Cowichan Valley Regional District
Drinking Water and Watershed Protection Strategy (2020 to 2030)

March 2020

Prepared by Econics and Compass Resource Management

Executive Summary

Healthy watersheds and sustainable water sources are essential to the wellbeing of our communities and ecosystems. This Drinking Water and Watershed Protection Strategy provides a map to guide the actions of the Cowichan Valley Regional District (CVRD) for the first ten years of the Program from 2020 to 2030.

This document describes the context in which this Strategy was developed, the Goals and Objectives, and the key Program Areas in which we will invest our time and effort to protect this most valuable resource.

Complicated hydrology, varied land use, diverse and numerous organizations involved in water management – all of these create complexity, compounded by rapid population growth, urbanization and development. These pressures have been underway for some time and, indeed, the volumes of water available for use by people in some streams is already fully allocated. The reality of climate change is now a deciding factor in the need for a more proactive approach to drinking water and watershed protection.

While the magnitude of the challenge before us is great, so too is the opportunity. By taking a watercentric view of policy, planning and operational decision making going forward, we can adapt to the realities of a changing climate, protect aquatic ecosystems, and ensure that the people who live here in the future also have safe sources of drinking water to sustain the communities they inherit. This view recognizes the linkages between human needs and the needs of aquatic and terrestrial ecosystems. It also sees groundwater and surface as one, interconnected whole.

Overarching Strategy Goal and Supporting Objectives

The Overarching Goal of the Drinking Water and Watershed Protection Strategy is:

Healthy watersheds and aquifers, recognizing that our personal wellbeing, our communities, our ecosystems and our water resources are all interconnected.

This Overarching Goal will provide an enduring, shared purpose for CVRD staff, elected officials, implementation partners and residents as we move forward with this Strategy over the coming decade.

Strategy objectives are the means by which the Overarching Goal is met. They are as follows, listed generally in order of priority:

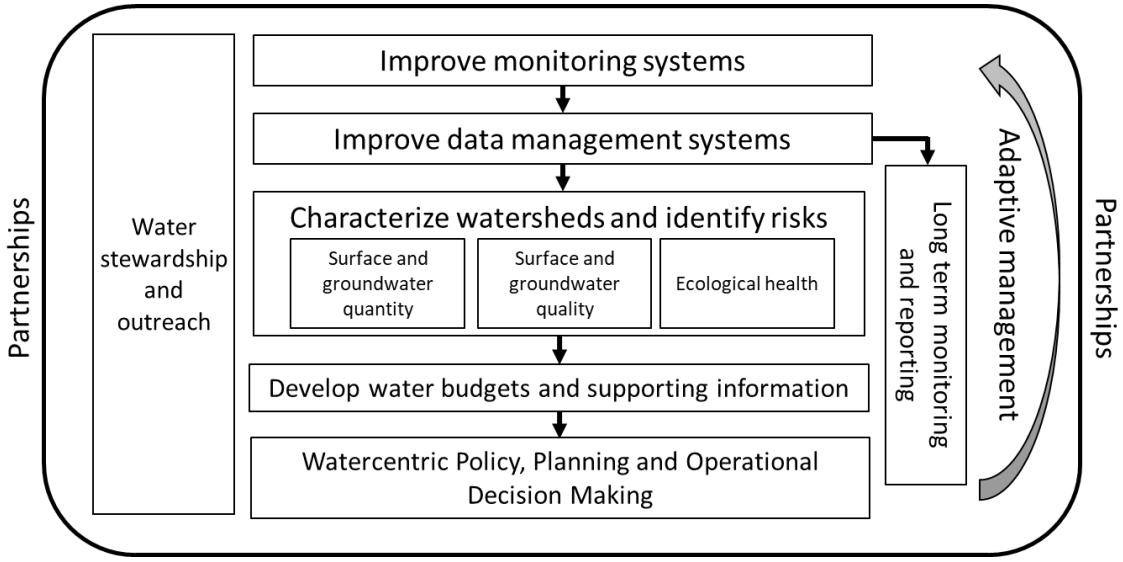
- Safe source water for domestic supply;
- Resilient watersheds, aquifers and aquatic ecosystems;
- Protection of social and cultural values and enjoyment of recreational amenities and services derived from our watersheds;
- Preparedness for climate change effects on the region’s water resources;
- Strong partnerships working together to ensure healthy watersheds; and,
- Efficient use of water.

Key Program Areas

The Drinking Water and Watershed Protection Strategy is organized around three Program Areas. These provide an organizational framework for the various Actions that will be implemented in the next ten years, as follows:

1. **Learn (Watershed Science and Information)** - Collect existing and new data; analyze them to create new knowledge and science; create knowledge products such as maps, reports and online information systems.
2. **Act (Watercentric Policy, Planning and Operational Decision Making)** - Use science and knowledge to inform policy, land use decisions, and operational activities that affect drinking water and watersheds.
3. **Share and Collaborate (Watershed Stewardship and Outreach)** - Work directly with residents to help them understand the benefits of water stewardship and how they can contribute.

Each Program Area is comprised of Actions that will progress us steadily towards the Overarching Goal and Objectives set out above. This is captured in the following flow diagram.



Drinking Water and Watershed Protection Strategy Flow Diagram

Key Program Areas and Actions under the Strategy are as follows:

Program Area 1: Watershed Science and Information

- Action 1.1 - Improve Climate and Water Monitoring Systems
- Action 1.2 - Improve Data Management Systems
- Action 1.3 - Characterize the Health of the Region's Watersheds and Identify Risks
    - Action 1.3.1 - Characterize Surface and Groundwater Quantity
    - Action 1.3.2 - Characterize Surface and Groundwater Quality
    - Action 1.3.3 - Assess Ecological Health
- Action 1.4 - Develop Water Budgets and Other Supporting Information
- Action 1.5 - Stable, Long Term Monitoring and Reporting

Program Area 2 - Watercentric Policy, Planning and Operational Decision Making

- Action 2.1 - Develop Coordinated Policy and Planning Frameworks
- Action 2.2 - Inform Planning Decision Making
- Action 2.3 - Inform Operational Decision Making

Program Area 3 - Watershed Stewardship and Outreach

- Action 3.1 - Educate and Communicate
- Action 3.2 - Foster Strategic Partnerships
- Action 3.3 - Watershed Restoration

Implementing the Strategy

Four Guiding Principles will help operationalize the Strategy:

1. Partnership based – We will achieve better results if we work with other organizations and local community groups committed to watershed stewardship and protection.
2. Action oriented - Program Areas in the Strategy are focused on improving and informing future decisions specific to CVRD's approved Drinking Water and Watershed Protection Service.
3. Adaptive management – Program Areas and Actions may be revised and adapted in response to new information and changing conditions (e.g., climate change).
4. Performance standards – The Program will adhere to strict performance requirements in the design, execution and reporting of the work to ensure consistency and that quality standards are met, especially those related to water science and information acquisition.

All of the Actions in this Strategy are important, but some require more urgent attention, particularly those necessary to initiate the Water Science Program Area. The following activities should start in 2020:

- hire a Program Coordinator;
- commence implementation of a surface water quality monitoring strategy;
- develop a groundwater quality monitoring strategy;
- develop a data management strategy and confirm arrangements with the Province around data warehousing and access;
- develop a hydrometric monitoring strategy (for both surface and groundwater);
- identify gaps in the existing monitoring network and install new stations as resources permit (stream gauges and observation wells);
- in partnership with stewardship groups and other partners, develop arrangements for field collection of data including quality assurance/quality control procedures;

- complete a preliminary screening to identify potentially high risk watersheds and aquifers; undertake a data gap analysis about the current state of knowledge on these risks;
- support the CVRD's Official Community Plan modernization process by providing existing information about watershed health and known risks; and,
- create terms of reference for a standing Technical Advisory Committee and recruit members.

Partners and representatives from other organizations involved in water management in the region will continue to guide further development and delivery of the Strategy through a **Technical Advisory Committee**. This committee will inform CVRD on implementation plans and issues on an ongoing basis.

Ultimate oversight of this Strategy is the purview of the CVRD Board of Directors. Reports on progress will be provided to the Board at least annually, as will workplans for the year ahead.

The period for this Strategy is 2020 to 2030. At the end of the decade, a structured review should be conducted to assess results and determine priorities for the next implementation period. Progress towards the Overarching Goal and Objectives will be continuously reviewed on at least a bi-annual basis through an adaptive management approach.

1.0 Introduction

Healthy watersheds and sustainable drinking sources are essential to the wellbeing of our communities and ecosystems. The Cowichan Valley was forged by water and ice. Our streams and lakes have nourished indigenous communities for generations and the people who live here now remain deeply connected to our waters. We enjoy abundant source water to sustain our bodies and fuel our communities. We rest on the shores of our magnificent lakes. We hike alongside cascading streams. We fish and paddle down our stunning coastal rivers. Water is what we are made of.

Together, we will work to protect our watersheds and make sure clean water is there for people who live here tomorrow. This Drinking Water and Watershed Protection Strategy provides a map to guide the actions of the Cowichan Valley Regional District (CVRD) from 2020 to 2030. It describes the context, the Overarching Goal and Objectives, and the key Program Areas in which we will invest our time and effort to protect this most valuable resource.

This document provides a high level, strategic perspective on the Program Areas and Actions that will be put in place in the years ahead. They will be operationalized through development of annual workplans, budgets and detailed implementation plans.

This Strategy has four main parts, as follows:

- Section 2 sets out the context including a brief overview of the resource, historical background, partners in strategy delivery and the process used to develop this Strategy;
- Section 3 sets out the Strategy's Overarching Goal and supporting Objectives;
- Section 4 describes the Strategy Program Areas and Actions; and,
- Section 5 discusses implementation matters including Guiding Principles, a monitoring framework and the adaptive management philosophy that will guide our work.

2.0 Setting the Stage

2.1 The Cowichan Water Story

The story of water in the Cowichan is a long one indeed. The plunging coastal watersheds of southern Vancouver Island were formed over hundreds of millions of years through a combination tectonic plate movement, volcanism and erosion. More recently, at least in geologic terms, glaciation led to ice accumulation on the mountain peaks that slowly grew into massive glaciers. These ice sheets cut major features in the landscape, including the Cowichan Valley. As they receded, lakes, streams and rivers formed, and large accumulations of glacial till were left behind. Not only did these processes shape the physical features above ground, they also deposited the materials that store water in the aquifers beneath our feet.

First Nations were the original occupants of this land. The Cowichan, Ditidaht, Halalt, Lyackson, Malahat, Pacheedaht, Pauquachin, Penelakut, Stz'uminus and Ts'uubaa-asatx people have thrived in this place for thousands of years. Their cultures were and are connected to the natural resources abundant in the area and the streams that flow through it.

New people began arriving in the mid-1800s and water management became more complicated. Forestry, mining, agriculture and other activities created new demands and impacted the landscape, a reality that amplifies through time to today.

Our rugged coastal watersheds and benchlands are small relative to other parts of North America (the Cowichan River drainage basin, our largest, is 795 square kilometers compared to the Hudson Bay watershed, Canada's largest, at 3.8 million square kilometers). But this does not detract from the complexity and diversity of water use and natural resource management issues we confront. In many ways it concentrates and magnifies them.

What is a Watershed?
A watershed is an area of land where all water that falls or drains into it moves toward a common outlet such as a river, basin or ocean.

For most of our watersheds, activity in the upper reaches is dominated by private managed forest land. Private companies manage these lands for timber value and, along with the Provincial Government, are the primary stewards responsible for maintaining water quality and ecosystem protection. CVRD does not have jurisdiction over practices on these lands but works collaboratively and positively with forestry companies to ensure proactive watershed management.

Moving down to the mid-watershed level, below about 200 meters of elevation, agriculture and other rural land use dominate. The Cowichan region enjoys growing fame for its agri-food industries including wine and food products. We want to foster these industries and the sustainable economic opportunities they create. Through land use planning and other processes, CVRD will continue to work collaboratively with residents, agricultural producers and other agencies, notably the Province. Together we will implement best management practices that protect watersheds and safeguard drinking water.

Outside of the major watersheds, much of the coast consists of benchlands, made up of many small watersheds draining directly to the ocean (CVRD groups these into coastal benchlands and includes them with major watersheds as 'watershed planning areas').

The most populous areas are in the benchlands or on the shores of our large lakes, near the bottom of the watersheds - Duncan, Ladysmith, Lake Cowichan, North Cowichan, Chemainus, Cowichan Bay, Crofton, Cobble Hill, Shawnigan Lake, Mill Bay, Youbou, Mesachie Lake/Honeymoon Bay and Maple Bay. Most people in these urban or suburban communities draw their water from centralized municipal water systems, which in turn extract from groundwater or (less frequently) surface sources.

Adding to the complexity, individual utilities operate under a diverse range of management structures including municipal systems (run by both the CVRD and municipal governments), improvement districts and private water utilities. In total, there are 44 different systems serving about 26,500 homes. And, of course, there are also thousands of private individual wells (see text box).

Water Service Providers in the CVRD
The Cowichan has a large number of entities that provide drinking water services to residents through diverse management and ownership structures:

- nineteen systems are operated by the CVRD, servicing communities ranging in size from about 775 connections to as few as about 25;
- six different municipal systems are operated by four municipalities (North Cowichan operates three systems; Duncan, Lake Cowichan and Ladysmith all operate one each);
- ten systems are operated by improvement districts;
- nine systems are privately operated; and,
- additionally, there are over 4,500 private water wells in the region.

Complicated hydrology, varied land use, the diversity and number of organizations involved in water management – all of these create complexity, compounded by rapid population growth, urbanization and development. These pressures have been underway for some time and, indeed, the volumes of water available for use by people in some streams is already fully allocated.

In response, the Cowichan community has been intensively engaged in water issues for a long time, epitomized in the efforts of groups like the Cowichan Watershed Board, the Shawnigan Basin Society and others who work tirelessly on stream restoration, monitoring, public outreach and more

Now though, the reality of climate change is a deciding factor in the need for a more proactive approach to drinking water and watershed protection. By the 2050s, the number of summer days above 25°C is expected to double, while summer rainfall is expected to drop by 17%, going on to be 26% less by the 2080s (CVRD, 2017). Reduced water flows place salmon populations at risk, jeopardize drinking water, and put even more pressure on a finite resource. To date, the response of both community groups and government has been sporadic, focusing often on scarcity or quality hotspots and lacking a regional lens.

While the magnitude of the challenge before us is great, so too is the opportunity. By taking a watercentric view of policy, planning and operational decision making going forward, we can adapt to the realities of a changing climate, protect aquatic ecosystems, and ensure that the people who live here in the future also have safe sources of drinking water to sustain the communities they inherit. This view recognizes the linkages between human needs and the

needs of aquatic and terrestrial ecosystems. It also sees groundwater and surface as one, interconnected whole.

This incomparable resource contributes immensely to what makes this a great place to live, work and play. Through this Strategy, we can collaborate to protect it so that we can all enjoy safe, healthy and resilient water now and for generations to come.

2.2 Snapshot of the Region's Water Resources

Water resources in the Cowichan Valley Regional District are rich and varied. Even the cursory scan provided in this section illustrates why we need a regional management approach.

The Cowichan is renowned for its iconic lakes, rivers and valleys. The region spans 18 major watersheds or watershed planning areas with several others overlapping neighbouring regional districts. Most (15) flow or infiltrate toward the more populous east coast of the island while the remainder flow west.

Cowichan Lake, at over 30 kilometers long, is our largest waterbody, drawing visitors from around the world for swimming, boating, and fishing. The lake is also the source of the Cowichan River flowing east to Cowichan Bay. A Canadian Heritage River, it is widely considered one of the finest trout fishing spots in British Columbia.

The Cowichan system occupies the center of the region and, because of its size, splendor and the challenge of managing it in the context of a changing climate, draws much attention. But the Cowichan is far from being our only extraordinary asset.

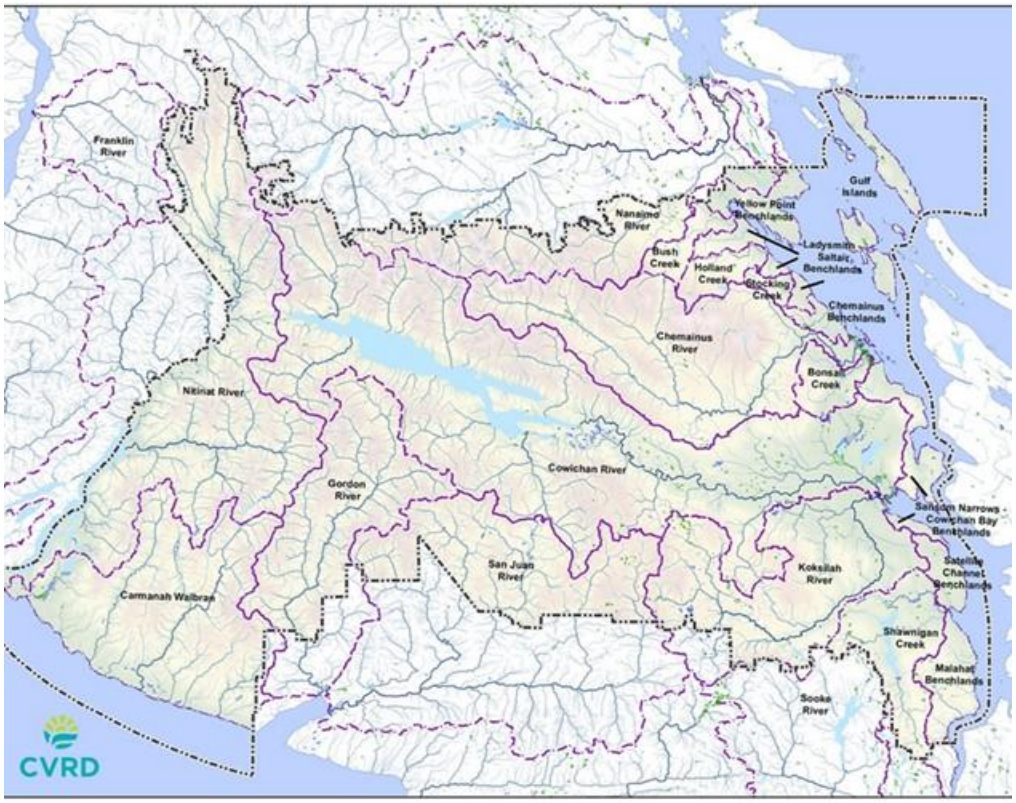
To the south lies Shawnigan Lake, an important recreational water body and home to rainbow trout, cutthroat trout, kokanee salmon and smallmouth bass. There is the Koksilah River and its tributaries, originating southeast of Shawnigan Lake and flowing 44 kilometers to the Cowichan/Koksilah estuary.

To the north is the Chemainus River, which flows eastwards to the Strait of Georgia near the town of Chemainus. The Chemainus is home to Coho salmon and steelhead runs, offers magnificent kayaking opportunities and is used by Roosevelt elk to migrate up and down the watershed.

To the west is the splendor of the Carmanah and Walbran Valleys, with their cascading coastal creeks and old growth temperate forests of giant western redcedar, Douglas-fir, western hemlock, and towering Sitka spruce.

These are but a sample of our many fine lakes, rivers, streams, wetlands and watersheds.

While lakes and rivers capture our imaginations with their grandeur, the aquifers that underly the region are just as vital. Most residents rely on groundwater for their drinking source, whether they draw from community water systems or private wells. There are 58 aquifers in the CVRD, of both sand/gravel and of bedrock composition. For example, portions of the Thetis Island Local Trust Area that fall within the region (including Thetis, Valdes, Ruxton, Reid, and Pylades Islands) are highly dependent on rain and groundwater. There are four aquifers on Thetis alone, of which two are considered both highly vulnerable and highly developed.



Watershed Planning Areas of the Cowichan Valley Regional District

2.3 Background to the Strategy

Historically, the resources and authority that CVRD had for watershed management were limited, but this has not stopped extensive work by both the Regional District and its partners. A small sample of recent projects that set the stage for this Strategy include the following:

- water quality assessments and objective development (1989 to present);
- well protection plans, aquifer studies and groundwater budget development (2001 to present);
- Cowichan Basin Water Management Plan (2007);
- South Cowichan Water Plan Study (2009);
- creation of the Cowichan Watershed Board (2010);
- incorporation of the Shawnigan Basin Society (2012);
- Regional Surface & Ground Water Management and Governance Study (2015);
- Bonsall Creek Watershed Management Plan, Municipality of North Cowichan (2016);
- *Water Sustainability Act* comes into force (2016);
- CVRD Watershed Atlas (2017);
- Cowichan Water Use Plan (2018);
- South Cowichan Watershed Characterization (2019); and,
- CVRD Watershed Risk Analysis (2019).

Over time, this foundational body of work continued to demonstrate the need for greater effort on water sustainability, better data and science to inform land use decision making, and a more coordinated, regional approach. This growing awareness was intensified by the demand for

increased investment from all levels of government to respond to emerging environmental and water supply problems – floods, droughts and shortages – as a result of additional pressures and changes in hydrology.

In response, on October 20, 2018, voters across the Regional District were presented with a referendum asking for the authority to establish a "Drinking Water and Watershed Protection Service". Passage would allow CVRD to create a new, focused service, including taxation authority, that would support relevant regional programs. In the lead up to the vote, CVRD and partners communicated the many potential benefits of such a service including:

- better land management decisions based on water resources inventory and monitoring data;
- protection of water through monitoring, planning and prevention;
- stewardship and conservation tools and information for residents and businesses; and,
- strategic and proactive climate adaptation measures.

The community showed strong support for the proposition, with about two thirds voting in favour. The CVRD Board of Directors subsequently passed CVRD Bylaw No. 4202 (Drinking Water and Watershed Protection Service Establishment Bylaw).

2.3.1 The Strategy Development Process

Along with passing the bylaw, the Board also directed staff to develop a strategy to support implementation. A strategic public planning process commenced in mid-2019. A Community and Technical Advisory Group made up of participants from across the region was formed. This temporary and ad hoc body was struck to provide high level advice to the CVRD. It was supported by a consulting team with staff from Victoria-based Econics and Vancouver-based Compass Resource Management. It included representatives from two Provincial Government ministries, Island Health, the Islands Trust, local governments, some First Nations, improvement districts, the private forestry sector, and community environmental organizations. The committee had three workshops through the fall and winter of 2019/20. It worked through a structured planning process where they explored core elements of the strategy and made recommendations. Central to its mandate was identifying key actions and activities prioritized for the first ten years of the Program. The results are presented in this document.

In parallel, advice was sought from an oversight team that included CVRD and local municipality staff.

The CVRD also had several direct meetings with a number of First Nations over the course of the planning process to seek their perspectives and to better understand their interests and water management goals. The CVRD recognizes that the development of the strategy is a constrained and time bounded process. As such, it made a commitment that working with First Nations communities to continuously integrate issues regarding water governance, knowledge building, and community capacity is a priority.

2.3.2 Linkages to Existing and Related CVRD Strategies and Initiatives

This document was not developed in a vacuum. Instead, it was informed by a number of relevant, parallel CVRD initiatives, some of which have been underway for a number of years. As implementation commences, this Strategy will strive to support and integrate with this current work. In many cases, it will help operationalize commitments made under these processes.

Watershed Planning – Much work by CVRD, along with partners, has already been completed to develop watershed plans and other important information products for several sub-regions already known to face supply constraints or other risks.

New Normal Cowichan and Climate Adaptation Strategy – a multi-phased project is underway to act on climate adaptation. Phase 1 (climate projections) was completed in 2017. Work on Phase 2 (vulnerability and risk assessments) and Phase 3 (adaptation strategy) is in progress.

Official Community Plan – CVRD is harmonizing existing electoral area Official Community Plans into a single, regional plan and is also modernizing that plan to address trends such as population growth, an evolving economy and a changing climate. Municipal government partners are also in the process of updating their OCPs.

Liquid Waste Management Plans – in collaboration with the Province and other partners, these plans guide collection, treatment and disposal of sewage and protect the environment from polluted runoff.

Hydrometric Monitoring and Water Quality Monitoring Strategies – in anticipation of this Strategy, work has already commenced on technical planning around hydrometric and water quality monitoring.

Watershed Risk Assessment Framework – A dynamic risk model was developed by the CVRD to look at multiple pressures and impacts across the region.

2.4 Partners in Strategy Delivery

Responsibility for water stewardship is shared among a sizable number of agencies, companies and organizations of which CVRD is just one. We work together towards shared goals of protecting water quality, quantity and aquatic ecosystems. We can share costs, information and tools, thereby magnifying the impact of our individual efforts. Through these supportive working relationships, CVRD can also more effectively influence the planning and policy of other responsible agencies. Perhaps most importantly, we can draw upon the skills and expertise of external partners and community organizations during the implementation of the Strategy.

Jurisdictionally, responsibility for water management is spread across agencies, organizations and companies at the federal, provincial and local levels. For example, the Federal Government is responsible for fisheries and water resource data. The Provincial Government oversees water allocation, waste discharge permits and, along with Island Health, drinking water protection. Local governments and First Nations operate their own water systems. They also oversee land use planning within their boundaries, as does the Islands Trust. Private managed forest lands operators, agricultural producers and other private companies own vast tracts of land and manage the impacts of their activities on streams and aquifers. Environmental non-

governmental organizations such as the Shawnigan Basin Society and Cowichan Watershed Board can provide outreach directly to residents about stewardship and deploy volunteers to assist with restoration projects or collect data from the field when necessary.

This Strategy was developed collaboratively with representatives from other organizations and could not have been successfully completed without their support. Continuing to work with these organizations and other partners is a foundational and integral element of how it will be implemented.

The following table provides a list of just some of the organizations involved in water management in the Cowichan region.

Partners in Water Management*

Federal Government
- Fisheries and Oceans Canada
- Natural Resources Canada
  - Geological Survey of Canada
  - Water Survey of Canada

Provincial Government
- Ministry of Environment and Climate Change Strategy
- Ministry of Transportation and Infrastructure
- Ministry of Forests, Lands, Natural Resource Operations and Rural Development
- Ministry of Agriculture
- Ministry of Health

First Nations
- Cowichan Tribes
- Ditidaht First Nation
- Halalt First Nation
- Lyackson First Nation
- Pacheedaht First Nation
- Pauquachin First Nation
- Penelakut Tribe
- Stz'uminus First Nation
- Ts'uubaa-asatx First Nation

Local Governments
- City of Duncan
- Town of Ladysmith
- Town of Lake Cowichan
- Municipality of North Cowichan

Other Regional Agencies
- The Islands Trust (Thetis Island Local Trust Area)
- Regional District of Nanaimo
- Capital Regional District
- Island Health

Non-Government Entities
- Improvement Districts and Private Water Utilities
- Environmental Non-Governmental Organizations
  - Shawnigan Basin Society, Cowichan Watershed Board and others
- Coastal Water Suppliers Association
- Mosaic Forest Management
- Agricultural producers

* This list is not intended to be comprehensive.

3.0 Strategy Goal and Objectives

This section sets out the Overarching Goal and Objectives for the Drinking Water and Watershed Protection Strategy. These were developed collaboratively with local government staff and Community and Technical Advisory Group members over the fall and winter of 2019/20. They reflect our shared aspirations as we work together to improve water resource management.

Overarching Strategy Goal

The Overarching Goal of the Drinking Water and Watershed Protection Strategy is:

Healthy watersheds and aquifers, recognizing that our personal wellbeing, our communities, our ecosystems and our water resources are all interconnected.

This Overarching Goal will provide an enduring, shared purpose for CVRD staff, elected officials, implementation partners and residents as we move forward with this Strategy over the coming decade.[1]

Mukw' stem 'o' slhilhukw'tul

The Community and Technical Advisory Group was inspired by this Hul'q'umi'num' saying during the strategy development. It informs the idea of "interconnectedness" captured in the goal statement above. Roughly translated, the phrase means that all things on this earth are connected. It expresses the shared view of all involved in this process that we must consider the whole watershed, top to bottom, in our planning and land use activities, encompassing both surface and groundwater, which are one integrated resource.

Supporting Strategy Objectives

Strategy Objectives are the means by which the Overarching Goal is met. They are as follows, listed generally in order of priority:

- Safe source water for domestic supply;
- Resilient watersheds, aquifers and aquatic ecosystems;
- Protection of social and cultural values and enjoyment of the recreational amenities and services derived from our watersheds;
- Preparedness for climate change effects on the region's water resources;
- Strong partnerships working together to ensure healthy watersheds; and,
- Efficient use of water.

[1] It is noted that in more developed and heavily impacted urban watersheds, emphasis may be more on resiliency and drinking water safety over watershed health.

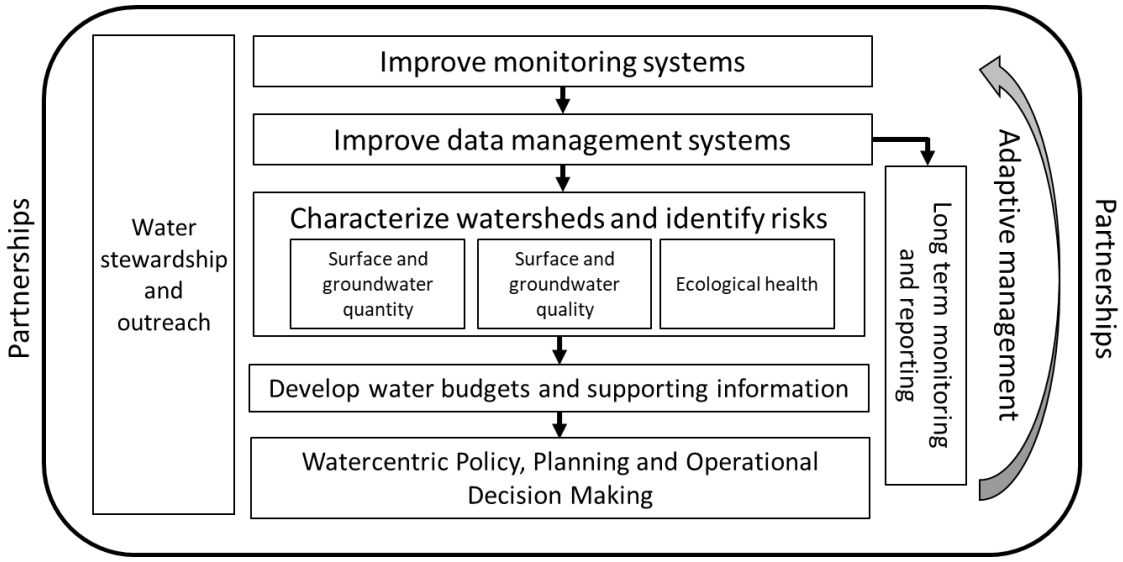
4.0 Key Program Areas

4.1 Strategy Program Areas and Organization

The Drinking Water and Watershed Protection Strategy is organized around three Program Areas. These are the policy instruments and tools that will be used by CVRD to deliver the work. They provide an organizational framework for the various Actions that will be implemented in the next ten years, as follows:

1. **Learn (Watershed Science and Information)** - Collect existing and new data; analyze them to create new knowledge and science; create knowledge products such as maps, reports and online information systems.
2. **Act (Watercentric Policy, Planning and Operational Decision Making)** - Use science and knowledge to inform policy, land use decisions, and operational activities that affect drinking water and watersheds.
3. **Share and Collaborate (Watershed Stewardship and Outreach)** - Work directly with residents to help them understand the benefits of water stewardship and how they can contribute.

Each Program Area is comprised of Actions. These must progress us steadily towards the Overarching Goals and Objectives set out in Section 3.0. Ultimately, this must lead to more informed policy, planning and operational decision making as well as better information for residents so they can participate effectively in protecting watersheds and use water efficiently. This is captured in the following flow diagram.



Drinking Water and Watershed Protection Strategy Flow Diagram

The following table summarizes Program Areas and Actions. It also lists potential partners, provides an indication of likely resource requirements and timing and a sample of specific initiatives.

Summary of Drinking Water and Watershed Protection Strategy Program Areas and Actions

#	Program Areas and Actions	Potential Partners (not comprehensive)	Resource Requirements	Timing	Sample Initiatives
1.	**Theme 1: Watershed Science and Information**				
1.1	Improve water and climate monitoring networks	BC, CN, FNs, LGs, ENGOS, SGs, PMFL, WSPs	High	Immediate & Ongoing	- Hydrometric monitoring strategy - Water quality monitoring strategy - Community well monitoring network
1.2	Improve data management systems	BC, CN, ENGOS, SGs	Medium	Immediate & Ongoing	- CVRD data mgmt. strategy - CVRD/BC data management agreement
1.3	Characterize watersheds and identify risks				
1.3.1	Characterize surface and groundwater quantity	BC, CN, FNs, LGs, ENGOS, SGs	High	Medium	- Groundwater contour mapping - Environmental flow needs assessments - SW/GW connectivity modelling
1.3.2	Characterize surface and groundwater quality	BC, CN, FNs, LGs, ENGOS, SGs	High	Medium	- Water quality mapping - Recharge area identification
1.3.3	Assess ecological health	BC, CN, FNs, LGs, ENGOS, SGs	Medium	Long	- Benthic invertebrate assessments
1.4	Develop water budgets and knowledge products	BC, CN, FNs, LGs	Medium	Medium to Long	- Watershed based water budgets
1.5	Ongoing monitoring and reporting	BC, CN, FNs, LGs, ENGOS, SGs, PMFL, WSPs	Medium	Long	- Regular public reports on watershed health
2.	**Theme 2: Watercentric Policy, Planning and Operational Decision Making**				
2.1	Develop coordinated policy and planning frameworks	BC, CN, FNs, VIHA, FNs, LGs, PMFLs, WSP, IT	Medium	Medium to Long	- Input to CVRD strategic planning - Input to Provincial policy development
2.2	Inform planning decision making	BC, CN, FNs, VIHA, FNs, LGs, PMFLs, WSP, IT	Medium	Medium to Long	- OCP updates - Watershed mgmt. plans - Water sustainability plans
2.3	Inform operational decision making	BC, CN, FNs, VIHA, FNs, LGs, PMFLs, WSP, IT	Medium	Medium to Long	- Referral reviews - Input to CVRD operational plans
3.	**Theme 3: Water Stewardship and Outreach**				
3.1	Educate and communicate	FNs, LGs, ENGOs, SGs, PMFL, WSPs	High	Immediate & Ongoing	- Well protection/septic savvy - Water efficiency education
3.2	Foster strategic partnerships	All	Medium	Immediate & Ongoing	- Data management agreements - Resource sharing agreements
3.3	Watershed Restoration	FNs, LG,s ENGOs, SGs	High	Medium to Long	- Seed funding for SG restoration work - Letters of support, etc.

Partners		
BC – Government of British Columbia	IT – Islands Trust	SGs – Stewardship Groups
CN – Federal Government	LGs – Local Governments	WSPs – Water Service Providers
ENGOs – Environmental Non-Government Organizations	PMFL- Privately Managed Forest Lands Managers	VIHA – Vancouver Island Health Authority

4.2 Key Actions by Program Area

The remainder of this section provides a detailed summary of the key Program Areas and Actions under the Strategy.

Program Area 1 - Watershed Science and Information

Action 1.1 - Improve Climate and Water Monitoring Systems

Attaining sufficient, high quality, and statistically defendable data on water resources in the region is an essential pre-requisite to success of the Drinking Water and Watershed Protection Strategy. This involves both surface and groundwater and both quality and quantity. CVRD will review the status and adequacy of water resource monitoring and add new capability as required and as resources permit. Work under this Action will be supported by rigorous, standardized collection procedures, ideally set by authoritative provincial or national sources.

A key initial task is a gap analysis of current monitoring stations in order to identify where additional capacity is needed. As part of this, CVRD will develop a regional hydrometric monitoring strategy.

With respect to surface water, this will focus on attaining better information on a range of metrics including temperature, levels and flow to enhance the existing Provincial network.

With respect to groundwater, improving information on the region's 58 known aquifers is another priority. Addressing this may involve new additions to the BC Observation Well Network or establishing a voluntary community well network to allow private landowners to share groundwater data.

Climate monitoring capacity (e.g., precipitation, temperature, wind) will also be reviewed, with the goal of improving information to a scale and scope appropriate to inform regional planning.

What does success look like?

There is sufficient data on surface and groundwater quality and quantity to support robust watershed characterization and to provide a baseline for ongoing monitoring and reporting.

Action 1.2 - Improve Data Management Systems

No matter how robust water resource monitoring might be, the efforts will be squandered if results are not readily accessible for analysis and creating new information products (reports, maps, etc.). CVRD will work with the Province and other agencies to improve systems for compiling, storing and accessing data collected through the Drinking Water and Watershed Protection Program. Wherever feasible, publicly accessible, open, provincial systems will be used, respecting privacy and proprietary considerations where relevant. For example, the Province's Aquarius system (for hydrometric information) or Environmental Management System (for water quality) or their successors are logical repositories. Where Provincial platforms are not available, robust internal data management systems will be created and managed by CVRD. It is also important that, while existing senior government data management system will be utilized wherever practical, the main role of the service is tailored to making data current and accessible for relevant recipients and audiences within the region.

Work under this Action will be framed by a data management strategy that will be developed in the early days of implementation. This will help clarify what data are needed and provide direction for ensuring data quality assurance/quality control (e.g., inclusion of metadata). And, it will also recognize that technology and monitoring needs will continue to change, calling for adaptation and continual improvement.

What does success look like?

- water and climate data are warehoused in publicly accessible, open, centralized databases;
- data are readily available to support watershed characterization;
- collection of ongoing monitoring results is supported;
- data are used to make strategic and operational decisions across the region; and,
- data sets are maintained and assessed on a regular basis to ensure applicability.

Action 1.3 - Characterize the Health of the Region's Watersheds and Identify Risks

Relying on results of the monitoring and data management programs, CVRD will progressively develop improved understanding of the health and function of the region's watersheds and the impacts of human activity on them, including climate change. The goal is to identify the critical or problem areas in the region from a water management perspective.

This program will not start from scratch. Rather, it will build on characterization work already completed, primarily in southern and central parts of the region, as well as related projects undertaken by CVRD in recent years (e.g., the CVRD Watershed Atlas).

Using a risk-based approach, effort will initially focus on priority watersheds (e.g., those facing known water supply constraints or under significant development pressure). This will be informed by an assessment of the state of current knowledge (i.e., a gap analysis). The objective is to identify which subregions and watersheds require additional data collection versus ones where there is already enough information to support land use decisions with reasonable confidence.

Characterization of the region's watersheds involves understanding both the resiliency of aquatic ecosystems and their effectiveness in providing ecological services to communities. For example, with the former - resilient aquatic ecosystems - better information about water temperatures in key streams might help identify where active management actions could be undertaken to protect biological diversity or fish. With the latter - effective ecological services - understanding the sources of drinking water might allow us to implement actions to better protect them, such as preserving critical groundwater recharge zones, riparian areas or wellhead protection zones.

Note that characterization of watersheds may - in certain circumstances - include assessing function or structure of specific landscape features to better understand their relationship with water resources.

Depending on their interests in this work, First Nations can be vital partners in characterization of the regional watersheds. This includes assisting with data collection and monitoring, as well as supporting appropriate use of traditional knowledge to enhance these efforts. In similar ways, the region's environmental and stewardship groups can also pay a key role.

Characterization efforts will be organized under two action areas, as follows:

Action 1.3.1 - Characterize Surface and Groundwater Quantity

CVRD will progressively develop better understanding of groundwater and surface water availability for communities, drinking water and ecosystems. For example, this may include mapping aquifers (e.g., contour maps), identifying vulnerable groundwater recharge areas, improving models to better understand environmental flow needs and how much remains for human use, or creating models of groundwater/surface water connectivity and travel time.

Action 1.3.2 - Characterize Surface and Groundwater Quality

CVRD will identify priority waterways and aquifers where water quality problems are occurring that may threaten aquatic ecosystem health, ecosystem services and particularly drinking water. It will build on work already underway including the recently commissioned CVRD water quality monitoring strategy and ongoing Provincial monitoring and characterization programs. Key goals include understanding risk of contamination of drinking water sources, improving management of quality in private wells, and ensuring that the ability of watersheds to assimilate wastes is not over-taxed.

Action 1.3.3 - Assess Ecological Health

Ecological health will be assessed using key ecological parameters such as benthic invertebrate assessments in parallel with provincial and other regional monitoring efforts. This action area will be developed in later stages of the program's maturity and as resources allow.

During the early phase of initiating this Action, biological monitoring and studies will not likely be undertaken. Instead, ecosystem health will be tracked through the narrower lens of water quality and quantity. This may inform more detailed and expensive biological studies, which may be undertaken by partner agencies.

Of course, it is recognized that water quality, quantity and ecological health are highly interrelated, so the intent is not to treat these as separate, siloed exercises but rather as an integrated approach. For example, some monitoring stations will track both quality and quantity parameters. Similarly, information products (reports, maps, etc.) should frame the issues as a unified whole.

CVRD will engage with First Nations to understand how traditional knowledge might supplement and inform scientific efforts under this program and to better understand and support First Nations' goals and interests in watershed characterization and management.

What does success look like?

- critical or problem areas in the region from a water management perspective are clearly identified;
- sufficient information is available to develop water budgets and thresholds;
- a baseline is set for ongoing monitoring;
- relevant information is developed to support land use policies and regulations;
- an appropriate level of information is developed to support water budgets;
- liquid waste management plans are informed by good quality datasets; and,
- water service providers have necessary data to make appropriate long term infrastructure plans.

Action 1.4 - Develop Water Budgets and Other Supporting Information

CVRD will work with partners, particularly the Province, to develop models of current water availability and quality in priority watersheds based on licensed use and assumed extraction rates. In early years of the Program, results of the monitoring and characterization work described above will provide preliminary indications of which watersheds and aquifers are undergoing stress. This will help direct enhanced monitoring to these areas and development of preliminary water budgets.

In turn, this will set the stage for developing robust numerical water budget models. These are one critical tool to asses a watershed's ability to provide water to the community and the environment over time. A water budgets is an accounting of the volume that flows in, the volume extracted and what flows out. It should account for all uses - both natural and human - and give us a clear indication of our natural limits.

The ultimate goal is to develop thresholds or objectives for informing land use and watershed supply and demand in the face of changing land use activities and changing hydrology (i.e., climate change). This will enable clear understanding of where supplies are sufficiently constrained that land use planning needs to be modified or where low impact development activities would be best located.

It must be recognized that this goal is challenging, and that time will be needed to collect enough high quality data to fully inform decision making. It is also the case that progress to date is variable across the region, with some area (e.g., the South and Center) generally already better characterized and closer to readiness for budgets and thresholds.

As well, this water budget work is not meant to duplicate nor take over from the Province's responsibilities around assessing availability of water resources. Instead, the intent is to support Provincial work through strong collaboration. The regional program will endeavor to carry out simplified watershed budgets to inform decision making in a way that is complimentary to more detailed budgets that might be developed by the Province in the future.

Once budgets or thresholds are set, partners can work together to determine which agencies should take action before they are triggered or exceeded, and what action is required. It will not always be easy to prescribe upfront the most appropriate solution for a particular watershed challenge. In some cases, it will be necessary to establish a multi-jurisdictional process to determine the best path forward (e.g., watershed management planning).

What does success look like?

- robust numerical water balance models are complete;
- all new development has appropriate long term proof of water attached;
- agriculture and industry needs are quantified and included in strategic planning;
- water managers have good understanding of water supply and environmental flow needs;
- planners and other decision makers have enough information to make the best decisions; and,
- data are in place to develop specific water balance requirements for development standards.

Action 1.5 - Stable, Long Term Monitoring and Reporting

All of the work described above will contribute to development and implementation of an ongoing monitoring and public reporting program that will continue throughout the life of the Drinking Water and Watershed Protection Program. This will encompass both surface and groundwater and both quality and quantity.

Long term monitoring as well as more focused, localized effects monitoring is a critical component of the Program and will be used to establish targets, monitor changes and evaluate the success of planning or policy instruments. As the Program evolves and monitoring and reporting requirements become more clearly identified over time, an adaptive management approach will be used to guide this work. The concept of adaptive management and how it will be applied is discussed in more detail in Section 5.5, below.

The degree of effort that will be required to do this effectively should not be discounted. As well, it is recognized that considerations such as the intended audiences for this reporting, the objectives, the frequency, preferred formats of data and reports, and the level of detail are all important implementation issues that should be addressed early. Nevertheless, the intent is that monitoring results will show changes in watershed health over time. They will also provide indications of the effectiveness of the Program and of land use decision making in the region generally.

Program Area 2 - Watercentric Policy, Planning and Operational Decision Making

The end goal of water science and information activities is to provide sufficient information to make educated decisions. Logically this flows from policy decisions, through to planning decisions (particularly around land use) then into the operational decisions and activities of agencies and organizations.

Action 2.1 - Develop Coordinated Policy and Planning Frameworks

Planning of all kinds, particularly land use and resource planning, is key to protecting watersheds and drinking water. The Program will develop a multi stakeholder coordinated policy and planning framework that allows and supports the alignment of multiple levels of government to coordinate water planning policies and programs. This will be accomplished by discussions with the provincial government, local First Nations communities as well as the proposed Technical Advisory Committee.

The Program will also support policy work of other agencies as they relate to the CVRD. Examples include:

- providing advice to policy development for *Water Sustainability Act* implementation;
- providing advice on other Provincial policy processes; and,
- supporting policy activities of the Federal Government, First Nations, local governments, other water service providers, Island Health and others.

Action 2.2 - Inform Planning Decision Making

Information garnered from the Water Science Program Area will be used to inform CVRD planning at all levels. It will also be offered to other agencies as appropriate to inform their planning. The goal is to use continuously improving knowledge about availability, quality, risk, and sustainability best practices to support land use decisions that retain pre-development watershed features and functions. By balancing development with retention of natural areas, the biophysical stability of the region's watersheds may be maintained. Specific objectives include ensuring that new growth demonstrates sustainable supply of drinking water and that resources are protected in the face of both new and existing development.

The work will assist CVRD planners to identify stressed areas and where current zoning may not adequately reflect availability. It may also help set water carrying capacities that establish the number of developments or activities that a watershed or aquifer can continue to support without experiencing unacceptable environmental degradation.

Land use planning mechanisms used by CVRD include Official Community Plans, Comprehensive Community Plans, development permitting for Electoral Areas and zoning bylaws among others. As such, roll out of Drinking Water and Watershed Protection Program implementation will be aligned with CVRD's Official Community Plan modernization process currently underway. The Program will also support other CVRD planning efforts such as environmental planning, liquid waste master planning and bulk water supply planning.

The Program's focus will be on interpreting, compiling, creating, and distributing information. It will provide clear, understandable and not overly technical reports, maps and graphics for planners and decision makers.

At a regional scale, water management plans are a promising option for promoting the goals of this Strategy. They may be developed for specific watersheds on a priority basis according to risks to ecological, public health and community values, recognizing that such planning can be resource intensive. Similarly, the Program will support inclusion of watershed protection in regional strategies and similar processes as opportunities to do so arise.

CVRD will also offer information and resources to inform other agencies and organizations' local and regional planning efforts. Examples include:

- Provincial water sustainability planning under the *Water Sustainability Act*;
- Provincial sub-division approvals;
- municipal land use planning and Official Community Plans;
- water service provider supply planning;
- First Nations development and water planning;
- Island Health drinking water protection activities; and,
- land use planning and regulation by the Islands Trust in the Thetis Island Local Trust Area.

To support this, the Program may develop templates, standards or tools that can be used by local governments and other agencies to further watershed planning and assessments. Stewardship outreach channels and mechanisms, as discussed below, may also be used to help the public understand why certain land use planning decisions are made.

Action 2.3 - Inform Operational Decision Making

In addition to supporting planning, the Program will also assist other CVRD operational areas, by providing information, public outreach and other support. Administrative areas include:

- Public Safety;
- Regional Parks;
- Regional Utilities (water, sewerage, drainage); and,
- Environmental Services (in which the Drinking Water and Watershed Protection Program will be housed).

The Program will also support policy and operational work of other agencies. Examples include:

- reviewing Provincial water allocation referrals;
- providing advice on other Provincial regulatory and operational processes; and,
- supporting operational activities of the Federal Government, First Nations, local governments, other water service providers, Island Health and others.

What does success look like?

- planning processes are optimized to protect water resources;
- CVRD and other agency operational activities benefit from improved information;
- more informed water allocation;
- greater certainty for developers and other resource users;
- zoning and density reflect watershed characteristics and limits;
- land use activities and infrastructure management are linked to water supply;
- spatial distribution of regional growth reflects watershed carrying capacities; and,
- climate change impacts on water resources is considered in long term planning.

Program Area 3 - Watershed Stewardship and Outreach

Action 3.1 - Educate and Communicate

This Program Area will promote awareness of watershed and aquifer protection by providing easily accessible, compelling and useful information to the public. Outreach objectives, roughly in order of priority, are as follows:

- drinking water source protection;
- explaining why watershed stewardship is important;
- water efficiency - changing consumption patterns to reduce waste;
- regionally coordinated watering restrictions during summer and shortages;
- community based outreach programs focused on water quality and supply;
- well protection and septic savvy initiatives; and,
- generally communicating the goals of the Drinking Water and Watershed Protection Strategy.

Audiences include both water service provider customers and private well owners. Efforts will be delivered more or less uniformly across the region, but may be concentrated more locally if there was a particularly water stressed area where outreach needs to be ramped up.

Broad scale communication efforts of this kind can be very resource intensive. However, investment in this area is expected to be relatively modest, particularly during the earliest days of implementation. This is necessary to ensure that there are sufficient resources for other critical projects under the science and planning Program Areas. However, it is recognized that outreach effort may be scaled up in the future as the character of watersheds and aquifers is better understood and as the Program matures.

Communication channels include web resources, some print communication, some direct outreach and some targeted incentives (e.g., well testing rebates). CVRD may also support innovative demonstration projects (e.g., for water reuse or rainwater harvesting) but will not typically commission and operate them directly.

Action 3.2 - Foster Strategic Partnerships

To build on successful existing programs, create synergies and avoid duplication, CVRD will endeavor to coordinate this work with local governments, water service providers and other regional districts. This could both expand reach and create economic efficiency.

Partnerships with local environmental and stewardship groups are a critical ingredient to the success of this Program, building on past shared achievements with public engagement and advocacy. Stewardship groups and volunteers can play a pivotal role in developing materials and getting the message out in a cost-effective and people-friendly way.

Action 3.3 – Watershed Restortation

Supporting watershed restoration work is not likely to be a major focus of the Program because of the significant financial costs and other challenges. However, CVRD may provide basic support to restoration activities of other organizations such as stewardship groups. For example, this may include providing letters of support for grant applications, playing a coordinating

function across groups, providing information, or potentially providing seed money to leverage additional funding. This would target locations where the Water Science Program Area has indicated that restoration is an appropriate solution and likely to improve overall watershed health. In the more distant future, the Program may evolve to provide more support for such activities (e.g., a more involved funding role) based on a partnership model, risk-based approach and assuming necessary resources are available.

What does success look like?

- heighted community interest in drinking water and watershed protection;
- support for land use decisions that protect watersheds and aquifers; and,
- increased public support for the Drinking Water and Watershed Protection Program.

5.0 Implementing the Strategy

As discussed in the introduction, this document provides high level, strategic direction for the Drinking Water and Watershed Protection Program. More detail is required in many areas before implementation can commence. As such, more comprehensive operational plans for many of these Program Areas will be developed, supported by annual workplans and budgets. In some cases CVRD will need to collaborate with partners to do this.

With this in mind, the following section provides some general guidance on implementation, including:

- principles to shape delivery;
- priorities for the first year or two;
- a brief discussion of roles, responsibilities, governance and funding;
- an initial set of progress indicators; and,
- some context on strategy timeframe and commitment to adaptive management.

This section discusses guidance, but it is recognized throughout that implementation effort will also be driven by CVRD Board direction and priorities as these evolve over the decade long horizon for this Strategy.

5.1 Guiding Implementation Principles

Four Guiding Principles will help operationalize implementation:

1. **Partnership based** - through a partnership approach to program design and delivery, working with other organizations and agencies also committed to watershed protection, CVRD will be more effective at leveraging resources and will achieve better results.

2. **Action oriented** – Program Areas in the Strategy are focused on improving and informing future decisions specific to CVRD's approved Drinking Water and Watershed Protection Service (Bylaw No. 4202). This emphasis on decision making at the local government level will help prioritize and allocate funds more efficiently and avoid duplication of effort with other jurisdictions.

3. **Adaptive management** - the Program will rely on the best available information in order to learn and adjust over time. This includes local and traditional knowledge along with evidence–based and scientific methods. Accordingly, the Program is predicated on adaptive management: Program Areas and Actions may be revised and adapted in response to new information and changing conditions (e.g., climate change). The adaptive management framework is discussed further in Section 5.5, below.

4. **Performance standards** - the Program will adhere to performance requirements in the design, execution and reporting of the work to ensure consistency and quality standards are met, especially those related to water science and information acquisition. For some tasks and initiatives, that will mean community organizations, private companies, and researchers assisting with delivery will need to demonstrate that they have the necessary skills and experience to successfully carry out the work.

5.2 Early Priorities

All of the actions in this Strategy are important, but some require more urgent attention, particularly those necessary to initiate the Water Science Program Area. These include tasks that will identify gaps in the existing knowledge base, establishing data management protocols and installing new monitoring infrastructure.

How effort will be deployed in the early days of implementation will be dictated by external factors such as what we already know about which watersheds and aquifers are under stress and evolving knowledge about likely climate change impacts. Other drivers include budget limitations and whether partnership opportunities present themselves.

In some cases, there may already be enough evidence to indicate that a watershed or aquifer is under threat. In these situations, support for policy and land use planning processes may be expedited so that opportunities for mitigation and drinking water protection are not foreclosed.

The following actions should start in 2020:

- hire a Program Coordinator;
- commence implementation of surface water quality monitoring strategy;
- develop a groundwater quality monitoring strategy;
- develop a data management strategy and confirm arrangements with the Province around data warehousing and access;
- develop a hydrometric monitoring strategy (for both surface and groundwater;
- identify gaps in the existing monitoring network and install new stations as resources permit (stream gauges and observation wells);
- in partnership with stewardship groups and other partners, develop arrangements for field collection of data including quality assurance/quality control procedures;
- complete a preliminary screening to identify potentially high risk watersheds and aquifers; undertake a data gap analysis about the current state of knowledge about these risks;
- support the CVRD's Official Community Plan modernization process by providing existing information about watershed health and known risks; and,
- create terms of reference for a standing Technical Advisory Committee and recruit members (see Section 5.3, below).

5.3 Implementation, Governance and Funding

As discussed above, this Strategy will be implemented through a partnership model. Depending on the nature of an individual initiative or task, CVRD may carry out implementation on its own with internal resources, may outsource work to partners in the region through a limited call for proposals, may put work out to the open market through open requests for proposals, or use some combination of these approaches. Procurement decisions will be driven by the guiding implementation principles set out above as well as standing CVRD procurement policies.

CVRD will act as a convener to facilitate partnerships, liaise and work with local municipalities, manage and administer contracts and grant applications, and provide quality assurance and control to ensure the Overarching Goal and Objectives are met. Its role will also likely entail other supportive activities, for example related to data management. Part of the annual funding will be allocated to CVRD staff directly to carry out administrative, contract management, regional coordinating functions, and so on.

Partners and representatives from other organizations involved in water management in the region will continue to guide further development and delivery of the Strategy through a **Technical Advisory Committee**. This committee will inform CVRD on implementation plans and issues on an ongoing basis. The Committee will provide advice related to priorities and workplans for the upcoming year (including input into draft annual budgets). It will advise on topics such as monitoring, study findings, and the performance and outputs of Program Areas.

Size and membership of the Technical Advisory Committee still needs to be determined. However, it is envisioned that most members will be by appointment through identified partner organizations. Composition would aim for balanced representation from across the region and from across different agencies and organizations involved in watershed and water resources planning and management (limited to about 20 members). Sector membership would include local governments, Provincial and Federal Government, First Nations, water service providers, environmental non-governmental organizations/stewardship groups and a representative from the private managed forest sector. Establishing this committee is an early implementation priority.

Once again, implementation will also depend on developing more detailed annual workplans and budgets. This will allow adapting to new information and priorities as we learn, consistent with the direction set out in this overarching Strategy.

The following table sets out an anticipated, high level implementation schedule for the Strategy's Program Areas and Actions:

High Level Implementation Schedule

#	Program Areas and Actions	Immediate (Year 1)	Medium Term (Year 2 to 5)	Long Term (Year 5 to 10)
1.	Watershed science and information			
1.1	Improve water and climate monitoring networks	■		
1.2	Improve data management systems	■		
1.3	Characterize watersheds and identify risks		■	
1.4	Develop water budgets and supporting info		■	
1.5	Stable, long term monitoring and reporting			■
2.	Watercentric decision making			
2.1	Coordinated policy and planning frameworks		■	
2.2	Inform planning decision making		■	
2.3	Inform operational decision making		■	
3.	Watershed stewardship and outreach			
3.1	Educate and communicate		■	
3.2	Foster strategic partnerships	■		
3.3	Watershed restoration			■

Key

■	Initiation
	Ongoing Implementation

Ultimate oversight of this Strategy is the purview of the CVRD Board of Directors. Reports on progress will be provided to the Board at least annually, as will workplans for the year ahead.

A starting annual budget for the Program has been set by the CVRD Board consistent with what was communicated to the electorate through the referendum process in 2018. However, it is recognized that the Board may elect to increase or decrease this amount through its regular budgeting process.

5.4 Progress Indicators

The following suite of indicators was developed to track general progress under each Program Area. The reader may note that they tend to measure process rather than outcomes. That is, they do not purport to monitor environmental outcomes such as changes in water quality parameters, groundwater levels, environmental flows, etc. Of course, the ultimate aim of the Strategy is to maintain or improve watershed health. As such, more specific, technical performance indicators may be developed in the future for individual Program Areas through their operational planning processes. As well, additional high level performance measures for the Strategy as a whole may also be added later.

Watershed Science and Information

- number of major and minor stream systems regularly monitored;
- number of aquifers with groundwater monitoring wells;
- number of sites with long-term datasets hosted on open Provincial platforms;
- number of watersheds and aquifers characterized; and,
- number of watersheds and aquifers with established water budgets or thresholds.

Watercentric Policy, Planning and Operational Decision Making

- number of major policy and planning processes and documents informed by the Program (both CVRD and other agencies); and,
- number of official community plans that include water driven objectives (CVRD and local governments).

Watershed Stewardship and Outreach

- public awareness of the need for and benefits of watershed protection (measured via market research);
- number of people reached by watershed stewardship outreach communications programs (measured based on both direct contact and access to online channels); and,
- number of partner organizations utilizing program communication material.

5.5 Strategy Timeframe and Adaptive Management

The period for this Strategy is 2020 to 2030. At the end of the decade, a structured review should be conducted to assess results and determine priorities for the next implementation period. Ten years is a sufficient amount of time to make headway on all of the Actions set out above and attain early results.

CVRD will aim for early wins, including opportunities to better utilize existing data to inform planning processes about watersheds and aquifers at risk. However, many of the Actions in this Strategy require long timeframes to see success. Notably, it takes many years to attain enough time series hydrometric data to fully characterize a watershed to the level where robust numerical water budgets can be established. Similarly, it will take many years of outreach to establish a well-recognized brand for the Program and to reach large numbers of residents with key messages. While the timeframe for delivery is ten years, most of the Actions set out here will need to carry on well beyond this horizon.

At the same time, progress towards the Overarching Goal and supporting Objectives will be continuously reviewed on at least a bi-annual basis through an adaptive management approach. Adaptive management is a systematic approach for improving water management by learning from outcomes. It focuses on adapting based on empirical evidence as well as the perspectives of program managers and partners in other organizations. An adaptive management approach will help CVRD maintain flexibility in decision making. It is particularly appropriate for this Program knowing uncertainties exist, especially around the limits of current knowledge of water resources and because of climate change.

Triggers that may cause a change in direction may include results of monitoring, new information about local impacts of climate change, evolving perspectives among stakeholders and partners about program direction, or new priorities set by the CVRD Board of Directors. An adaptive management approach provides CVRD the latitude to adjust direction to improve progress towards the Strategy Overarching Goal:

healthy watersheds and aquifers, recognizing that our personal wellbeing, our communities, our ecosystems and our water resources are all interconnected.

6.0 References

The following reports and resources are among many that informed development of this Strategy:

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https://www.cvrd.bc.ca/2319/South-Cowichan

In addition to these source, additional technical reports and resources can be found on the CVRD website at https://www.cvrd.bc.ca/1691/Environment.

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