some remnant stands exist scattered throughout the District on private land. Coastal Douglas-fir forests cover approximately 2,729 ha which represents 23.8% of the District.

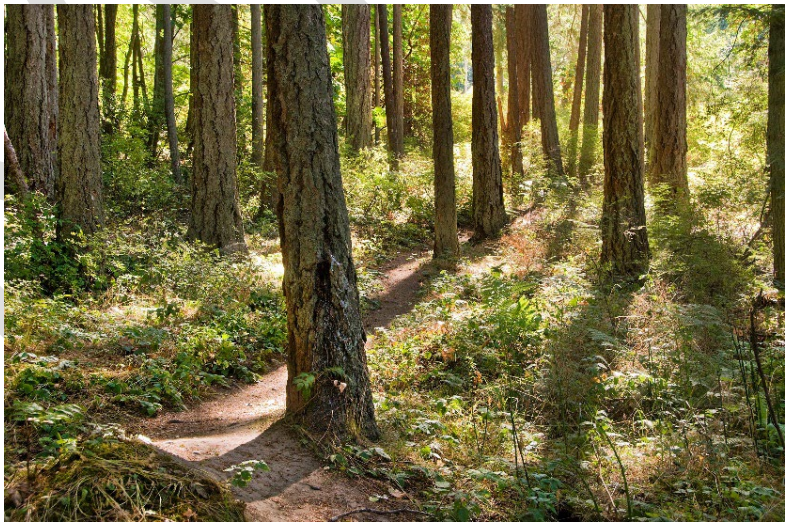

Photo 22: Coastal Douglas-fir forests are among Canadas most at risk forests.

5.2 Greenspace

Greenspace includes large, pervious areas in Saanich that are primarily grass and used for recreation. This includes four golf courses, and one cleared area at the south end of Prospect Lake. The greenspace category covers 164 ha which represents 1.4% of land in the District. These exist mostly on private land. One of the golf courses is publicly owned and operated.

5.3 Garry Oak Ecosystems

Garry oak ecosystems (described in section 3.5.2) are among the most recognizable and cherished ecosystems in the District. Vegetation in these areas is characterized by a well-developed herbaceous layer, with an irregular canopy of trees including Garry oaks. These ecosystems thrive in the unique climate of Southern Vancouver Island and the Gulf Islands and were maintained through Indigenous land management practices. Since the removal of cultural burning and extensive development in the area, few Garry oak ecosystems remain in Saanich. The hyperabundant predation by deer and trampling by visitors limits the ability of this ecosystem to regenerate understory plants. These ecosystems cover 251 ha which represents only 2.2% of land in the District.

5.4 Backyard Biodiversity – Rural & Urban

The rural classification of this category applies to lands outside of the Urban Containment Boundary (UCB), while areas within the UCB are considered urban. Urban backyard biodiversity areas are generally characterized by smaller parcels and denser housing while larger parcels and significantly more agricultural land are more common in rural areas.

Photo 23: Example of a more urban park.

These backyard biodiversity categories include private land ranging from small backyards to agricultural fields and hedgerows. They also include pervious public land such as street trees, boulevards, playing fields and urban parks. Vegetation in these areas typically includes turf grasses, ornamental landscaping and street trees. Urban backyard biodiversity areas cover 2,698.1 ha representing 23.8% of the District. Rural backyard biodiversity areas cover 2,167.0 ha representing 19.1% of land in the District. In total, these classifications account for 43% of the Districts land base.

Of the 4,889 ha of backyard biodiversity, approximately 13% of it is on public land, with 12% within roadway dedications and 1% on City-owned areas outside parks (Table 8). The other 87% is on a mix of commercial/industrial (1.5%), rural/agriculture (36.3%) and residential (37.1%). This highlights the importance of agricultural land to provide pervious areas and some habitat value on top of the food production value, as well as the opportunity for stewardship of residential and rural homes.

Table 8. Data summary of backyard biodiversity.

Classification	Backyard Biodiversity - Rural		Backyard Biodiversity - Urban		Total Sum of Total Area (ha)	Total Sum of % Cover
	Sum of Total Area (ha)	Sum of % Cover*	Sum of Total Area (ha)	Sum of % Cover*		
City-owned areas outside Parks	24.7	0.5	20.6	0.4	45.3	0.9
Commercial/Industrial	5.4	0.1	68.1	1.4	73.5	1.5
Residentials/Private Housing	212.9	4.4	376.0	7.7	588.9	12.1
Road Allowance	53.3	1.1	1741.8	35.8	1795.2	36.9
Rural/Agriculture	141.8	2.9	444.0	9.1	585.8	12.0
Others**	1728.9	35.5	47.6	1.0	1776.5	36.5
Total	**2167.0**	**44.5**	**2698.1**	**55.5**	**4865.1**	**100.0**

**% Cover refers to the proportion of each category in the backyard biodiversity, not cover District wide.
**Others includes grass/shrub/herb areas along the forest/greenspaces edges that are not part of a biodiversity polygon

5.5 Wetlands, Lakes and Hydroriparian Systems

Aquatic ecosystems and their associated riparian habitat support some of the highest levels of biodiversity in Saanich. Wetlands of all kinds are included in this classification, including bogs, seasonal ponds, lakes, streams, and forested swamps. Riparian systems are terrestrial habitats that exist next to these ecosystems and are influenced by their hydrology. These areas cover approximately 667 ha which represents 5.9% of the District.

5.6 Coastal Sand Ecosystems

Coastal Sand Ecosystems include the terrestrial portion of sand-dominated beaches, spits, and dunes. These areas are generally characterized by sparsely vegetated or herbaceous ecological communities and any associated forest, bluff, and wetland communities. The structure of these ecosystems relies on the influence of both the marine and terrestrial realms and the dynamic nature of this transition zone. Due to the limited range in which these ecosystems occur, they cover only 39 ha, which represents 0.3% of the District. The majority (98%) of these ecosystems occur outside of protected areas.

Photo 24: Native beach pea found in coastal ecosystems.

Photo 25: Few of Saanich's coastal sand ecosystems are protected. This an example of a recently restored coastal sand dune system.

5.7 Marine Shorelines

Marine Shorelines include the areas along the marine-terrestrial transition zone that are not considered coastal sand ecosystems. These ecosystems include rock outcrops, coastal bluffs, intertidal marshes, and estuaries. The foreshore, intertidal and subtidal zones are included in this target category. These ecosystems are variable across Saanich, ranging from sparsely vegetated bedrock to rich marshland in estuaries. Many species at risk inhabit these areas. These areas cover a small area covering only 28 ha, which represents 0.2% of the District.

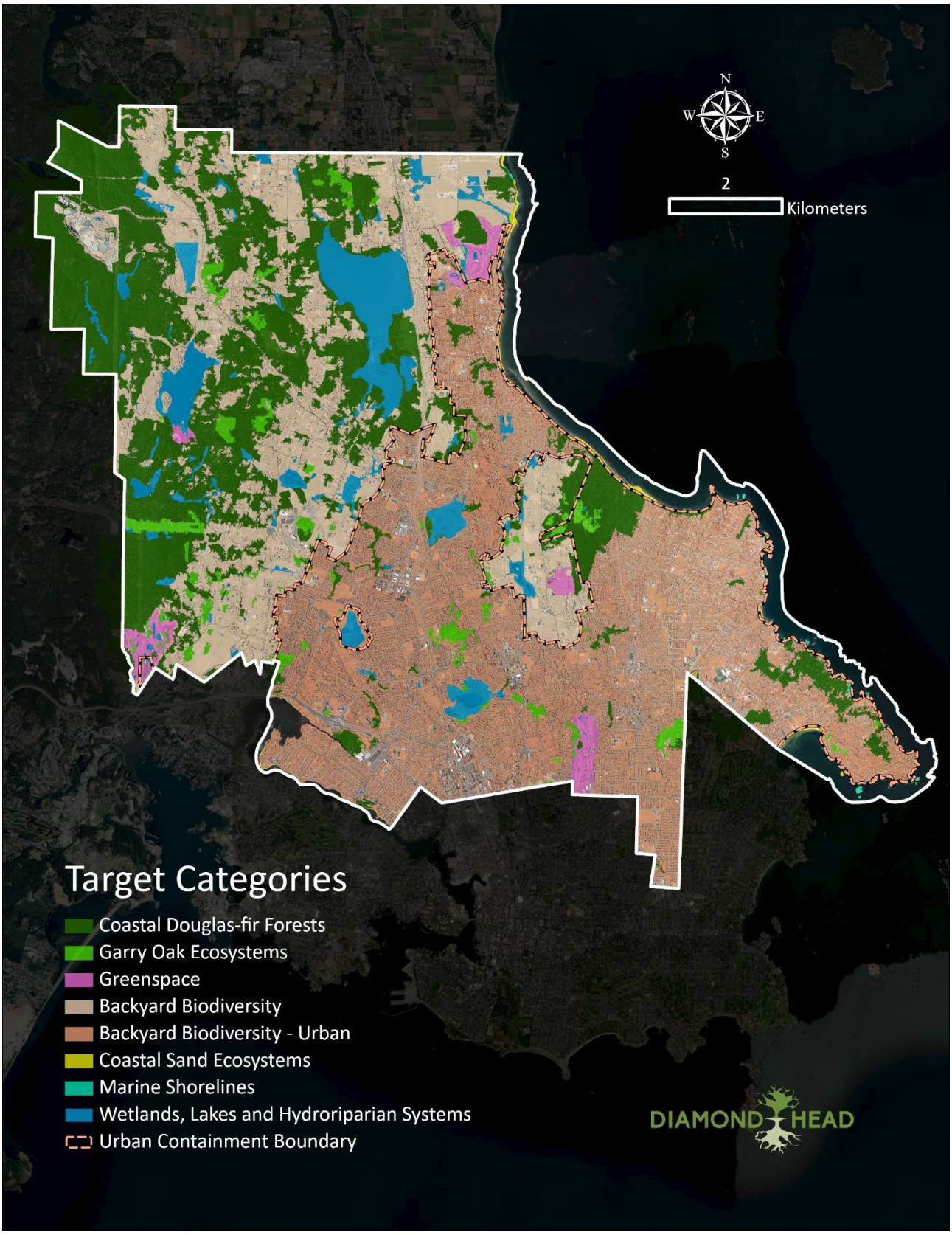

Figure 16. Biodiversity Target Categories.

6.0 Relative Biodiversity Ranking

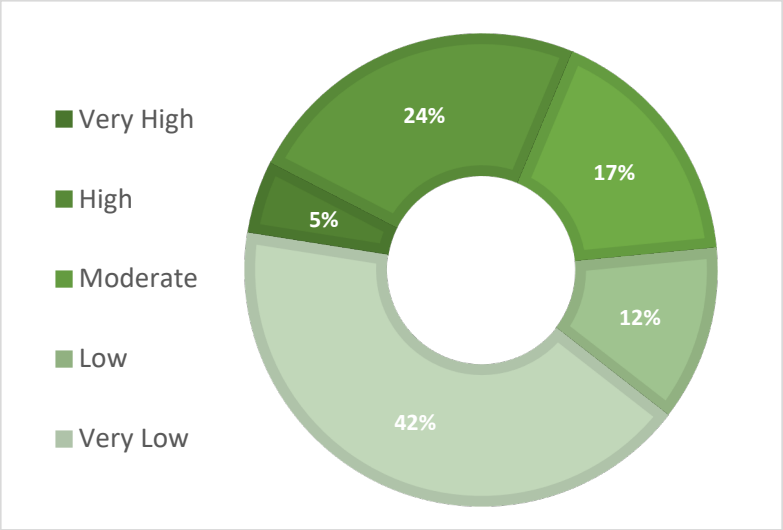

Figure 17. Percent area coverage breakdown of each biodiversity ranking category.

The final biodiversity ranking in Saanich provides a relative comparison of which areas in the District are likely to support the greatest diversity of species. The rankings are sorted into five categories, from very high to very low (Table 9). Only 5% of the land included in the analysis came out as very high, while 42% came out as very low (Figure 17, 18). Just over half of the land came out between high and low.

Table 9. Breakdown of biodiversity ranking.

Ranking	Score
Very Low	0 - <10
Low	10 - <35
Moderate	35 - <70
High	70 - <105
Very High	105 - 160

The areas that rank the highest are typically large in size, with refuge areas located away from urban development and have access to forage, shelter and water (Figure 19). Access to water in particular is very important. Even fragmented and small riparian areas next to watercourses can often support high levels of biodiversity, even when compared to larger natural areas that are separated from water sources[42].

Photo 26: Pacific sideband (*Monadenia fidelis*).

Generally, higher ranked areas were found outside the urban containment boundary (UCB), while areas within the UCB tended to rank lower. This is due to the fragmentation of natural areas by urban development within the UCB. Habitat areas tend to be smaller and fragmented with higher levels of disturbance. Larger urban parks such as PKOLS (Mount Douglas Park), Swan Lake, and Rithet's Bog are highly ranked and stand out as biodiversity hotspots within the UCB. These parks and other similar parks provide important refuge for wildlife within the UCB. Cuthbert Holmes Park is ranked as medium biodiversity value, but likely acts as a stepping-stone for that area, particularly for birds and flying insects.

Heavily treed residential areas with mature, closed canopies such as the Cadboro Bay neighbourhood support higher levels of biodiversity compared to more recently developed areas with younger, more spread-out boulevard trees. In comparison, areas outside of the UCB in rural Saanich features larger

tracts of contiguous forest and agricultural land with less development. The greatest concentration of highly rated natural area exists in the large tracks of natural forests in the northwest part of the District.

Many of the remaining Garry oak ecosystems in Saanich are found in smaller fragmented natural areas surrounded by development. Many of these areas have been disturbed from their natural state. Their fragmentation, small size, and lack of water sources cause them to be ranked lower than some may have expected. These important ecosystems provide specific habitat for many species at risk but do not necessarily support a high number of species in their current condition. They are critical for supporting species at risk but do not provide the size and diversity of habitat found in the large, continuous tracts of forest and riparian areas in more rural areas of Saanich.

It is important to note that proximity to water was possibly the greatest indicator of a polygon ranking in the high and very high-ranking categories. Since riparian corridors do not have their own vegetation classification, and are instead absorbed into a greater vegetation classification, much of the area identified as high and very high ranking in forests (Table 10) are associated with riparian areas.

Table 10. Sum of total polygon area (ha) by vegetation type and biodiversity ranking*/.**

Biodiversity Ranking	Agriculture	Broadleaf Forest	Coniferous Forest	Grass	Herb	Marine	Mixed Forest	Shrub	Urban Trees	Wetland	Total
Very High	-	81.9	8.2	-	-	3.1	308.2	22.5	-	-	**423.9**
High	-	201.3	343.2	-	-	63.9	1213.6	143.5	0.0	30.31	**1995.7**
Moderate	0.0	82.1	864.0	-	-	0.0	247.3	245.1	0.0	-	**1438.5**
Low	527.1	2.0	34.8	-	0.0	-	1.4	49.5	395.6	1.61	**1012.1**
Very Low	39.1	0.0	0.2	1439.5	308.5	-	-	518.8	1217.6	-	**3523.5**
Total	**566.2**	**367.2**	**1250.4**	**1439.5**	**308.5**	**67.0**	**1770.5**	**979.4**	**1613.2**	**31.92**	**8393.7**

*0.0 indicates a small total sum area (<0.05 ha), while the dash (-) indicates no areas with this ranking class.
**Proximity to watercourses was an important factor in determining the biodiversity ranking.

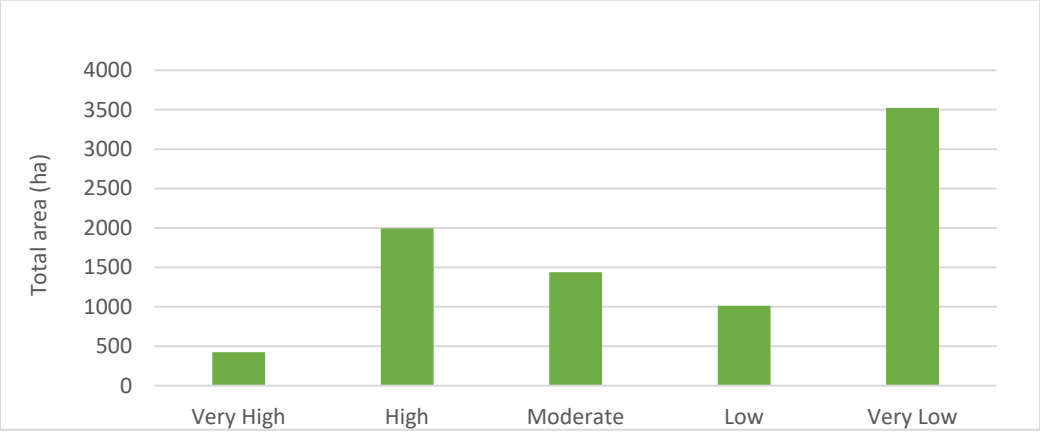

Figure 18. Total area coverage based on biodiversity ranking.

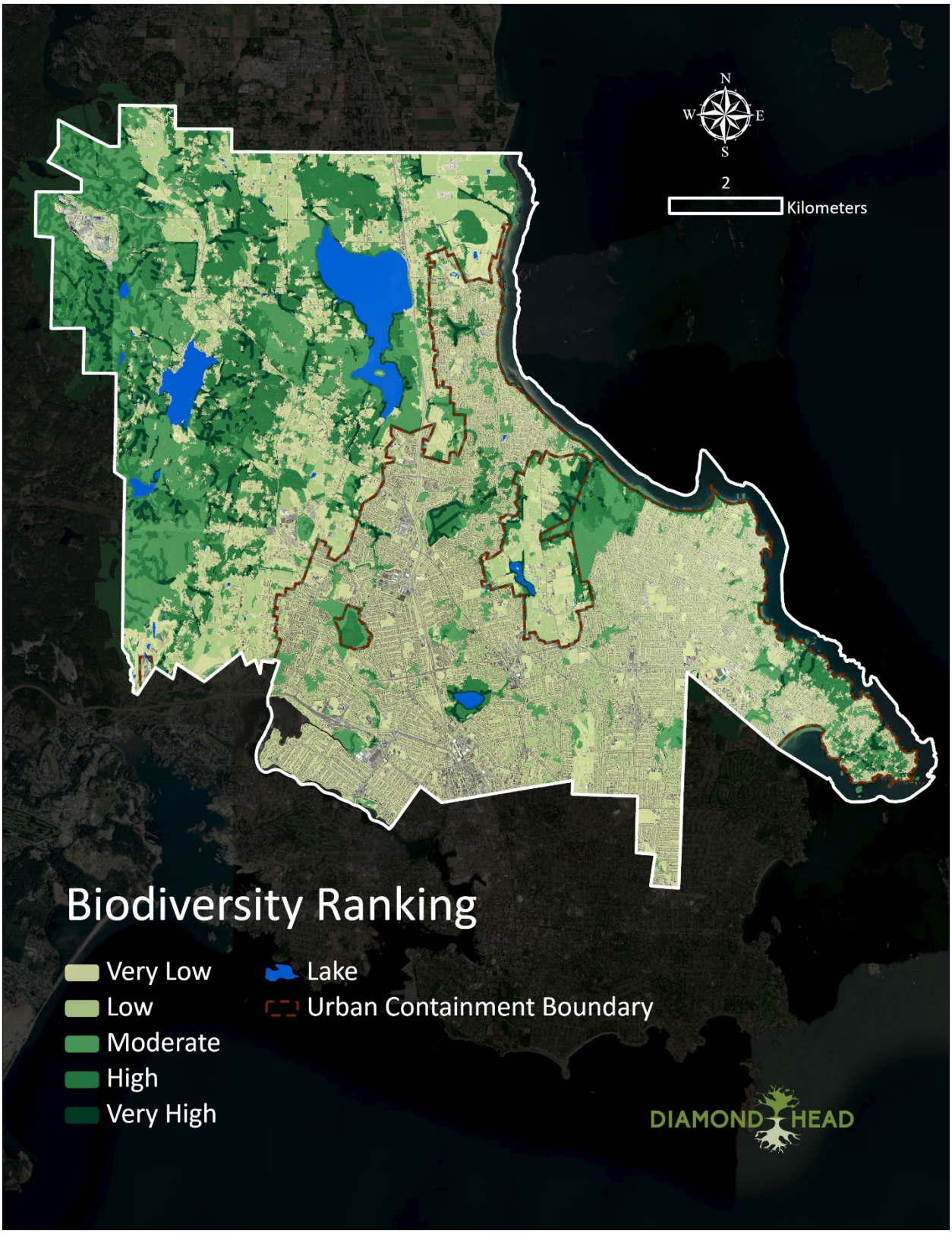

Figure 19. Natural areas throughout the District have been ranked based on their relative capacity to support biodiversity. This ranking incorporates habitat type, patch size, fragmentation, and proximity to freshwater.

7.0 Protected Areas

There is a total of 1,758 hectares of protected land within the District of Saanich (Figure 20). These are protected under a combination of jurisdictions including municipal and regional parks and conservation areas, as well as privately owned lands with natural state covenants. For this assessment, all parkland was considered protected, this includes natural area parks as well as urban parks, some of which provide natural areas. Protected areas are critical for managing biodiversity across the District. Understanding where these protected areas are, how they are protected, and how they contribute to biodiversity will help prioritise planning and resources for this Strategy. Maintaining biodiversity within the District requires that more areas be strategically protected focusing on the highest value areas and those that provide important connectivity corridors. It is important to note that while these lands are protected from development, they are not protected from other threats such as climate change, invasive species, over browsing, or overuse.

7.1 Private Land Regulation

7.1.1 Municipal

Natural state covenants are registered agreements that can be a municipal requirement for the approval of some development applications. The covenant is legally binding and remains in perpetuity for the property, unless new terms are agreed upon by the District and landowner. Natural state covenants are used by the District to protect sensitive ecosystems, plants, and wildlife. These agreements protect entire natural areas and their respective features. As part of the terms, the covenanted area is to remain undisturbed and, in some cases, restoration may be required. Any proposed activities must follow the terms of the covenant agreement and may also require written permission from the District of Saanich. Covenants are often issued as part of environmental development permit areas. The District does not currently have any environmental development permit areas.

7.1.2 Provincial

The province relies largely on municipalities to regulate environmental protection on private land. It does, however, have legislation in place to protect certain aspects of the natural environment. One significant piece of legislation is the Riparian Areas Protection Regulation (RAPR), which requires the protection of watercourses and a minimum functioning riparian area, called a Streamside Protection and Enhancement Area (SPEA). The SPEA (i.e. the vegetation, soils, and natural features that contribute to a watercourse's form and function) are protected from development and developmental impacts. There are some weaknesses to this legislation. One weakness is that RAPR applies to watercourses that provide fish habitat or significant flow or nutrients to fish habitat. It does not protect watercourses that are not connected to fish habitat. It does not protect against all land uses including agriculture. It also doesn't require restoration of degraded areas.

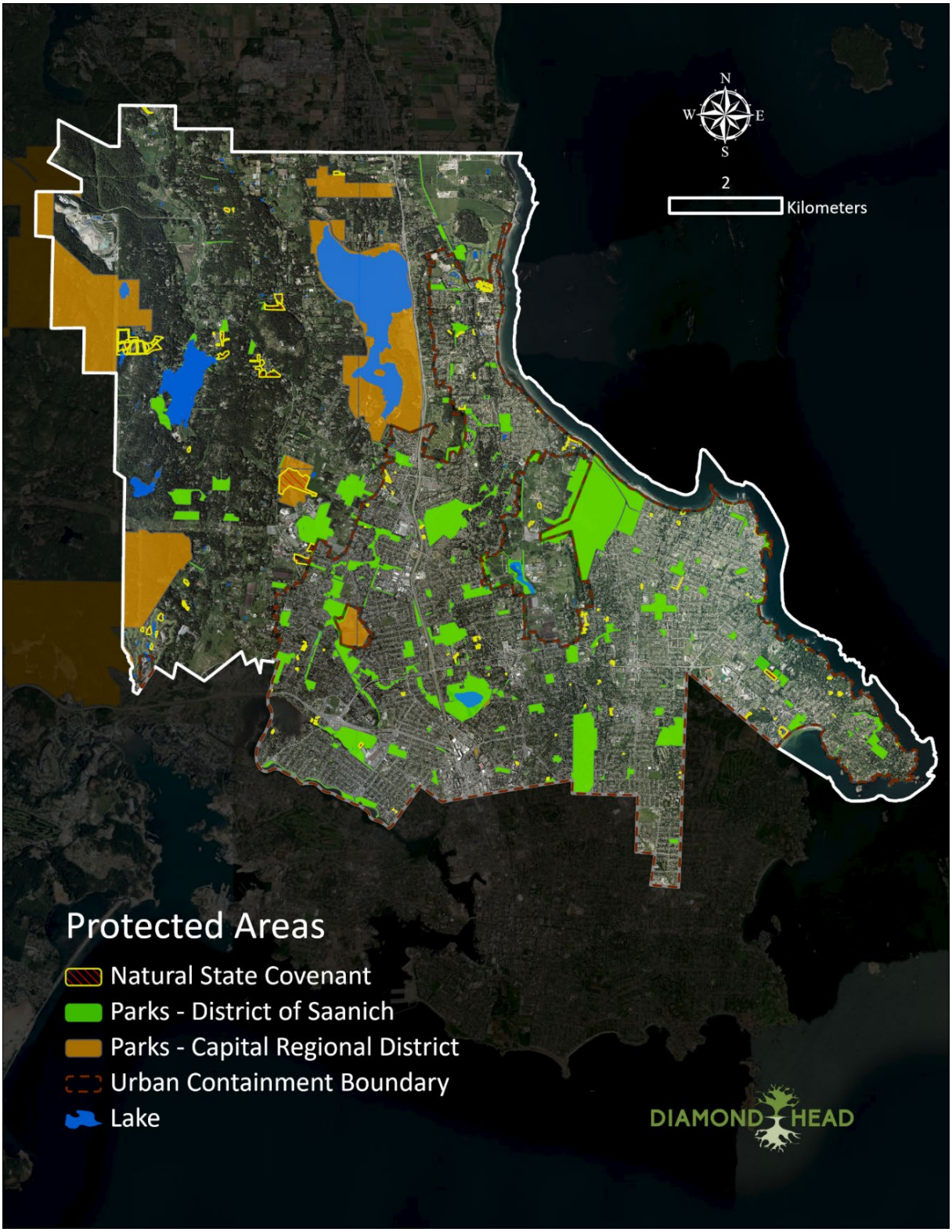

Figure 20. Location of lands protected under natural state covenants, District of Saanich Parks, and Capital Regional District Parks.

The Water Sustainability Act (WSA) a Provincial act that protects all watercourses and groundwater sources, regardless of fish status, and includes the regulation of instream works. It is the main enforcement mechanism of RAPR, outside of municipal Development Permit Areas. The watercourses and their riparian areas which are protected by these legislations were not included in Figure 20.

It is important to note that some additional legal protections exist outside of restrictive land covenants and parkland. They are, however, often limited in enforcement and/or applicability. These include federal or provincial regulations which protect specific habitat features such as nests, trees, or certain wildlife species. For example, the *Migratory Bird Regulation* (2022) federally protects migratory birds and their nests; however, this act only protects active nests (with some exceptions) and enforcement is largely left up to the municipality. Similarly, the federal *Fisheries Act* (2019) protects fish and fish habitat. In freshwater systems, this is largely done through enforcement of the provincial Riparian Areas Protection Regulation (RAPR). In marine systems, fish and fish habitat (including terrestrial riparian habitat i.e. shorelines) are technically protected; however, actual guidelines and enforcement may be inconsistently applied across jurisdictions. Tools exist for municipalities to expand on these protections beyond land acquisition and will be explored in the upcoming Biodiversity Conservation Strategy.

7.2 Natural Areas Program Overview

The District of Saanich has over 800 ha of parks, about 500 ha (62%) of which is in a natural state. Municipal park agencies have had a strong focus on providing recreational services and facilities, but have seen a shift based on community interest in conservation. Natural areas management in a municipal context evolved in the late 1990s and early 2000s as part of the Urban Forestry sector and only became formalized with dedicated staff 5 years ago. The program has four main program areas including invasive species management, large habitat restoration, protecting habitats and ecological restoration, and community stewardship and partnerships. It is very operationally based and focused on the ground with a supervisor, four regular full-time staff, and up to 6 seasonal staff.

From 2015 to 2020, the base budget to manage natural areas on a day to day basis remained relatively constant with some growth (1.4 times increase from $437,000 to $603,300) as the Natural Areas Program took over work from other groups such as vegetation management along trails. Significant growth was seen in capital budget for natural areas. Specific project funds were also acquired from external sources, such funding received by the Ministry of Transportation and Infrastructure for specific restoration projects. Funds are also provided to support the Pulling Together program.

In total, program budget grew from just under $600,000 to roughly $1.5 million annually from 2015 to 2020. With increasing community interest, expectations and demands also continue to grow. Invasive species management spending alone increased from $40,000 in 2015, to about $100,000 in 2020 to manage over 500 sites annually. An additional $142,000 was spent in 2021 to help support the Pulling Together program.

7.3 Summary of Findings

There are many high-value natural areas that remain unprotected in Saanich (Figure 21). These are found on a variety of lands including private property, right of ways, and industrial sites. The biodiversity analysis has highlighted areas in Saanich that have the capacity to support high levels of biodiversity but remain unprotected. These include much of the north-western part of Rural Saanich. These are typically lower-density neighbourhoods with larger minimum lot sizes and older and continuous forests.
The mapping of Biodiversity Target Categories illustrates the variability found in protected and unprotected habitat types across the District. As an example, the majority (63.2%) of wetlands, lakes and hydroriparian streams are protected. This is in large part due to the environmental legislation that applies to watercourses. Garry oak ecosystems are the second most protected biodiversity category, with 40% of these ecosystems currently protected. Coastal sand ecosystems are the least protected target category in Saanich, with only 1.8% of sand ecosystems occurring in protected areas, leaving 98.2% of these ecosystems unprotected. Other marine shorelines are also poorly protected, with only 8.9% of marine habitats occurring on protected land.

Photo 27: Many marine shorelines along Saanich are not protected as parkland.

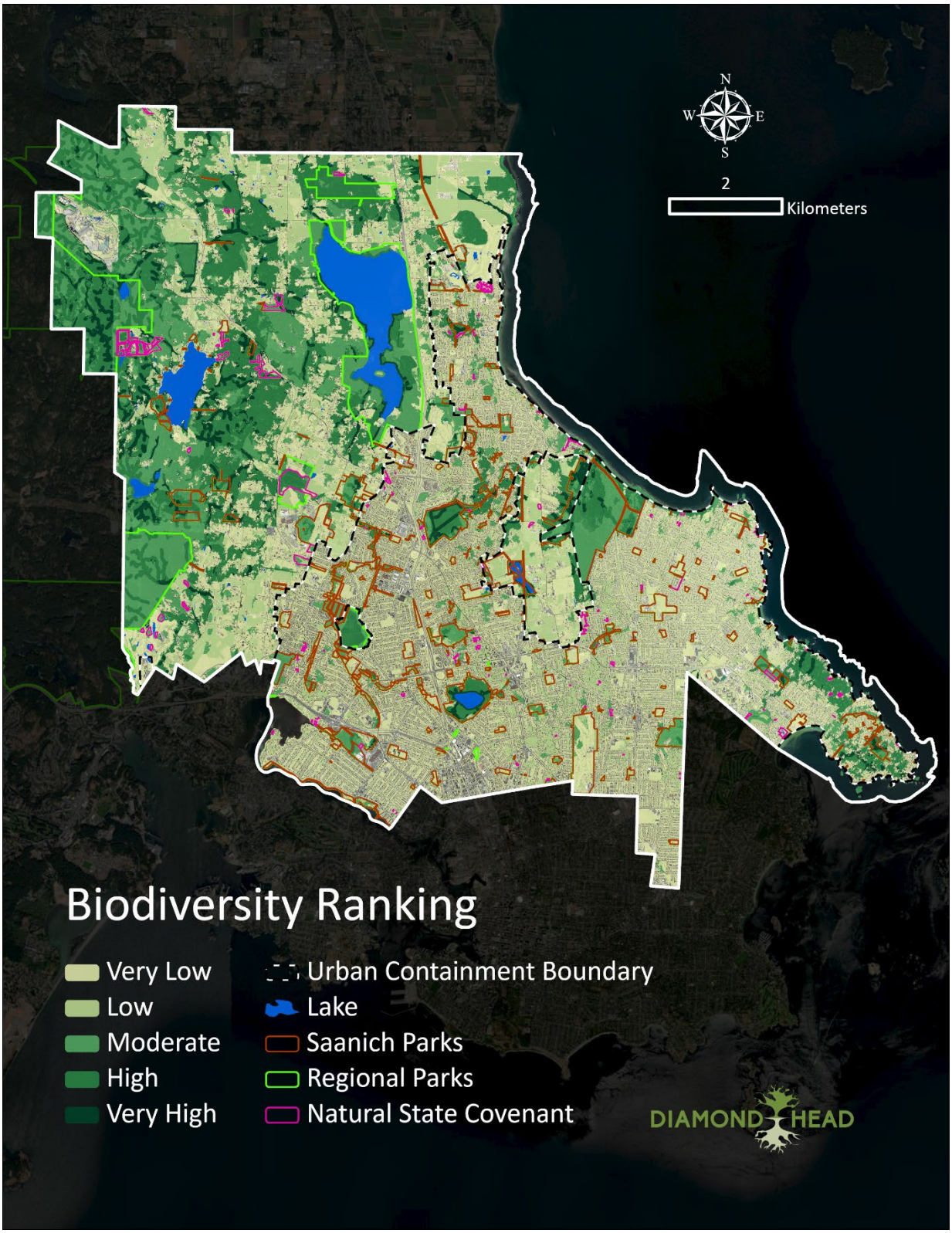

Figure 21. Location of protected lands and findings from the biodiversity ranking. This map highlights areas of high biodiversity value that could be vulnerable to development or other disturbances.

8.0 Threats to Biodiversity

There are numerous threats to the integrity of natural areas. These can include direct permanent impacts such as the clearing of natural features for urban development, indirect impacts from human activity such as the establishment of invasive species, as well as natural threats such as wildfires. Often, these threats are interconnected and compounding such as the effect on plant stress caused by climate change, which can increase the susceptibility and spread of diseases. Urban development may lead to increased disturbance and fragmentation, which can facilitate the spread of invasive species. Some of these impacts are permanent while others can be mitigated through restoration.

8.1 Residential and Commercial Development

The expansion of urban growth can result in distinct and permanent changes to Saanich's landscape. Intense urban development has been concentrated in specific regions mainly within the Urban Containment Boundary (UCB). Dense urban development is limited outside of the UCB, easing development pressure in more rural areas. While this benefits the natural environment outside the UCB, it comes at the expense of habitat within the UCB. The State of the Urban Forest Report (in development) identifies historic trends in tree loss. Urbanizing neighbourhoods including Saanich Core, Shelbourne and Tillicum have experienced increasing tree loss over time, despite having some of the lowest existing canopy in the District.[43] This trend is likely explained by ongoing infill development in this area.

Land development affects biodiversity across the landscape through direct habitat loss, fragmentation and urban interface effects. Direct habitat loss is the most impactful disturbance caused by development. This can include converting natural areas into new developments, clearing areas for parking lots and infrastructure, or even removal of a backyard tree.

Photo 28: Roads and trails can fragment habitat for small wildlife with limited mobility.

Habitat fragmentation occurs when large, contiguous tracts of a natural area are split into smaller pieces. This can vary in scale as well as the effects it has on various species. Smaller species that have limited mobility can be negatively affected by smaller features such as trails and roads. Larger areas of clearing can create wide separations between natural areas. The ability for species to move across these areas depends on their mobility and their tolerance for urban environments. Flying animals can make use of fragmented areas better than land-based animals. Venturing across urban landscapes can make smaller creatures more vulnerable to predation.

Fragmentation can exacerbate the effects caused by urban development by increasing the number of interface edges around a natural area. As the patch size of a natural area decreases, the influence of urban disturbances can have greater affects on it. These impacts are called edge effects and include disturbances such as noise, lighting, invasive species spread and encroachment. On a smaller scale, this can include understory trampling caused by off-leash dogs and park visitors or the spread of invasive plant seeds on clothing.

8.2 Climate Change & Severe Weather

Climate change is altering the growing conditions for plants and trees across the province. The BC Ministry of Forests classifies our province's forests into BEC zones. These are geographic areas that share a similar climate, vegetation, and soil types. Climate modelling is predicting that these zones will shift over time as climatic conditions change. These shifts are generally predicted to result in these zones shifting upward in latitude and elevation. Based on these models, the Coastal Douglas Fir zone (CDF) which currently cover much of southeastern Vancouver Island and the Gulf Islands is expected to move to higher elevations along the coast by 2040.[44] The dominant tree species in the CDF Zone (Douglas-fir and western redcedar) are already experiencing the impacts of drought in our region. These effects will only become more pronounced with the further influence of climate change. As models look further into the future, by 2070 these forests will be limited to higher elevations in the Gulf Islands (such as Mt. Maxwell and Mt. Tuam on Salt Spring Island). The District of Saanich and other low-lying areas currently classified as CDF are expected to shift to a novel, undescribed BEC type by 2040.

As climate change progresses, the southern, coastal areas of BC will experience warmer weather, though the effect will be moderated by the ocean and not as pronounced as inland areas of BC. Nighttime lows are anticipated to increase at a greater rate than daytime highs. The gap between daily high and low temperatures is anticipated to decrease during the winter and increase in the summer. Precipitation is also projected to increase annually, which is also likely to arrive as more frequent heavy rain events and not evenly occurring over the year.[45] This can have implications for capacity of stormwater systems and streams, which will have to convey flashier and heavier rainfall events. Seasonal flow through watercourses is expected to change, likely affecting fish habitat.

8.2.1 Sea Level Rise

Changes to sea levels have occurred over time due to a variety of causes. These include isostatic rebound, where the land moves vertically following the expansion and retreat of glaciers, and physical changes such as thermal expansion as water warms. Changes to the volume of water in our oceans directly affects sea levels. In general, sea level has risen along most of BC's coasts over the past century, outpacing isostatic rebound.[46] Sea level rise is expected to cause localized flooding and erosion of low-lying areas including coastal dunes, wetlands and beaches. Another phenomenon called coastal squeeze occurs when human-made buildings and infrastructure restrict the landward retreat that would otherwise naturally occur in response to rising sea levels. Coastal squeeze can lead to smaller and more degraded intertidal zones and terrestrial habitats along the coasts where manmade structures have been constructed too close to the foreshore.

Photo 29: Saanich is a coastal community with low-lying areas which are vulnerable to rising sea levels.

8.3 The invasion of non-native and other problematic species and genes

8.3.1 Invasive species

Invasive species are plants and animals introduced from other regions which have the potential to negatively impact ecosystems and the native species that reside there. While not all introduced species are considered harmful, those that can establish quickly and spread rapidly in new areas and outcompete existing vegetation communities and wildlife are considered invasive.

Photo 30: Scotch broom (*Cytisus scoparius*) is among the most problematic invasive species on the south coast.

The District of Saanich has developed and maintains an inventory for 13 noxious weeds which are sporadically found across the District. Saanich's Invasive Species Management Plan aims to improve its inventory of invasive species in partnership with community groups, educational institutions, the Coastal Invasive Species Committee (CIPC), the Capital Region Invasive Species Partnership (CRISP), the Province, and volunteers. In comparison to data from iNaturalist, Saanich's data has fewer observations but are distributed more evenly across the region (Figure 22). iNaturalist data is generally concentrated in parks and other community gathering places. This can cause it to underrepresent the presence of invasives in other areas.

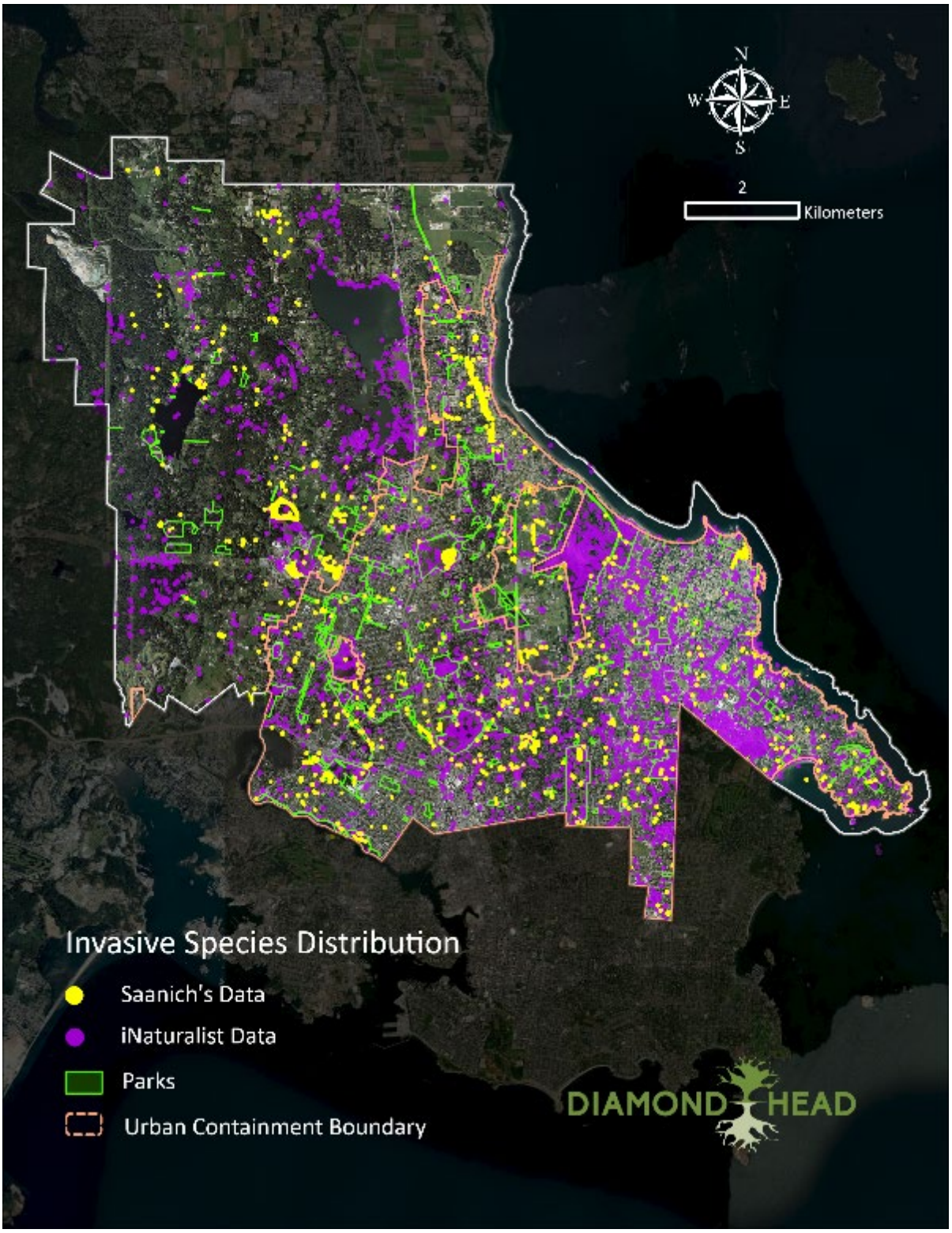

Figure 22. Invasive species have been mapped by the District or by the public using iNaturalist. It is likely that the true distribution of invasive species is far greater than either of these datasets shows.

Photo 31: English ivy (*Hedera helix*) is a common invasive species in Saanich.

Invasive plants and animals have been identified as one of the greatest threats to biodiversity.[47] They often require repeated aggressive treatment to eradicate them once established. Common invasive species found in Saanich include provincially recognized Early Detection Rapid Response (EDRR) species such as knotweeds, garlic mustard, giant hogweed, lesser celandine, purple loosestrife, and blessed milk thistle (Table 11). Saanich has committed to increasing resources to control invasive species focusing on those that pose high ecological or human health risks[48].

EDRR is a provincial approach for managing invasive species. As invasive species become established across the landscape, they become increasingly harder to eradicate, control, and manage. The EDRR approach addresses the increasingly higher time and costs associated with eradicating established invasive species and places priority on the species that are (a) not yet present in BC, and (b) species that are present in BC but at an extremely limited extent. These are actively managed with the goal of eradication.

Table 11. Invasive plant species occurring in the District of Saanich.[49]

Prevent	Eradicate	Contain	Control
Kudzu (*Pueraria lobata. var. Montana)*	Knotweeds *(Fallopia spp)*	Yellow Flag Iris (*Iris pseudacorus)*	Scotch Broom (*Cytisus scoparius*)
Carpet Burweed (*Soliva sessilis)*	Garlic Mustard (*Alliaria petiolate)*	Gorse (*Ulex europaeus)*	English Ivy (*Hedera helix*)
	Giant Hogweed (*Heracleum mantegazzianum)*	Poison Hemlock (*Conium maculatum)*	English Holly *(Ilex aquifolium)*
	Spotted Knapweed (*Centaurea maculosa)*	Purple Loosestrife (*Lythrum salicaria)*	Daphne / Spurge Laurel (*Daphne laureola)*
	Blessed Milk Thistle (*Silybum marianum)*	Golden Willow (*Salix alba var. vitellina)*	Himalayan Blackberry (*Rubus armeniacus*)
	Policeman's Helmet (*Impatiens glandulifera)*		English Hawthorn (*Crataegus monogyna*)
	Scotch Thistle *(Onopordum acanthium)*		Periwinkle (*Vinca major, V. minor*)
	Shiny Geranium *(Geranium lucidum)*		

Parks is currently leading the response to manage invasive species. Saanich developed an Invasive Species Management Strategy (ISMS) in 2015 with the goal: *To prevent establishment of new invasive species and reduce, control and mitigate the effects of established invasive species on natural ecosystems, human health and the economy.*

The ISMS addresses invasive species management on public and private land, staff roles and responsibilities, priorities, actions, community stewardship, partnerships, and resources. This comprehensive program includes preventing the introduction of and eradicating new invasive species, and the containment and/or control of the spread of established invasive species.

Many of these undesirable plant species arrived in the region through various forms of transportation such as visitors, birds, wildlife, trains, and boats. Others were purposefully planted in landscapes. The District is actively managing over 600 invasive plant sites on park and public land. Most treatment efforts utilize manual and mechanical removal by hand or machine. Chemical treatment is not used frequently and only if best management practice (BMP) recommends them. Of the few species where chemical treatment is recommended to prevent their spread, spot spray or hand painted treatments are used with regulated herbicides. Information on the use of pesticides as well as invasive species fact sheets can be found on the District's Invasive Species Webpage. CRISP maintains a Regional Priority Invasive Plant Status list which Saanich adapts for management planning.

Invasive animal species require a multi-faceted approach including new or amended regulations, the promotion of educational materials, community partnerships, and participation in regional initiatives. Some examples include Saanich's participation in the regional strategy for Canada Geese (goose egg addling) and the development of an educational program to raise awareness of American Bullfrogs. The CRD is exploring additional measures including a regional egg addling program and collaborating with First Nations to harvest geese. The Animals Bylaw was amended to address animal conflicts involving rabbits and deer. Together, these actions are part of a comprehensive approach to reduce new occurrences and spread of invasive species within the District of Saanich. Examples of invasive wildlife management species are found in Table 12.

Table 12. Invasive animal species occurring in the District of Saanich.

Invasive wildlife management	
Eastern Grey Squirrel (*Sciurus carolinensis*)	Eastern cottontail (*Sylvilagus floridanus*)
European Fire Ants (*Myrmica rubra)*	Resident Canada Goose (*Branta canadensis*)
American Bullfrog (*Lithobates catesbeianus*)	Feral Cats (*Felis catus*)
Green Frog (*Lithobates clamitans*)	European rabbit (*Oryctolagus cuniculus*)
European Wall Lizard (*Podarcis muralis*)	European Starling (*Sturnus vulgaris)*

The Pulling Together program is an initiative run by the District of Saanich to combine the efforts of District staff and volunteers to help reduce the presence of invasive species across the District. From the Plan Review and Status Update report to the Mayor and Council, the ratio of volunteer hours to staff hours has remained consistently at 8:1 since 2015. The specific metrics of the

rate of removal by volunteers are unknown. Additional data on the number of removals and time spent removing will need to be collected to identify the effectiveness of the program.

8.3.2 Pests and Diseases

Disease, pests and the stress or mortality they can cause are natural parts of ecosystem dynamics. At natural levels these agents of change can improve biodiversity. They can create small stand openings, wildlife trees and often can provide a food source for predators. At unnatural levels however pests and diseases can cause significant negative impacts to ecosystems.

There is a wide range of diseases and pests which threaten our forests and wildlife. An example of the impact these can have on our landscape is the white pine blister rust (*Cronartium ribicola*), which is regarded as one of the most damaging tree pathogens in BC. The western white pine (*Pinus monticola*) was once a dominant species of southern interior BC forests and a component of forests across Vancouver Island. A history of logging, mountain pine beetle and the spread of white pine blister rust has resulted in the widespread loss of this species across our landscape over the last 100 years. Some estimates state the range of this species has been reduced by 90%[50]. This pathogen was introduced to BC in the early 1910s and 1920's through seedling importations from Europe and Eastern North America.[51] The disease subsequently spread throughout the west coast, resulting in widespread mortality. White pine is now uncommon in our region.

Photo 32: Deer are natural herbivores that have reached unnatural population levels in the District.

White-nose syndrome is a disease affecting bat populations which were first detected in New York in 2006. Since then, this fungus has spread across North America, killing over 6 million bats in eastern North America.[52] *Pseudogymnoascus destructans*, the fungus responsible for this disease presents as a white, powdery substance on the affected bats' nose, ears, wings and or tail. The pathogen causes behavioural changes resulting in unusual activity, such as flying during the daytime in the winter and spending time outside of the hibernaculum. This results in a loss of fat supply during the winter and can cause widespread mortality at a hibernaculum (80-90%). Currently, this pathogen has not been identified in BC but has been found in Washington since 2016. In Canada, the fungus has been confirmed in Manitoba, New Brunswick, Newfoundland and Labrador, Nova Scotia, Ontario, Prince Edward Island, Quebec and Saskatchewan.[53] As of July 2022, white-nose syndrome had not been detected in BC, but was anticipated it was only a matter of time before it appeared[54]. Early detection and rapid response programs are key to preventing new pathogens from becoming established in BC.

Photo 33: Homemade sign asking residents not to feed deer.

Pests and diseases are not limited to introduced species but can also naturally occur in our ecosystems. Examples of these can be species such as the mountain pine beetle (*Dendroctonus ponderosae*) which is a natural component of BC's forests but was responsible for affecting millions of hectares of inland forests between 1999 and 2015.[55] In Saanich, the Columbian black-tailed deer (*Odecoileous hemionus columbianus*) is an example of a naturally occurring species which has become a pest species in some areas. These deer have been able to adapt to human settlements, and now are a common sight in Saanich. Black-tailed deer are herbivores and primarily browse grasses and forbs but will also eat many tree saplings. Urban feeding, lack of predation and abundant food opportunities has allowed the population to thrive in Saanich, impacting tree regeneration and understory vegetation throughout the landscape.

8.4 Human impacts

Humans have direct impacts on natural areas. Positive impacts includes protecting and restoring the natural environment, and individual species such as agricultural crops have thrived under human altered conditions. Negative impacts can range in scale from leaving a pet unattended to complex societal issues such as the removal of Indigenous land management techniques and non-point source pollution in waterways. Many of these influences are challenging to solve due to their scale, complexity, and limited resources. They can be classified into acute or diffuse impacts depending on their temporal scale.

Photo 34: Degraded understory vegetation and stream banks caused by understory trampling and other disturbances.

Acute threats to biodiversity are those where a single management decision or action has an immediate impact on biodiversity. These can include hydrological changes such as the construction of dams and reservoirs, water main breaks landfills, and land clearing. In marine habitats, this can includes oil and chemical spills, where a single event can drastically impact ecosystems. Diffuse impacts on biodiversity include those which are spatially small and not necessarily caused by a single event. Understory trampling for example caused by off-leash dogs may not result in an immediate loss of understory, however, over time the cumulative impacts can drastically alter an ecosystem. Larger scale impacts can include non-point source nutrient loading and pollution into

watercourses. These can include minor chemical spills, fertilizer runoff, as well as outdated septic systems, all of which often result in low quantities of pollutants seeping into waterways.

8.5 Impervious Surfaces

Photo 35: Impervious surfaces can reduce water infiltration and fragment the landscape.

Surfaces which do not allow water to pass through are considered impervious. These include buildings, roads, parking lots sidewalks and other artificial structures. Measuring the extent of impervious surfaces helps to understand the impacts that urban areas have on biodiversity. Rainfall on natural areas and other pervious surfaces allows water to infiltrate into the groundwater. This allows groundwater recharge, removes pollutants, and increases the base flow of watercourses. Impervious surfaces prevent water from entering the ground, and instead moves it across the landscape as runoff. This flushes pollutants into streams, reduces groundwater, and can have significant effects on stream health and morphology.[56]

LiDAR and GIS processing of CRD layers was used to identify impervious surfaces across the District. It was found that impervious surfaces account for a total of 15.8% of the District's land area. There is, however, a large variation across the District (**Figure 23**). Within the UCB, impervious surfaces account for 29.5% of the land area. Outside of the UCB, only 4.8% of the land cover is impervious. In all areas, over half of impervious surfaces consist of roads and buildings (Table 13).

Table 13. Impervious surfaces vary inside and outside of the Urban Containment Boundary.

Vegetation Type	Total Area – UCB (ha)	Total Area – Outside UCB (ha)	Total Area (ha)	% - Within UCB	% - outside UCB	% - District-wide
Buildings	716.6	89.2	805.8	14.2%	1.4%	7.1%
Roads	345.9	68.6	414.6	6.8%	1.1%	3.7%
Other paved surfaces*	427.9	145.1	573.0	8.5%	2.3%	5.1%
Total	**1,490.4**	**302.9**	**1,793.4**	**29.5%**	**4.8%**	**15.8%**

* Defined as pavement, packed gravel, and other paved surfaces not listed (e.g. paved playgrounds)

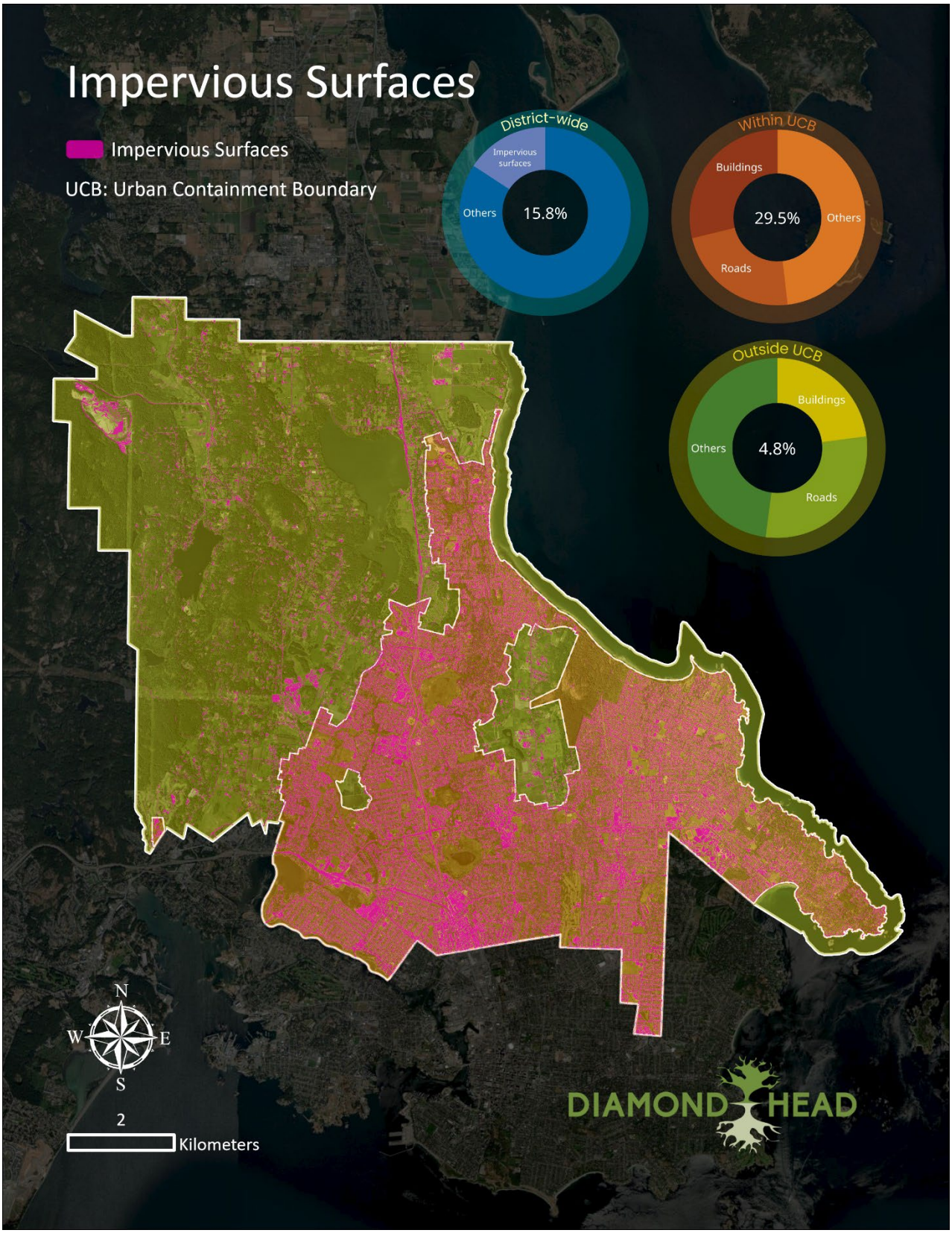

Figure 23. Map showing location of impervious surfaces in Saanich, within and outside the UCB.

8.6 Loss of Indigenous Knowledge and Practices

Land stewardship and management by the W̱SÁNEĆ, Lək̓ʷəŋən and Xwsepsum/Esquimalt peoples has shaped plant and animal communities across the peninsula and is perhaps most exemplified through the creation and maintenance of Garry oak ecosystems. Over centuries, these ecosystems were maintained and expanded through periodic burning to remove shrubs and trees, increasing habitat for edible root crops.[57] Removing this important cultural practice from the landscape has resulted in the widespread loss of Garry oak ecosystems in natural areas, which has now been accelerated by many other impacts such as development and land conversion. The removal of cultural burning from Garry oak Ecosystems as well as the loss of indigenous knowledge has had a major impact on biodiversity in Saanich.

In recent years, the impact of the loss of this knowledge has been more widely understood, with collective, collaborative efforts underway for Indigenous people and communities to reclaim culture and language. For example indigenous languages are now being incorporated on signage and brochures for Saanich Parks, with indigenous place names becoming more widely recognized.

Photo 36: First Nations have knowledge of the forests, shorelines, and marine ecosystems in Saanich that has been acquired over thousands of years.

9.0 Data gaps and Limitations

9.1 Analysis completed based on existing spatial datasets

The analysis that has been completed was done using available municipal, regional, and provincial datasets. The findings of this report are reliant on the accuracy of that data. It is recommended that these datasets be refined and updated as more accurate information becomes available. Errors, mistakes, and missing data were identified within these datasets. These included linework inaccuracies, codes that are found and used in adjacent BEC zones, inconsistent use of non-natural codes, and inconsistencies in the level of detail between polygons. DHC has corrected some errors and inconsistencies, but due to the number of errors and budget limitations, the corrections were not comprehensive. The District has been working to further refine their datasets to remove errors and improve linework, and plans to continue to make improvements.

The analysis and mapping was based on the data that was consistently available across the entire District. There is site-specific data that is available and provides a high level of detail, but could not be incorporated as it only pertained to specific area. For example, understand the fish species found in one stream cannot be used for comparison unless similar information is known for all other streams in the District. The analysis requires that the input data be consistent and cover the entire District. There are Qualified Environmental Professional (QEP) reports available that provide high levels of details for certain areas. However similar levels of detailed analysis is not available for the entire District. For District-wide planning and high-level management, it is important that the data be consistent and treated equally so that prioritization frameworks in future phases are not biased towards sites that contain more information.

The District of Saanich has a relatively good level of mapping detail compared to other municipalities in British Columbia. However, some data layers provide better quality than others. For example, the District's invasive inventory and spatial data only provides information on the locations of invasive plant species that are reported to the District within public property. Since this data is limited to reported occurrences and does not include invasive species presence on private land, the extent of invasive species is an underestimation of the actual invasive plant species present, their location and extent, across the District.

9.1.1 Terrestrial Ecosystem Mapping

The Terrestrial Ecosystem Mapping (TEM) is a provincial mapping approach for site-specific classifications and descriptions of ecosystem units in BC. Individual inventories are conducted across the province and submitted to the Province. A standardized approach to TEM mapping in British Columbia was developed in 1998[58]. TEM data is submitted to the province through the Terrestrial Ecosystem Information System (TEIS). This system helps the province acquire and administer data throughout the province while also ensuring that the data corresponds with the objectives of the Resources Information Standards Committee (RISC)[59]. Data collection dates for provincial TEM data are not provided.

TEM data provides comprehensive ecosystem information across the entire District and was the foundational data source used for the biodiversity analysis. Within the dataset, the TEM uses a variety of site codes and site modifiers to describe terrestrial ecosystem polygons. The data presented through spatial layers are a snapshot in time and reflect the environmental conditions at the time of collection. Since ecosystems are dynamic, information must be updated over time to understand the changes that have occurred and reflect current-day conditions.

9.1.2 iNaturalist

A summary of iNaturalist data was included to highlight the variety of species that can be found across the District. iNaturalist is an online application that allows the public can input observations and recommend, confirm, or dispute species identification. The accuracy of this data is not as reliable as data collected by registered professionals. As this is a free application available to people with varying degrees of knowledge and skill, it is expected to have identification errors. To minimize identification errors, only 'Research Grade" status observations were used for this summary. Observations are assigned 'Research Grade' status when multiple users have confirmed the species identification. iNaturalist reports this data as usable for scientific research.

The public reporting methods of iNaturalist also bias the location of where the information is collected. Most observations tend to be concentrated in popular and frequented parks, resulting in a heatmap that is skewed towards those locations. This is illustrated in the Figures depicting the iNaturalist data. Although there are differences in the density of observations, their distribution is similar between invasives, threatened species, and native species which overlap, suggesting that there are biases to where data was collected. Observations in iNaturalist are also biased towards species which are most active during the daylight. The data likely underrepresents nocturnal and crepuscular species because they are most active when humans are least likely to encounter them.

9.2 Field visits, LiDAR, and orthophotos were used to refine existing datasets

Field verification was conducted by Registered Professional Biologists from Diamond Head Consulting (DHC) to assess the accuracy of the data used in analysis and to supplement some areas where data may have been absent. Time and budget limited the number of field verifications and was not comprehensive across the entire District. Only public lands were visited as part of these field visits. 141 (8%) of the total of 1821 polygons were visited. This report did not include the identification or prioritisation of areas for restoration. Restoration opportunities were identified and will be discussed further in the Biodiversity Conservation Strategy.

A detailed wildlife survey was not completed as part of this report. A detailed survey would require extensive resources and would have to be completed for representative areas across the entire district. A representative species guild was used to compare habitat areas. These include higher-order wildlife that is present indicate that lower order species are also likely present. For example, if Great blue herons are expected to be found inhabiting the marine intertidal area, it can be expected that small fish, shrimps, crabs, and aquatic insects that great blue herons consume will live there as well.

A list of species and ecosystems at risk was developed by the RSTC and has been included in Appendix 3. This list consists of species and ecosystems at risk that can be found in Saanich. Species presence and absence are continually evolving. This information only provides a current (2022) description of what was present and extirpated and must be continually updated to provide the most accurate information.

A flow accumulation model was run for the District. This is a LiDAR model that predicts flow patterns based on detailed ground data from the LiDAR-derived hillshade and Digital Elevation Model layers. This was used to create a new detailed inventory of LiDAR-derived potential watercourses. Some of these have been identified by the District or verified through the DHC field work, while others have not yet been confirmed. This model identifies many potential lower-order watercourses that remain unconfirmed. It is expected that this layer is to be refined and updated on an ongoing basis.

10.0 Next Steps and Future Considerations

10.1 Biodiversity Conservation Strategy

This report provides a District-wide overview of the state of biodiversity using available datasets and supplemented with recent technologies and ground truthing. The next phase of the project will be to identify and prioritize ways to protect biodiversity in the District of Saanich through the development of a Biodiversity Conservation Strategy.

This State of Biodiversity Report will be used as a foundational document to inform the Biodiversity Conservation Strategy (BCS). Engagement will kick off the development of the BCS where the public, stakeholders, and First Nations will be consulted to provide input. In addition, a polling company will be hired to conduct a statistically significant survey among Saanich's citizens. The BCS will identify current resources and stewardship groups that contribute to managing the biodiversity in Saanich. To help inform the development of the BCS, the District's current policy context will be reviewed, and a series of municipal interviews will be conducted to establish an understanding of what is successful in other municipalities. With this information, policy recommendations will be developed for the BCS.

The biodiversity ranking that was developed as part of the state of biodiversity report will be used to inform the development of a Green Infrastructure Network (GIN). The GIN will provide a network of natural environment and features that will support a variety of species across the District. As the foundational document for protecting natural areas and preserving biodiversity across the District, the Biodiversity Conservation Strategy will identify the baseline conditions and provide the framework for developing a monitoring program that will help the District track the effectiveness of working towards the recommended vision, goals, and objectives. The monitoring framework will include recommended indicators that can be used to understand the condition of the environment and reflect the ecological health of a target area.

The Biodiversity Conservation Strategy will:

- Review the existing legislative framework to understand current protection and management practices of natural areas and biodiversity in Saanich;
- Identify gaps in legislation coverage;
- Develop a municipal comparison to understand what tools are used in other municipalities; their successes and drawbacks, and provide a range of possible solutions;
- Analyze connectivity – identify existing natural hubs and corridors to create a GIN;
- Collaborate with First Nations;
- Engage with the public through a StoryMap (complete), public open houses, and survey (both publicly available and targeted);
- Engage with relevant stakeholders;
- Develop a vision and high-level goals;
- Develop recommendations for biodiversity indicators;
- Develop recommendations for monitoring, education, and stewardship

10.2 Future considerations

This State of Biodiversity report provides an understanding of the current state of the District's natural areas and the elements that threaten their integrity. It provides a foundation of information intended to inform the next phase of the Reliant Saanich program, which is developing a Biodiversity Conservation Strategy. Several information gaps were identified through the development of this report. Some of these will be discussed in more detail in the Biodiversity Conservation Strategy, which will discuss and prioritize management opportunities for natural areas. The following is a list of ideas generated by DHC staff, RSTC members, and Saanich staff. They may have varying degrees of usefulness for natural area management and are presented in no particular order.

- **Invasive plant species**: Between the District of Saanich, Capital Regional District, and Qualified Environmental Professionals, there is a good understanding of what invasive plant species exist in Saanich. However, there is a lack of detailed information on their location and extent, particularly on private property and for new invasive plant species.
    - The municipality has an invasive species layer containing known species occurrences as points. This can be further supplemented by publicly accessible observations such as the IAPP – Invasives BC app and iNaturalist data.
    - Many municipalities choose to collect invasive plant species on specific land types (i.e. roadways, along ditches, parkland, etc.). Ideally, these are collected every 3 to 5 years to understand how invasive plant species have changed (successful management or eradication and identifying new threats).
- **Invasive animal species:** Details on invasive animal species are extremely limited compared to the information for invasive plant species. Reports on invasive animal species can be found in iNaturalist data. However, this data may be skewed, and its accuracy is unknown. Invasive animals should be included in an invasive species management initiative for the District.
- **Species at risk**: Managing species at risk at a municipal level is often done by targeting the management of their preferred habitat. By managing habitat for species at risk, you help to

protect those individuals and provide habitat for their future recovery. Species-at-risk extents are not fully understood in Saanich. Future studies should be done to identify these extents and habitat preferences more completely.

- **Canopy analysis & tree health**: Detailed data about the canopy, tree health, and the urban forest are being developed through the ongoing State of Urban Forest reports and Urban Forest Strategy. This initiative will provide information on the trends in canopy loss and its causes.
- **Understory vegetation**: While LiDAR, orthophotos, and other data sources provide detailed and up-to-date information on the canopy overstory, it does not provide detail for what is located below the dominant and codominant species in a stand. This information is best collected through field visits on a site-by-site basis.
- **Trends**: This report will act as a baseline for the state of biodiversity in Saanich, however, trends could not be determined due to the lack of temporal District-wide datasets. Future studies could be completed to identify historical and future trends in Saanich. The Urban Forest Strategy and State of Urban Forest reports will provide information on the trends in canopy loss and their causes.
- **Animal species data**: Highly accurate, fine-scale occurrence data is unavailable for species in Saanich. Developing this data and tracking occurrences over time is best done on a targeted, small scale and site-specific basis since it is highly time consuming to determine and is highly dynamic. Publicly sourced data can be helpful in collecting occurrences, however, they can often be biased and should be reviewed. A long-term biodiversity blitz could be considered to develop a species inventory for the District.
- **Benthic Invertebrates:** Benthic invertebrate studies have been collected for limited watercourses across the District. They are a valuable indicator of aquatic health in streams. They will be considered along with other indicators to monitor biodiversity and ecosystems health.
- **Fish species:** The fish-bearing status of streams in Saanich is not fully known. Classifications have been made for some streams, however, this data has not been applied to all watercourses. The development of an accurate watercourse inventory will help to protect water resources and some of the most biodiverse areas in Saanich.
- **Restoration**: Restoration of disturbed sites will preserve, protect and enhance natural areas in Saanich. The field assessments collected comments on recommended restoration actions for the assessed field plots. Disturbance has a noted effect across Saanich, and restoration could be helpful in nearly all natural areas. A restoration prioritization framework should be developed to help direct efforts by staff and volunteers.
- **Watercourses:** A spatial layer of LiDAR-derived streams was created. These watercourses should be assessed and data updated to include information on stream permanence, fish-bearing status, and condition.

These considerations will improve the District's understanding of biodiversity and the state of the natural areas that it manages. However, their implementation depends on allocating resources such as funding and staff. In many cases, these will take multiple years to organize, plan, and complete. This list is not comprehensive and will be discussed in more detail in the Biodiversity Conservation Strategy.

Appendix 1 Summary of SEI condition classes

Table 14. Summary definition of SEI condition classes:

Class	Definition
Excellent	a. Typical climax vegetation. b. No anthropogenic disturbances or changes to natural disturbance regimes have altered the EO (including fire exclusion or flood control), no vegetation or soil removal has occurred. Forested ecological communities are generally late seral vegetation. Wetland and riparian communities have intact hydrologic regimes. There is minimal influence of domestic grazing. c. No alien species occur at the site. d. No artificial structures occur at the site. e. There is little or no internal fragmentation (< 5%) of the occurrence.
Good	a. Typical mature seral vegetation. b. For forested communities, there has been no soil removal or disturbance to soil surface; little or no influence of old road beds or skid tracks, no construction evidence, old selection harvesting only, minimal changes to natural disturbance regimes (including fire exclusion or flood control). Forested ecological communities are late seral or mature, or younger if originating from natural disturbance. Wetland and riparian communities have largely intact hydrologic regimes. There is a low-moderate influence of domestic grazing. c. Minor cover of alien species (<5% except <20% in grasslands) may occur at the site. Some earlier successional species occur. d. Some artificial structures may occur at the site (< 2% of total area of occurrence). e. There is little or no internal fragmentation (<5%) of the occurrence.
Fair	a. Anthropogenic disturbances and changes to natural disturbance regimes have occurred. Forested ecological communities are young seral stages after harvesting. There is a moderate to high influence of domestic grazing in grassland ecological communities. There may be significant alterations to the hydrologic regime in wetlands and riparian ecosystems. b. Significant cover of alien species occurs (5-20% in forests and riparian systems, up to 60 % in grasslands). Most of the plants in grassland communities are early successional species. c. Some artificial structures may be present (less than 10% of total area). d. There is minor internal fragmentation (<5%) of the EO.
Poor	a. Significant anthropogenic disturbances have occurred, particularly the removal or disturbance of soil materials and vegetation. There are significant alterations to the hydrologic regime of wetlands and riparian ecosystems. b. Alien species may dominate a vegetation layer or may total more than 20% (>60% for grasslands) cover overall. c. Significant artificial structures occur (>10% of total area of occurrence). d. The element occurrence is fragmented by artificial structures or barriers.

Appendix 2 Data Summary Tables

Polygon data summary for RSTC target categories.

RSTC Targets	Total Area - UCB (ha)	Total Area Outside UCB (ha)	Total Area (ha)	Total Area Protected (ha)	Total Area Unprotected (ha)	% - Protected*	% - Unprotected *	% - UCB	% - outside UCB	% - District-wide
Backyard Biodiversity	53.91	2,113.12	2,167.03	100.72	2,066.30	4.6%	95.4%	N/A	33.7%	19.1%
Backyard Biodiversity - Urban	2,685.70	12.38	2,698.07	200.87	2,497.20	7.4%	92.6%	53.1%	N/A	23.8%
Coastal Douglas-fir Forests	383.69	2,345.62	2,729.31	888.77	1,840.54	32.6%	67.4%	7.6%	37.4%	24.1%
Coastal Sand Ecosystems	3.03	36.06	39.09	0.70	38.40	1.8%	98.2%	0.1%	0.6%	0.3%
Garry Oak Ecosystems	95.47	155.08	250.55	100.02	150.53	39.9%	60.1%	1.9%	2.5%	2.2%
Greenspace	56.97	107.05	164.03	44.13	119.90	26.9%	73.1%	1.1%	1.7%	1.4%
Marine Shorelines	10.47	17.44	27.91	2.49	25.41	8.9%	91.1%	0.2%	0.3%	0.2%
Wetlands, Lakes and Hydroriparian Systems	95.02	572.15	667.18	421.90	245.28	63.2%	36.8%	1.9%	9.1%	5.9%

***% relates to the percent of the total area for that class, rather than the percent of the total land area in the district.**

Polygon data summary based on vegetation type.

Vegetation Type	Total Area - UCB (ha)	Total Area Outside UCB (ha)	Total Area (ha)	Total Area Protected (ha)	Total Area Unprotected (ha)	% - Protected*	% - Unprotected*	% - UCB	% - outside UCB	% - District-wide
Agriculture	0.64	565.56	566.20	0.21	565.99	0.0%	100.0%	9.0%	9.0%	5.0%
Coniferous Forest	109.97	1140.38	1250.35	510.93	739.42	40.9%	59.1%	18.2%	18.2%	11.0%
Deciduous Forest	144.27	222.94	367.22	199.13	168.09	54.2%	45.8%	3.6%	3.6%	3.2%
Grass	888.03	551.28	1439.30	128.66	1310.64	8.9%	91.1%	8.8%	8.8%	12.7%
Herb	116.43	191.73	308.16	31.21	276.96	10.1%	89.9%	3.1%	3.1%	2.7%
Lake	13.81	336.02	349.83	247.26	102.57	70.7%	29.3%	5.4%	5.4%	3.1%
Marine	13.50	53.50	67.00	3.19	63.81	4.8%	95.2%	0.9%	0.9%	0.6%
Mixed Forest	379.54	1390.93	1770.47	306.07	1464.40	17.3%	82.7%	22.2%	22.2%	15.6%
Shrub	567.25	411.64	978.89	207.68	771.22	21.2%	78.8%	6.6%	6.6%	8.6%
Urban Trees	1148.74	464.58	1613.32	93.39	1519.93	5.8%	94.2%	7.4%	7.4%	14.2%
Wetland	1.09	30.34	31.43	31.06	0.37	98.8%	1.2%	0.5%	0.5%	0.3%

***% relates to the percent of the total area for that class, rather than the percent of the total land area in the district.**

Appendix 3 Species and Ecosystem at Risk Tables

A summary of species and ecosystems at risk that can be found in the District and respective preliminary Biodiversity Target Categories have been provided below. This information was developed and provided by the RSTC. Biodiversity Target Categories have been updated since this original list. The following acronyms are used in the table:

CDF – Coastal Douglas-fir, GOE – Garry Oak Ecosystems, WLH – Wetlands, Lakes, and Hydroriparian, BB – Backyard Biodiversity, UG – Urban Greenspace, MS – Marine Shorelines

Scientific Name	English Name	BC List	RSRTC Target Categories						
			CDF	GOE	WLH	BB	UG	CSE	MS
Amphibians									
Aneides vagrans	Wandering Salamander	Blue	X		X	X			
Rana aurora	Northern Red-legged Frog	Blue	X		X	X			
Pseudacris regilla	Pacific Chorus Frog	Yellow	x	X	X	X	X		X
Taricha granulosa	Rough Skinned Newt	Yellow	X	X	X	X	X		
Arachnids									
Gnaphosa snohomish	Georgia Basin Bog Spider	Red			X	X	X		
Birds									
Accipiter gentilis laingi	Northern Goshawk, *laingi* subspecies	Red	X						
Aechmophorus occidentalis	Western Grebe	Red			X	X			X
Ammodramus savannarum	Grasshopper Sparrow	Red		X		X	X		
Ammospiza nelsoni	Nelson's Sparrow	Red		X	X	X	X		
Branta canadensis occidentalis	Canada Goose, *occidentalis* subspecies	Red			X	X	X		
Buteo swainsoni	Swainson's Hawk	Red	X	X	X	X	X		
Falco mexicanus	Prairie Falcon	Red		X	X	X			
Falco peregrinus anatum	Peregrine Falcon, *anatum* subspecies	Red	X		X	X	X		X
Nycticorax nycticorax	Black-crowned Night-Heron	Red			X	X			
Phalacrocorax penicillatus	Brandt's Cormorant	Red							X
Setophaga castanea	Bay-breasted Warbler	Red		X	X	X	X		
Tyto alba	Barn Owl	Red		X		X	X		
Uria aalge	Common Murre	Red							X
Ardea herodias fannini	Great Blue Heron, *fannini* subspecies	Blue			X	X	X		X
Asio flammeus	Short-eared Owl	Blue			X	X	X		
Botaurus lentiginosus	American Bittern	Blue			X	X			
Brachyramphus marmoratus	Marbled Murrelet	Blue							X
Branta bernicla	Brant	Blue							X
Buteo lagopus	Rough-legged Hawk	Blue		X	X	X	X		
Butorides virescens	Green Heron	Blue			X	X			
Calcarius pictus	Smith's Longspur	Blue		X		X	X		

Scientific Name	English Name	BC List	RSRTC Target Categories						
			CDF	GOE	WLH	BB	UG	CSE	MS
Cardellina canadensis	Canada Warbler	Blue		X	X	X	X		
Carychium occidentale	Western Thorn	Blue							
Chondestes grammacus	Lark Sparrow	Blue		X		X	X		
Contopus cooperi	Olive-sided Flycatcher	Blue	X	X		X	X		
Cygnus columbianus	Tundra Swan	Blue				X			X
Cypseloides niger	Black Swift	Blue			X	X	X		
Erythemis collocata	Western Pondhawk	Blue	X	X	X	X	X		
Euphagus carolinus	Rusty Blackbird	Blue			X	X	X		
Falco rusticolus	Gyrfalcon	Blue	X	X	X	X	X		X
Glaucidium gnoma swarthi	Northern Pygmy-Owl, *swarthi* subspecies	Blue	X	X	X	X	X		
Hirundo rustica	Barn Swallow	Blue			X	X	X		
Hydroprogne caspia	Caspian Tern	Blue			X	X			X
Larus californicus	California Gull	Blue			X	X			X
Limnodromus griseus	Short-billed Dowitcher	Blue			X	X			
Megascops kennicottii kennicottii	Western Screech-Owl, *kennicottii* subspecies	Blue	X		X				
Melanitta americana	Black Scoter	Blue							X
Melanitta perspicillata	Surf Scoter	Blue			X	X			X
Numenius americanus	Long-billed Curlew	Blue			X	X			
Patagioenas fasciata	Band-tailed Pigeon	Blue	X	X		X	X		
Phalacrocorax auritus	Double-crested Cormorant	Blue			X				X
Phalaropus lobatus	Red-Necked Phalarope	Blue			X	X			X
Pinicola enucleator carlottae	Pine Grosbeak, *carlottae* subspecies	Blue		X		X	X		
Progne subis	Purple Martin	Blue			X				X
Recurvirostra americana	American Avocet	Blue			X	X			
Setophaga virens	Black-throated Green Warbler	Blue		X	X	X	X		
Synthliboramphus antiquus	Ancient Murrelet	Blue							X
Tringa incana	Wandering Tattler	Blue			X	X			X
Bubo virginianus	Great Horned Owl	Yellow	X	X	X	X	X		

Scientific Name	English Name	BC List	RSRTC Target Categories						
			CDF	GOE	WLH	BB	UG	CSE	MS
Calidris mauri	Western Sandpiper	Yellow							X
Cathartes aura	Turkey Vulture	Yellow	X	X	X	X	X		X
Catharus ustulatus	Swainson's Thrush	Yellow							
Certhia americana	Brown Creeper	Yellow	X	X	X	X	X		
Chordeiles minor	Common Nighthawk	Yellow	X	X		X			
Cistothorus palustris	Marsh Wren	Yellow			X	X	X		
Coccothraustes vespertinus	Evening Grosbeak	Yellow		X	X	X	X		
Colaptes auratus	Northern Flicker	Yellow							
Dryocopus pileatus	Pileated Woodpecker	Yellow	X		X	X	X		
Haliaeetus leucocephalus	Bald Eagle	Yellow	X		X	X	X		X
Pipilo maculatus	Spotted Towhee	Yellow	X	X	X	X	X		
Poecile rufescens	Chestnut-backed Chickadee	Yellow	X	X	X	X	X		
Tachycineta bicolor	Tree Swallow	Yellow		X	X	X	X		
Tachycineta thalassina	Violet Green Swallow	Yellow		X	X	X	X		
Thryomanes bewickii	Bewicks' Wren	Yellow	X	X	X	X	X		
Troglodytes pacificus	Pacific Wren	Yellow	X	X	X	X	X		
Ecosystems									
Abies grandis / Mahonia nervosa	Grand Fir / Dull Oregon-Grape	Red	X						
Abies grandis / Tiarella trifoliata	Grand Fir / Three-leaved Foamflower	Red	X						
Alnus rubra / Carex obnupta [*Populus trichocarpa]*	Red Alder / Slough Sedge [Black Cottonwood]	Red			X				
Alnus rubra / Lysichiton americanus	Red Alder / Skunk Cabbage	Red			X				
Arbutus menziesii / Arctostaphylos columbiana	Arbutus / Hairy Manzanita	Red		X					
Carex lasiocarpa - Rhynchospora alba	Slender Sedge - White Beak-rush	Red			X				
Dulichium arundinaceum	Three-way Sedge	Red							X
Leymus mollis ssp. *mollis - Lathyrus japonicus*	Dune Wildrye - Beach Pea	Red			X				
Myrica gale / Carex sitchensis	Sweet Gale / Sitka Sedge	Red			X				

Scientific Name	English Name	BC List	RSRTC Target Categories						
			CDF	GOE	WLH	BB	UG	CSE	MS
Pinus contorta / Sphagnum spp.	Lodgepole Pine / Peat-mosses	Red			X				X
Populus tremuloides / Malus fusca / Carex obnupta	Trembling Aspen / Pacific Crab Apple / Slough Sedge	Red	X						
Pseudotsuga menziesii - Arbutus menziesii	Douglas-Fir - Arbutus	Red	X						
Pseudotsuga menziesii / Mahonia nervosa	Douglas-Fir / Dull Oregon-grape	Red	X						
Pseudotsuga menziesii / Melica subulata	Douglas-Fir / Alaska Oniongrass	Red		X					
Quercus garryana - Arbutus menziesii	Garry Oak - Arbutus	Red		X					
Quercus garryana / Bromus carinatus	Garry Oak / California Brome	Red		X					
Quercus garryana / Holodiscus discolor	Garry Oak / Oceanspray	Red			X				
Salix sitchensis - Salix lasiandra var. *lasiandra / Lysichiton americanus*	Sitka Willow - Pacific Willow / Skunk Cabbage	Red	X						
Thuja plicata - Pseudotsuga menziesii / Eurhynchium oreganum	Western Redcedar - Douglas-fir / Oregon Beaked-moss	Red	X						
Thuja plicata / Achlys triphylla	Western Redcedar / Vanilla-leaf	Red	X						
Thuja plicata / Oemleria cerasiformis	Western Redcedar / Osoberry	Red	X						
Thuja plicata / Symphoricarpos albus	Western Redcedar / Common Snowberry	Red			X				
Alnus rubra / Rubus spectabilis / Equisetum arvense	Red Alder / Salmonberry / Common Horsetail	Blue			X				
Populus trichocarpa - Alnus rubra / Rubus spectabilis	Black Cottonwood - Red Alder / Salmonberry	Blue			X				
Rhododendron groenlandicum / Kalmia microphylla / Sphagnum spp.	Labrador-Tea / Western Bog-laurel / Peat-mosses	Blue		X					
Selaginella wallacei / Cladina spp.	Wallace's Selaginella / Reindeer Lichens	Blue	X		X				

Scientific Name	English Name	BC List	RSRTC Target Categories						
			CDF	GOE	WLH	BB	UG	CSE	MS
Thuja plicata / Polystichum munitum - Lysichiton americanus	Western Redcedar / Sword Fern - Skunk Cabbage	Blue	X						
Fish									
Oncorhynchus clarkii clarkii	Cutthroat Trout, *clarkii* subspecies	Blue			X				X
Insects									
Callophrys johnsoni	Johnson's Hairstreak	Red	X		X	X	X		
Callophrys mossii mossii	Moss' Elfin, *mossii* subspecies	Red	X	X	X	X	X		X
Cercyonis pegala incana	Common Wood-nymph, *incana* subspecies	Red	X	X	X	X	X		
Coenonympha tullia insulana	Common Ringlet, *insulana* subspecies	Red	X	X	X	X	X		
Erynnis propertius	Propertius Duskywing	Red	X	X	X	X	X		
Hesperia colorado oregonia	Western Branded Skipper, *oregonia* subspecies	Red		X	X	X	X	X	
Omus audouini	Audouin's Night-stalking Tiger Beetle	Red	X	X	X	X	X	X	X
Arctiostrotus perrieri	Earthworm	Blue							
Bidens amplissima	Vancouver Island Beggarticks	Blue			X				X
Bombus occidentalis	Western Bumble Bee	Blue	X	X	X	X	X	X	
Callophrys eryphon sheltonensis	Western Pine Elfin, *sheltonensis* subspecies	Blue	X		X	X	X		
Euphyes vestris	Dun Skipper	Blue	X	X	X	X	X		
Icaricia icarioides blackmorei	Boisduval's Blue, *blackmorei* subspecies	Blue		X	X				
Pachydiplax longipennis	Blue Dasher	Blue	X	X	X	X	X		
Sympetrum vicinum	Autumn Meadowhawk	Blue	X	X	X	X	X		
Amphiagrion abbreviatum	Western Red Damsel	Yellow			X	X	X		
Catocala aholibah	Aholibah Underwing	Yellow		X	X	X	X		
Gryllus pennsylvanicus	Fall Field Cricket	Yellow		X	X	X	X		
Harpaphe haydeniana	Almond-scented Millipede	Yellow	X			X	X		
Hemaris thetis	Rocky Mountain Clearwing	Yellow	X	X	X	X	X	X	
Hemileuca eglanterina	Elegant Sheep Moth	Yellow							
Neophasia menapia	Pine White	Yellow	X		X	X	X		
Scaphinotus angusticollis	Snail-killer Carabid	Yellow	X			X	X		

Scientific Name	English Name	BC List	RSRTC Target Categories						
			CDF	GOE	WLH	BB	UG	CSE	MS
Lichens									
Cladonia decorticata	Strip-tease Pixie	Blue		X					
Mammals									
Corynorhinus townsendii	Townsend's Big-eared Bat	Blue	X	X	X	X	X		
Sorex navigator brooksi	Western Water Shrew, brooksi subspecies	Blue							
Castor canadensis	Beaver	Yellow			X				
Eptesicus fuscus	Big Brown Bat	Yellow	X	X	X	X	X		
Lasionycteris noctivagans	Silver-haired Bat	Yellow	X	X	X	X	X		
Lasiurus cinereus	Hoary Bat	Yellow	X	X	X	X	X		X
Myotis californicus	California Myotis	Yellow	X	X	X	X	X		X
Myotis evotis	Long-eared Myotis	Yellow	X	X	X	X	X		
Myotis lucifugus	Little Brown Myotis	Yellow	X	X	X	X	X		X
Myotis volans	Long-legged Myotis	Yellow	X	X	X	X	X		X
Myotis yumanensis	Yuma Myotis	Yellow	X	X	X	X	X		X
Tadarida brasiliensis	Mexican Free-tailed Bat	Accidental		?	?	?	?		
Molluscs									
Allogona townsendiana	Oregon Forestsnail	Red							
Cryptomastix devia	Puget Oregonian	Red							
Deroceras hesperium	Evening Fieldslug	Red							
Haliotis kamtschatkana	Northern Abalone	Red							X
Hemphillia dromedarius	Dromedary Jumping-slug	Red							
Hemphillia glandulosa	Warty Jumping-slug	Red							
Galba bulimoides	Prairie Fossaria	Blue							
Galba dalli	Dusky Fossaria	Blue							
Musculium partumeium	Swamp Fingernailclam	Blue							
Musculium transversum	Long Fingernailclam	Blue							
Nearctula sp. 1	Threaded Vertigo	Blue							
Ostrea lurida	Olympia Oyster	Blue							X

Scientific Name	English Name	BC List	RSRTC Target Categories						
			CDF	GOE	WLH	BB	UG	CSE	MS
Planorbula campestris	Meadow Rams-horn	Blue							
Pristiloma johnsoni	Broadwhorl Tightcoil	Blue							
Promenetus umbilicatellus	Umbilicate Sprite	Blue							
Prophysaon coeruleum	Blue-grey Taildropper	Blue							
Sphaerium striatinum	Striated Fingernailclam	Blue							
Mosses									
Bartramia aprica	Rigid Apple Moss	Red		X					
Entosthodon fascicularis	Banded Cord-moss	Blue		X					
Syntrichia laevipila	Twisted Oak Moss	Blue		X					
Reptiles									
Chrysemys picta pop. 1	Painted Turtle - Pacific coast population	Red			X				
Contia tenuis	Sharp-tailed snake	Red	X	X					
Thamnophis spp.	Garter Snakes spp.	Yellow	X	X	X	X	X		
Vascular Plants									
Balsamorhiza deltoidea	Deltoid Balsamroot	Red		X					
Cephalanthera austiniae	Phantom Orchid	Red	X						
Epilobium densiflorum	Dense Spike-primrose	Red			X				
Eurybia radulina	Rough-leaved Aster	Red		X	X				
Festuca roemeri - Koeleria macrantha	Roemer's Fescue - Junegrass	Red		X	X				
Fraxinus latifolia	Oregon Ash	Red		X					
Limnanthes macounii	Macoun's Meadow-foam	Red		X	X				
Lomatium dissectum	Fern-leaved Desert-parsley	Red		X					X
Meconella oregana	White Meconella	Red		X					
Potentilla gracilis var. gracilis	Graceful Cinquefoil	Red		X					
Microseris bigelovii	Coast Microseries	Red		X	X				
Psilocarphus elatior	Tall Woolly-heads	Red		X					
Sanicula bipinnatifida	Purple Sanicle	Red		X					
Silene scouleri ssp. *scouleri*	Coastal Scouler's Catchfly	Red		X					X

Scientific Name	English Name	BC List	RSRTC Target Categories						
			CDF	GOE	WLH	BB	UG	CSE	MS
Triphysaria versicolor ssp. *versicolor*	Bearded Owl-clover	Red		X					X
Triteleia howellii	Howell's Triteleia	Red		X					
Viola howellii	Howell's Violet	Red	X	X	X				
Viola praemorsa var. *praemorsa*	Yellow Montane Violet	Red		X					
Abronia latifolia	Yellow Sand-verbena	Blue						X	
Allium amplectens	Slimleaf Onion	Blue		X					
Corallorhiza maculata var. *ozettensis*	Ozette Coralroot	Blue	X						
Eleocharis palustris	Common Spike-rush	Blue			X				
Navarretia propinqua	Near Navarretia	Blue			X				
Schoenoplectus acutus	Hard-stemmed Bulrush	Blue			X				
Sericocarpus rigidus	White-top Aster	Blue							
Trifolium depauperatum var. *depauperatum*	Poverty Clover	Blue		X					
Typha latifolia Marsh	Common Cattail Marsh	Blue			X				
Camassia leichtlinii ssp. suksdorfii	Great Camas	Yellow		X	X	X	X		
Camassia quamash	Common Camas	Yellow	X	X		X	X		
Carex tumulicola	Foothill Sedge	Yellow		X	X				
Gaultheria shallon	Salal	Yellow	X			X	X		
Quercus garryana	Garry Oak	Yellow	X	X		X	X		
Thuja plicata	Western Redcedar	Yellow	X		X	X	X		
Acer glabrum	Douglas Maple	Yellow							
Aquilegia formosa	Red Columbine	Yellow							
Arbutus menziesii	Arbutus	Yellow	X	X		X	X		
Coallorhiza mertensiana	Pacific Coralroot	Yellow							
Corallorhiza striata	Striped Coralroot	Yellow							
Drosera rotundifolia	Round-leaved Sundew	Yellow							
Menyanthes trifoliata	Buckbean	Yellow							
Montropa uniflora	Ghost Pipe/Indian Pipe	Yellow							

Scientific Name	English Name	BC List	RSRTC Target Categories						
			CDF	GOE	WLH	BB	UG	CSE	MS
Prunus emarginata	Bitter Cherry	Yellow							
Rhamnus purshiana	Cascara	Yellow							
Romanzoffia sitchensis	Sitka Mistmaiden	Yellow							
Vaccinium oxycoccos	Bog Cranberry	Yellow							

Appendix 4 Fish Species Available from BC Conservation Data Centre

In sum, twenty-three species of fish have been observed in the waters of Saanich[60]. The most common species are rainbow and cutthroat trout, with most observations found at Elk/Beaver Lake, Tod Creek, and the Colquitz River. Several invasive species are also present, the most common of which are pumpkinseed (*Lepomis gibbosus*), smallmouth bass, and brown catfish.

Scientific name	English name	Native?
Ameiurus melas	Black Catfish	No
Ameiurus nebulosus	Brown Catfish	No
Ameiurus spp.	Bullhead (General)	No
Cottoidea	Sculpin (General)	Yes
Cottus aleuticus	Coastrange Sculpin	Yes
Cottus asper	Prickly Sculpin	Yes
Cottus cognatus	Slimy Sculpin	Yes
Cyprinus carpio	Carp	No
Gasterosteidae	Stickleback (General)	Yes
Gasterosteus aculeatus	Threespine Stickleback	Yes
Lepomis gibbosus	Pumpkinseed	No
Micropterus dolomieu	Smallmouth Bass	No
Micropterus salmoide	Largemouth Bass	No
Oncorhynchus clarkii	Cutthroat Trout	Yes
Oncorhynchus clarkii clarkii	Coastal Cutthroat Trout	Yes
Oncorhynchus clarkii lewisi	Westslope (Yellowstone) Cutthroat Trout	Yes
Oncorhynchus keta	Chum Salmon	Yes
Oncorhynchus kisutch	Coho Salmon	Yes
Oncorhynchus mykiss	Rainbow Trout	Yes
Pacifastacus leniusculus	Signal Crayfish	Yes
Perca flavescens	Yellow Perch	No
Salvelinus fontinalis	Brook Trout	No
Various	Bass/Sunfish (General)	No

Appendix 5 Christmas Bird Counts Species List

Every year, bird enthusiasts partake in the world's longest-running citizen science project – the Christmas Bird Count. This survey documents resident bird species in different areas around the world to gather information about the abundance, distribution, and status of birds in their natural habitat. The 2022 Christmas Bird Count for our region documented 137 bird species within a 12 km radius of the Westoaks neighbourhood in Saanich. As such, this tally contains data from outside the boundaries of the District of Saanich.

Common name					
Accipiter sp.	Alcid sp.	American Coot	American Dipper	American Goldfinch	American Kestrel
American Pipit	American Robin	American Wigeon	Ancient Murrelet	Anna's Hummingbird	Bald Eagle
Band-tailed Pigeon	Barn Owl	Barred Owl	Barrow's Goldeneye	Belted Kingfisher	Bewick's Wren
Black Oystercatcher	Black Turnstone	Black-bellied Plover	Blackbird sp.	Blue Jay	Bonaparte's Gull
Brandt's Cormorant	Brewer's Blackbird	Brown Creeper	Bufflehead	Bushtit	Cackling Goose
California Gull	California Quail	Canada Goose	Canvasback	Cedar Waxwing	Chestnut-backed Chickadee
Clay-colored Sparrow	Common Goldeneye	Common Loon	Common Merganser	Common Murre	Common Raven
Common/Red-breasted Merganser	Cooper's Hawk	cormorant sp.	Dark-eyed Junco	Dark-eyed Junco (Oregon)	Double-crested Cormorant
Downy Woodpecker	Duck sp.	Dunlin	Eared Grebe	Eurasian Collared-Dove	Eurasian Wigeon
European Starling	Finch sp.	Fox Sparrow	Gadwall	Glaucous-winged Gull	Golden-crowned Kinglet
Golden-crowned Sparrow	Great Blue Heron (Blue form)	Great Horned Owl	Greater Scaup	Greater White-fronted Goose	Greater Yellowlegs
Greater/Lesser Scaup	Green-winged Teal	Gull sp.	Hairy Woodpecker	Harlequin Duck	Hawk sp.
Hermit Thrush	Herring Gull	Herring x Glaucous-winged Gull (hybrid)	Hooded Merganser	Horned Grebe	House Finch
House Sparrow	Hutton's Vireo	Killdeer	Lesser Scaup	Lincoln's Sparrow	Long-tailed Duck

Loon sp.	Mallard	Mallard (Domestic type)	Marbled Murrelet	Marsh Wren	Merlin
Mew Gull	Mourning Dove	Murrelet sp.	Northern Flicker	Northern Harrier	Northern Pintail
Northern Pygmy-Owl	Northern Saw-whet Owl	Northern Shoveler	Northern Shrike	Northwestern Crow	Orange-crowned Warbler
Pacific Loon	Pacific Wren	Palm Warbler	Passerine sp.	Pelagic Cormorant	Peregrine Falcon
Pied-billed Grebe	Pigeon Guillemot	Pileated Woodpecker	Pine Siskin	Purple Finch	Red Crossbill
Red-breasted Merganser	Red-breasted Nuthatch	Red-breasted Sapsucker	Red-necked Grebe	Red-tailed Hawk	Red-throated Loon
Red-winged Blackbird	Rhinoceros Auklet	Ring-necked Duck	Rock Pigeon (Feral Pigeon)	Ruby-crowned Kinglet	Ruddy Duck
Ruffed Grouse	Rusty Blackbird	Savannah Sparrow	Scoter sp.	Sharp-shinned Hawk	Short-billed Dowitcher
Snow Goose	Song Sparrow	Sparrow sp.	Spotted Sandpiper	Spotted Towhee	Steller's Jay
Surf Scoter	Surfbird	Swamp Sparrow	Thayer's Gull	Townsend's Solitaire	Trumpeter Swan
Turkey Vulture	Varied Thrush	Virginia Rail	Western Grebe	Western Gull	Western Meadowlark
Western x Glaucous-winged Gull (hybrid)	White-crowned Sparrow	White-throated Sparrow	White-winged Scoter	Wilson's Snipe	Wood Duck
Wren sp.	Yellow-rumped Warbler	Yellow-rumped Warbler (Audubon's)			

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Saanich Environmental Policy Framework

Prepared by the Resilient Saanich Technical Committee

March 2023

DRAFT March 2, 2023

Territorial Acknowledgement

The District of Saanich is within Coast and Straits Salish territory, the territories of the lək'ʷəŋən peoples, known today as Songhees and Esquimalt Nations, and the W̱SÁNEĆ peoples, known today as W̱JOŁEŁP (Tsartlip), BOḰEĆEN (Pauquachin), SȾÁUTW̱ (Tsawout), W̱SIḴEM (Tseycum) and MÁLEXEŁ (Malahat) Nations. The First Peoples have been here since time immemorial and their history in this area is long and rich.

The District respectfully acknowledges the First Nations' long history of land stewardship and knowledge of the land and will look for opportunities to learn from and collaborate with First Nations to help us improve our community's resilience.

Contents

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1. Introduction

1.1. A Coordinated Approach to Environmental Stewardship

The Environmental Policy Framework (EPF or the Framework) is a way of thinking. It provides Guiding Principles and Goals to align and direct the District of Saanich's policies and programs to support the creation of a Resilient Saanich. It fosters a strong and united culture of environmental protection and enhancement from Council, staff, business interests, and the community.

Definition of "natural environment". Use definition from Glossary so as to be consistent across all RSTC docs

A healthy natural environment is a high priority for the Council and residents of the District of Saanich. The Official Community Plan[1] (OCP) vision is that:

> "*Saanich is a sustainable community where a healthy natural environment is recognized as paramount for ensuring social well-being and economic vibrancy, for current and future generations*."[2]

This importance is emphasized in numerous OCP policies, multiple departments, and numerous public committees such as the "Sustainability and Climate Action" and "Natural Areas, Parks and Trails Committees." Saanich residents also play a large part in maintaining and enhancing the natural environment, both on their own properties and by assisting with environmental stewardship on public lands.

The Framework Guiding Principles and Goals nest within and are consistent with Saanich's OCP (Figure 1). In turn, if the objectives associated with each thematic policy area[3] (such as parks, urban forests, biodiversity) are consistent with the Framework Principles and Goals, this will support the creation of a resilient natural environment that supports the biodiversity, economy, and desirability of Saanich.

[1] 2008 OCP . Note that an updated OCP is in development.

[2] https://www.saanich.ca/EN/main/community/community-planning/official-community-plan-ocp.html, page 10.

[3] Add to Glossary

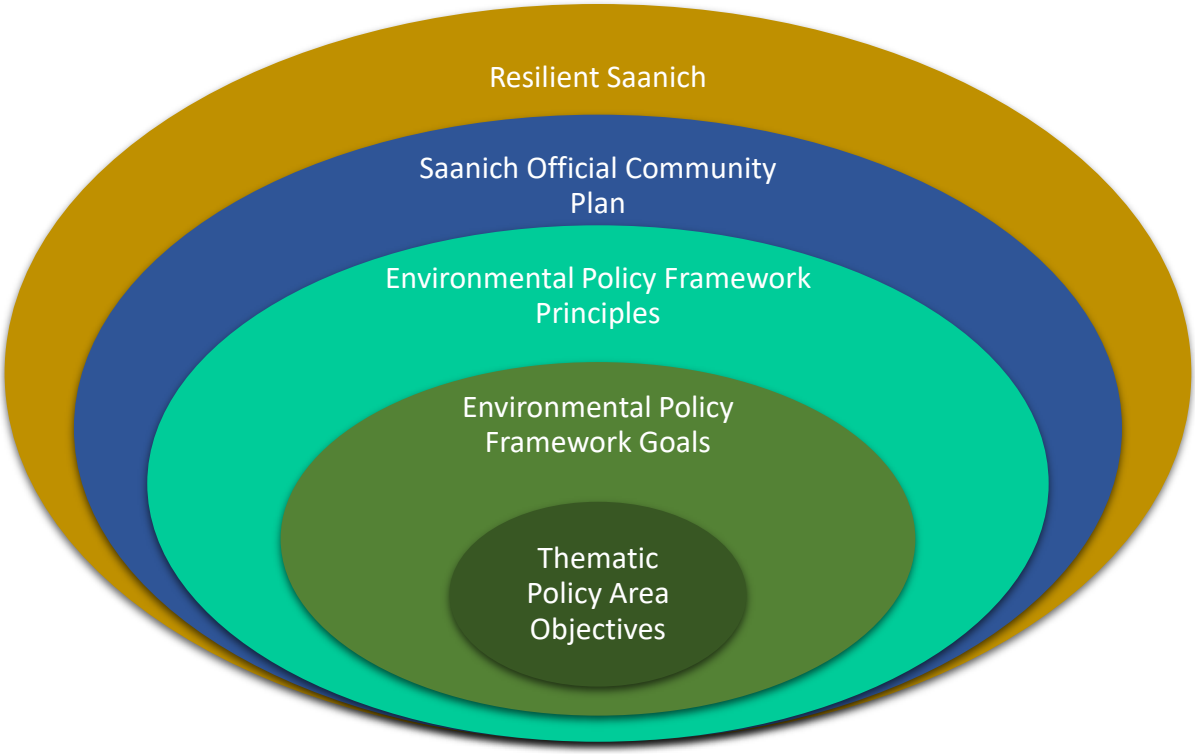

Figure 1: Environmental Policy Framework

1.2. Creating a Resilient Saanich

The concept of resilience is the ability to withstand, adapt to, and recover from adverse change. Resilient Saanich includes not just a resilient *natural environment*, but a resilient *population* that is well informed, socially well-connected, and supportive of actions to address issues that would otherwise diminish community health and wellbeing.

Benefits of working towards greater resilience include better preparedness for natural hazards (such as flooding and heat domes), as well as creating community cohesion and providing for the health and safety of all members of society. Having a resilient and healthy natural environment brings the added benefit of having highly desirable places to live, providing habitats for wildlife, and benefitting from the many ecosystem services[4] that natural environments provide.

Achieving a Resilient Saanich will involve cooperation across society. As an initial step, Council has asked for this enabling and unifying framework for environmental policies and programs. Application of the Framework will be District-wide, as decisions and actions impacting the

[4] See Glossary (add to Glossary)

natural environment (directly or indirectly) are found in multiple departments. The Principles and Goals are intended to apply equally to policies and procedures affecting both public and private lands in Saanich.

Background to the Environmental Policy Framework

Saanich introduced an Environmental Development Permit Area (EDPA) bylaw in 2012. This bylaw was created to ensure that new subdivisions or structures would not harm native species/ ecosystems and natural features. The bylaw proved controversial and was later rescinded, although many in Saanich were in favour of retaining the policy.

This discussion prompted Saanich Council to look for ways to accomplish the goal of environmental protection throughout the community, with broader public support. An overarching framework for improved coordination of environmental programs and policies was initiated. In November 2017, Council passed a motion:

> *"That Council direct staff to bring Council a report as soon as possible on the potential of developing a Saanich program which includes the topics of Climate Adaptation, a Biological Conservation Strategy, and Stewardship Program to serve as a policy framework for other Saanich environmental policies and programs, and a new Environmental Development Permit Area be considered part of this program; and that the Diamond Head report recommendations be considered a component of this report."*

The **Resilient Saanich Technical Committee** was established as an independent technical committee of natural resource practitioners and specialists. The purpose of this Committee, as outlined in its terms of reference, is to "*provide independent analysis, recommendations and other input as might be helpful to Council, Staff and consultants to shape and inform the* ***development of an Environmental Policy Framework***." Tasks assigned were:

- Rationalize existing and new environmental policies and programs into the Framework;
- Develop a new Biodiversity Conservation Strategy and enhanced Stewardship Program to serve with Saanich's new Climate Plan as the strategic pillars for the Framework
- Evaluate the strength of the Environmental Policy Framework (EPF) and the Biodiversity Conservation Strategy (BCS) to replace the EDPA.
- Identify a range of potential policy tools, possibly including a new EDPA, for managing the environment in Saanich.

2. The Environmental Policy Framework

2.1. Guiding Principles

The Environmental Policy Framework Guiding Principles set the tone and direction for Saanich's policies and practices. These principles are consistent with the District's Strategic Plan[5] and OCP Goals.

The eleven Guiding Principles of the Environmental Policy Framework are:

1. **Recognize the intrinsic value** of nature.[6]
2. **Respect and include Indigenous knowledge**, worldviews and perspectives in environmental decisions and actions.
3. **Use evidence-based decision-making** to support adaptive environmental management.
4. **Adopt the precautionary approach[7]** in environmental decision making.
5. **Lead by example** through innovation and improving on best practices.
6. **Look beyond Saanich's borders** to achieve results at a bioregional scale.
7. **Address climate** adaptation and mitigation in all that we do.
8. **Collaborate** with diverse interests to achieve multiple environmental benefits.
9. **Provide transparency** with open environmental data for public oversight and research.
10. **Enhance community capacity** and knowledge to create a passionate, informed and skilled community that participates in building a more resilient Saanich.
11. **Support fairness and inclusion** by respecting private property rights and creating safe and welcoming public spaces.

Section 4.3 and Appendix XX discuss how these Guiding Principles can be used as a "policy filter" to review new and existing policies and programs.

[5] District of Saanich Strategic Plan 2019-2023. Note that this may need to be updated.

[6] This means nature has value in its own right, independent of the value or utility humans give it.

[7] The International Institute for Sustainable Development notes that, "In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation." https://www.iisd.org/articles/deep-dive/precautionary-principle

2.2. Environmental Policy Framework Goals

The Framework Goals describe the desired results from implementing this Environmental Policy Framework.

Goal 1. Protect, rehabilitate, and enhance the ecological function and biological diversity of Saanich

Goal 1 aims to enhance biodiversity and other essential ecosystem functions. It addresses direct action to protect, rehabilitate, and enhance the natural environment in the face of changing climates.

Examples of District of Saanich actions that would support this goal include:

- Rehabilitation of natural park lands
- Daylighting of streams
- Identification and protection of sensitive ecosystems, including riparian and marine foreshores
- Enhancement of the urban forest
- Support for Pulling Together volunteers and other stewardship initiatives on public and private land
- Private land restoration (backyards and larger holdings such as UVic, Royal Oak Burial Park)
- Citizen science monitoring
- Promoting sustainable agriculture
- Reducing sources of pollution
- Promoting more “environment-friendly” developments through education, incentives and/or regulation
- Improving ecosystem mapping in parks; develop protection management plans for parks and nature reserves
- Encouraging backyard biodiversity through voluntary stewardship

Achieving this goal will also require the commitment of residents, businesses, and landowners to be active stewards.

Goal 2. Foster complementary and coordinated policies, strategies, regulations, and incentives that are aligned with the Environmental Policy Framework Guiding Principles.

Goal 2 promotes a culture of environmental stewardship and resilience within Saanich Council, staff, and the public. The Guiding Principles will assist in evaluating existing District policies and provide guidance for the development of future policy.

Examples of actions that would support this goal are:

- Assessing existing regulatory, management, and administrative tools to identify gaps and inconsistencies with the Guiding Principles
- Inter-departmental cooperation to evaluate and address the environmental impacts of policy decisions, and enhance their environmental benefits
- Ensuring resources are effectively used to achieve good environmental outcomes
- Increasing community understanding of policies, plans, programs, bylaws, and partnerships encompassed by the Environmental Policy Framework

3. Measuring Outcomes

Progress towards meeting the goals of the Environmental Policy Framework will be measured primarily through the success of the policies and programs it informs (achieving the objectives of each of the policies and strategies).

In addition, it will be important to track the overall progress towards a more Resilient Saanich.

Goal 1 urges on-the-ground action towards a more Resilient Saanich. Progress can be measured through a State of Saanich Environment report, repeated every five years. This report might look at indicators such as:

- Hectares of Saanich parks that have been rehabilitated or enhanced (including clearing of invasives)
- Urban forest canopy cover
- Kilometres of stream restoration/enhancement
- Sensitive ecosystems in “protected” status

Goal 2 urges the District to align its programs and policies to meet Goal 1. Indicators of progress could include:

- Percentage of staff who have received training on the Framework Guiding Principles and Goals
- Number of policies that have been created (or updated) using the Framework Policy Filter.
- Extent to which the thematic plans are meeting their objectives
- Public awareness of the Environmental Policy Framework

4. Implementing the Environmental Policy Framework

The Environmental Policy Framework is intended to apply to the entire body of Saanich policies and practices that—directly or indirectly—touch on the natural environment.

The Resilient Saanich Technical Committee recommends the following steps to begin implementation of this Framework.

1. Council should adopt the Environmental Policy Framework and direct that it be implemented District-wide.

2. Provide training so that every staff person becomes familiar with the importance and purpose of the Environmental Policy Framework, and so that the Framework Guiding Principles and Goals become part of the District culture.

3. Amend the OCP to reflect the Environmental Policy Framework, ensuring that the OCP adheres to the Framework Guiding Principles and Goals. This change could be incorporated into the current (2023) OCP update.

4. Amend the 2020 Climate Plan: Renewable and Resilient Saanich to reflect the Environmental Policy Framework.

5. Conduct an environmental policy gap analysis (see Section 4.1) to identify new (or updated) policies, bylaws and strategies that will support the movement towards a more resilient Saanich.

6. Develop/update additional thematic policies and strategies as required and ensure that all associated objectives are SMART (specific, measurable, achievable, realistic and time-bound) (Section 4.2).

7. Identify existing Saanich policies, bylaws and strategies that touch on the environment, and review these policies, bylaws and strategies through the Policy Filter (Section 4.3).

8. Encourage and support public actions that support framework goals (Section 4.4).

4.1. Policy Gap Analysis

The Environmental Policy Framework is intended to help coordinate the many municipal policies meant to protect Saanich's natural environment. However, it is unknown how

completely existing policies address the breadth of existing and emerging environmental concerns in the municipality.

To address this uncertainty, an environmental policy gap analysis is needed to:

- Catalogue existing and emerging threats to Saanich's natural environment
- Identify existing Saanich policies meant to protect the environment and those aspects of Saanich's natural environment not currently addressed by policy

This high-level gap analysis can also identify policies with multiple environmental benefits.

A preliminary gap analysis approach is shown in Appendix C.

4.2. New and Updated Policy Areas and Strategies

Additional and updated policy areas will be needed to fill in identified gaps. These must be designed to conform to the principles in the Framework and focused on achieving its Goals.

The following thematic policy areas have been suggested. Some strategies may be a subset of broader strategies; for example, a Park Management Strategy may be part of the Biodiversity Conservation Strategy, or green space conservation may be in several strategies, etc.

- Urban Forestry (includes soil and green space conservation)
- Water Management (includes storm water and watershed health)
- Land Use Planning & Development
- Marine Shoreline
- Saanich's Ecological Footprint
- Park Management Strategy (rehabilitation, invasive species management)
- Agriculture (includes sustainable practice & food security)
- Green Economy
- Transportation (environmental aspects)
- Governance and Administration

Appendix D provides examples of how these policy areas needed to fill gaps could be developed.

4.3. Policy Filter

Saanich has a large number of existing policies and programs that directly or indirectly affect the natural environment.

The Resilient Saanich Technical Committee has developed a Policy Filter to provide staff with a method to evaluate new and existing policies or programs to determine how closely they fulfil the intent of the Framework Principles and Goals. More information on the Policy Filter is found in Appendix E.

4.4. Public Actions Supporting a Resilient Saanich

Actions by residents (and non-residents) of Saanich will influence the ability to achieve a more Resilient Saanich. The District will play a role in helping residents to learn about ways to protect and enhance the natural environment at home and in the community.

Examples of positive actions that residents could take include participating in programs such as Pulling Together, creating more biodiverse backyards, and making choices that reduce carbon emissions.

5. Appendices

(Note that the appendices are a “work in progress” and incomplete at this time.)

A. Glossary

Bev working on

B. Resilient Saanich Technical Committee

Members

Staff support

C. Gap Analysis

Information to be added

D. Sample Thematic Plans

Each of the thematic policy areas will be addressed by a plan or strategy that adheres to the Framework principles and have an outline that typically includes the following elements. This is where SMART[8] objectives will be found along with strategies and actions. The following outlines information that could be included.

Policy Area Plan or Strategy - guide

(the outline can vary depending on the policy area) - pick and choose

1. Relevant Landscapes and Scales - situation assessment
2. Evaluation of ecosystem health and functional condition
3. Indigenous interests and relevant knowledge
4. Desired future condition
5. Data gaps
6. Policy gaps
7. SWOT (Strengths, Weaknesses, Opportunities, Threats) assessment
8. Policies and program objectives
9. Strategies (approaches)
10. Tools
11. Action Plan (tasks, timelines, lead department, resources)
12. Monitoring and Assessment

[8] Specific, Measurable, Achievable, Realistic and Time-bound

Example of Draft Outline: Thematic Plan for Water

Draft for illustration purposes

Water and Water Management

Note: it is expected that any thematic plan would be developed either by staff or a consultant, but using public engagement.

Situation Assessment

- Look at on a regional and watershed scale
- Climate change may alter the seasonality, distribution and abundance of rainfall
- Long periods of summer and fall drought to be reconned with
- Water can be assessed in three 'streams' (so to speak): drinking water and sewage, stormwater management, and overall watershed health
- Drinking water arranged at a regional scale, but sewers are District of Saanich; Saanich has small jurisdiction over water supply but responsibility for sewage, which is where water supplied goes after use.
- Stormwater flows may change and create additional flood risks or overwhelm capacity
- Watershed health critical for aquatic life and related biodiversity, especially during low and peak flow conditions that may threaten during critical life stages
- Key watersheds are Colquitz and its tributaries, Tod creek and Cecelia Creek
- Marine shorelines are addressed in a different Thematic Plan

Desired Future Condition

- Watersheds yield water at rates that prevent extreme flow conditions, both too high and too low. Watersheds have continuous riparian zones vegetated with native species. Water meets provincial quality guidelines.
- Reduce stormwater runoff rates and increase run-off delays.
- Drinking water sources are secure

Policy and Program Objectives

- Watersheds:
    - Set critical flow design parameters

- Set surface water quality objectives aimed at protecting aquatic life and appropriate monitoring program
- Inventory riparian zones and develop revegetation plans for areas requiring it

- Drinking water and sewer
  - Reduce per capita water use to below 200L/day
  - Find and repair leaks in the pressurized water distribution system
  - Find breaks and repair sewage system and evaluate its capacity to accommodate population growth
- Stormwater Management
  - Reduce stormwater runoff rate by 40% in rural Saanich and 60% inside the Urban Containment Boundary
  - Require pervious pavers and surfaces where feasible. Incent the use of these.
  - Wide implementation of rain gardens and exfiltration ponds
  - Proper maintenance and clean-out of catch basins

Gap and SWOT

SWOT Table:

Strengths	Weaknesses	Opportunities	Threats
• Developing strategies for the three streams will off the bests hope for sustainability of water resources	• Does not address groundwater, which may require a separate strategy	• Get water management properly organized now, rather than scrambling to do so in a panic as water resources becomes a crisis	• Taking too long to undertake these strategies or not resourcing them adequately may result in failures in one or more streams

Gaps:

- Incomplete inventory of groundwater and understanding of aquifer health; more research needed
- Incomplete record of water quality and flow data for the key watersheds in Saanich (Colquitz/Bowker). Routine flow and quality monitoring needed.
- etc

Strategies and tools

- Develop watershed management plan for the Colquitz and its tributaries. Include appropriate land development restrictions in riparian zones, and rehabilitation plans for degraded areas in the watershed that are necessary to protect these drainages. Ensure there is an implementation phase that is costed and properly resourced.
- Develop a strategic approach to improving water infiltration across the District. Where necessary, enact bylaws to ensure the strategy is carried out.

Action plan

- Council approval of the Thematic Plan and authorize implementation
- Set up a steering group among staff with cross department representation to prepare for and implement the Thematic Plan
- Then, just do it

Monitoring and assessment

- Establish criteria for measuring success: measured reductions in storm run-off, measured reduction in per capita water use
- Establish a routine for reporting back to council on progress.
- Council hold staff accountable for completion

E. Policy Filter

A means of evaluating new policies or programs is needed to determine how closely they fulfil the intent of the principles. The Resilient Saanich Technical Committee suggests two approaches. The one chosen may depend on the nature of the policy or program.

1. A simple approach is to use the proposed criteria in the table to determine if a policy has a high, medium or low relevance to each principle. A neutral category is added for policies or programs that have no relevance to a principle, and there is a category for evaluating if a policy or program might work against a principle. The final evaluation of a policy or program would be to weigh the determinations for all the principles to draw a conclusion about how close, overall, a policy or program comes to fulfilling the intent of the principles and achievement of Goal 2.

2. A more numerical approach is the use of a scoring scale for adding numerical scores to the criteria in the table for each principle. In this approach, scores are added and the sum of scores gives a numerical means to evaluate how close a policy is to complying with the principle. If a proposed policy or program scores high, it complies closely with the principles in the EPF, and will contribute to a more Resilient Saanich. In the example below, a scoring scale of zero to three is used, but any scale is usable. In this example, policies and program initiatives that score 27 are in full compliance with the principles, and can be adopted as consistent with the Environmental Policy Framework. Polices and program initiatives that score in the mid-range could be re-examined to see where they could be enhanced before adoption. Policies and program initiatives that score low may need to go back to the generating department for a re-think on how it can conform more closely to these principles. Policies and program initiatives that score very low are probably not adoptable because they will not advance, and may work against, achievement of a Resilient Saanich.

Add the policy filter and revise to match principles list.