Capital Regional District

625 Fisgard St.,
Victoria, BC V8W 1R7

Notice of Meeting and Meeting Agenda
Water Advisory Committee

Tuesday, November 25, 2025 | **12:00 PM** | **Goldstream Meeting Room, 479 Island Hwy, Victoria BC V9B 1H7**

Members of the public can view the live meeting via MS Teams link: **Click here**

K. Harper (Chair), K. Zimmerman (Vice Chair), C. Davis, M. Doehnel, A. Fernandes, A. McArdle, C. Nowakowski, K. Oppen, T. Pedersen, W. Scheuer, M. Turner, M. Wagner

The Capital Regional District strives to be a place where inclusion is paramount and all people are treated with dignity. We pledge to make our meetings a place where all feel welcome and respected.

1. Territorial Acknowledgement

2. Approval of Agenda

3. Adoption of Minutes

3.1. 25-1260 Minutes of the Water Advisory Committee Meeting of May 27, 2025

Recommendation: That the minutes of the Water Advisory Committee meeting of May 27, 2025 be adopted as circulated.

Attachments: Minutes - May 27, 2025

4. Chair's Remarks

5. Presentations/Delegations

The public are welcome to attend CRD meetings in-person.

Delegations will have the option to participate electronically. Please complete the online application at www.crd.ca/address no later than 4:30 pm two days before the meeting and staff will respond with details.

Alternatively, you may email your comments on an agenda item to the Committee at LegServ@crd.bc.ca.

6. Committee Business

6.1. 25-1185 General Manager's Verbal Update - November

Recommendation: There is no recommendation. This verbal update is for information only.

6.2. 25-0903 Master Plan Implementation Framework

Recommendation: [At the Regional Water Supply Commission meeting of September 17, 2025, the Commission approved the following motion:
That the Regional Water Supply Commission directs staff to proceed with the Master Plan Implementation Project using the 5 Guiding Principles as shown on the draft Tabletop Document.]
There is no recommendation. This report is for information only.

Attachments: Staff Report: Master Plan Implementation Framework

Appendix A: Draft Tabletop Document

6.3. 25-1245 2026-2035 Water Conservation Plan for Greater Victoria

Recommendation: There is no recommendation. This report is for information only.

Attachments: Staff Report: 2026-2035 Water Conservation Plan for G.V.

Appendix A: 2026-2035 Water Conservation Plan for G.V.

Presentation: Water Conservation Plan for G.V.

6.4. 25-0901 Research Partnerships and Projects in the Greater Victoria Water Supply Area

Recommendation: There is no recommendation. This presentation is for information only.

Attachments: Presentation: Research Partnerships and Projects in the GVWSA

7. Notice(s) of Motion

8. New Business

9. Adjournment

The next meeting will be held in 2026.

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625 Fisgard St.,
Victoria, BC V8W 1R7

Capital Regional District

Meeting Minutes

Water Advisory Committee

Tuesday, May 27, 2025 **12:00 PM** **Goldstream Meeting Room**
479 Island Hwy
Victoria BC V9B 1H7

PRESENT:
K. Harper (Chair), K. Zimmerman (Vice Chair), M. Doehnel, A. Fernandes (12:11 pm) (EP), A. McArdle, K. Oppen, T. Pedersen, W. Scheuer, M. Turner, M. Wagner

STAFF: A. Fraser, General Manager, Infrastructure and Water Services; Laura Hardiman, Senior Manager, Corporate Asset and Maintenance Management, Marlene Lagoa, Manager, Legislative Services and Deputy Corporate Officer (EP); Megan MacDonald, Legislative Services Coordinator (Recorder)

EP - Electronic Participation

Regrets: C. Davis, C. Nowakowski

The meeting was called to order at 12:00 pm.

1. Territorial Acknowledgement

Chair Harper provided a Territorial Acknowledgement.

2. Approval of Agenda

MOVED by W. Scheuer, SECONDED by A. McArdle,
That the agenda for the Water Advisory Committee meeting of May 27, 2025 be approved.
CARRIED

3. Adoption of Minutes

3.1. 25-0525 Minutes of the Water Advisory Committee Meeting of March 25, 2025

MOVED by M. Wagner, SECONDED by A. McArdle,
That the minutes of the Water Advisory Committee meeting of March 25, 2025 be adopted as circulated.
CARRIED

4. Chair's Remarks

Chair Harper advised that the Regional Water Supply Commission has previously considered some of the items on the agenda. She expressed appreciation for staff bringing the information to the committee. All members were encouraged to be engaged and further their understanding of the water system as a whole.

5. Presentations/Delegations

There were no presentations or delegations.

6. Committee Business

6.1. 25-0596 General Manager's Verbal Update - May

A. Fraser presented Item 6.1. and provided the following information:
- the CRD received an award for the best tasting water in BC
- a first place award for the water operators challenge
- hosting a recent water symposium
- peak demand challenges have decreased, public education is ongoing

Discussion ensued regarding:
- alternative options to reduce water usage during peak times
- responses from the Province related to agricultural water rates

A. Fernandes joined the meeting electronically at 12:11 pm.

6.2. 25-0615 Regional Water Supply Strategic Plan - Public Engagement Summary

A. Fraser presented Item 6.2. for information.

Discussion ensued regarding:
- importance of ongoing communication and engagement opportunities
- mixed feedback received on responses about water conservation
- First Nations engagement is underway
- water consumption rates vary by municipality

6.3. 25-0526 Asset Management Strategy

L. Hardiman presented Item 6.3. for information.

Discussion ensued regarding:
- critical importance of having spare parts available
- natural assets which provide services or benefits will be included in future
- strategies to mitigate cost increases during uncertainty related to trade tariffs
- financing/loan repayment timelines relate to the life span of each asset

7. Notice(s) of Motion

There were no notice(s) of motion.

8. New Business

8.1. Fluoride in Water

Committee member K. Oppen noted that most regions in the province do not have fluoride in drinking water despite potential benefits.

A. Fraser noted that direction to pursue implementation of a fluoridation system would need to be provided by Island Health.

Discussion ensued regarding:
- public health concerns and operating costs
- benefits of fluoride for preventing tooth decay

9. Adjournment

MOVED by W. Scheuer, SECONDED by A. McArdle,
That the Water Advisory Committee meeting of May 27, 2025 be adjourned at 2:02 pm.
CARRIED

_____
Chair

_____
Recorder

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REPORT TO REGIONAL WATER SUPPLY COMMISSION
MEETING OF SEPTEMBER 17, 2025

SUBJECT **Master Plan Implementation Framework**

ISSUE SUMMARY

To provide an update on the Capital Regional District's ongoing *Regional Water Supply Master Plan Implementation* project and seek the Regional Water Supply Commission's direction and endorsement of the Guiding Principles for the Master Plan Program.

BACKGROUND

In 2022, Stantec delivered the Regional Water Supply (RWS) 2022 Master Plan, which was endorsed by the Regional Water Supply Commission (Commission) in July 2022, and subsequently by the Capital Regional District (CRD) Board in August 2022.

The Master Plan includes a recommended capital improvement program consisting of 21 projects that accommodates population growth and mitigates risks to the drinking water quality and supply from climate change, wildfires, earthquakes and water quality events. Proposed projects include a water filtration plant, bringing the Leech watershed online, a second deep lake intake at Sooke Lake Reservoir, a new balancing storage tank within the system, and various water transmission main installations and upgrades throughout the system.

Since 2022, the CRD has proceeded with early-works items in the RWS 5-year capital plans, such as North Basin Intake Siting Studies, Reservoir Hydrodynamic Modelling, Sooke Lake Drawdown Study, the Development Cost Charge Program (growth funding), Transmission Main Upgrades and other related studies and tasks recommended by the Master Plan.

Among the budgeted initiatives was the Project Delivery Strategy (Master Plan Implementation Project). The scope of this project was to develop a strategy on how to deliver the complex and interdependent projects that were identified as part of the RWS Master Plan. The scope includes developing a comprehensive roadmap to guide the CRD over the coming years, addressing key areas such as service-level planning, risk mitigation, project prioritization, integrated work breakdown structures and scheduling, delivery strategies, governance frameworks, resource allocation, funding mechanisms, stakeholder communications and regulatory compliance.

The CRD issued a Request for Proposal (RFP) in late-2024 for this assignment and received four bids. Based on the review of both the technical and financial proposals, Carollo Engineers Canada (Carollo) were the preferred bidder. The CRD formally engaged Carollo in early 2025 to assist in the Master Plan Implementation Project. Carollo demonstrated extensive organizational expertise, supported by a network of subject matter specialists located throughout North America.

The assignment is structured around five key tasks:

- Task 1 – Orientation and Visioning: Establishing a shared understanding of objectives and long-term goals of the program, identifying risks and opportunities and establishing strategic goals to guide future decision making.

- Task 2 – Program Refinement and Risk Review: Evaluating and refining program elements, including project sequencing, while identifying and assessing potential risks.

- Task 3 – Project Scope Definition: Clarifying the scope and requirements of individual projects within the program, including prerequisite activities to inform the overall program road map.

- Task 4 – Program Delivery Review: Analyzing program delivery models and strategies to optimize program delivery.

- Task 5 – Program Implementation Plan: Developing a comprehensive Program Implementation Plan using the four previous tasks and including the Program Governance Framework, Long-Term Resourcing Plan, Funding and Grant Strategy, Permits and Regulatory Management Plan and a Communications Plan

A key component of this initiative is the early-stage internal engagement within the CRD, complemented by the technical expertise of the Carollo team. This assignment has put particular emphasis on cross departmental engagement. This collaboration is designed to incorporate diverse perspectives from a broad range of departments and interested parties across the organization, aiming at building common understanding and strengthening the resulting implementation plan. The following engagement activities are completed, underway or scheduled to occur:

Task #	Activity	Status
1	Site tours, staff questionnaire, one-on-one interviews with CRD staff	Complete
1	Full-day visioning workshop with CRD staff from various departments	Complete
1	Political, Economic, Social, Technological, Legal and Environmental (PESTLE) exercises (with CRD Staff and the **Water Advisory Committee**)	Complete
2	Level of service goal setting workshop with CRD staff	Complete
2	Risk framework workshop with CRD staff	Complete
2	Subject matter expert meetings to review Master Plan project scopes	Complete
3	Risk mitigation workshop with CRD staff	Complete
4	Contractor outreach and high-level market sounding	Underway
4	Project delivery framework and procurement workshop with CRD staff	Pending
5	Implementation review workshop with CRD staff	Pending

The main deliverable of *Task 1 – Orientation and Vision* is a draft “Tabletop Document”, which will be used to communicate the purpose, vision and goals of the Master Plan to the public, staff and elected officials over the life of the program. The final Tabletop Document may also include background information on the Master Plan projects, high-level schedule, funding projections.

A draft Tabletop Document is attached as Appendix A for the Commission’s consideration. The Tabletop Document will continue to be refined through the course of the Master Plan Implementation Plan development, and a final Tabletop Document will be brought forward at project completion.

The draft Tabletop Document includes five Guiding Principles that establish the high-level direction and goals for delivering the Master Plan Program over its life cycle. These principles will support the CRD in prioritizing the projects and related tasks required to achieve the vision and strategic goals of the Program. Serving as a foundational framework for decision making, they will also help maintain alignment throughout the multidecade implementation that will likely involve many different teams of contractors and consultants over time.

Additionally, the Tabletop Document and its guiding principles will provide a level of transparency to the public on how the CRD is making decisions related to these significant investments. The Guiding Principles of large programs of this nature need to reflect the unique values of the community they are serving, and can be reviewed and adjusted over the life of the program, although changes, additions or deletions should be done in a judicious way as they can have significant impacts on the delivery strategy and prioritization of projects or design alternatives.

The early Task 1 activities (i.e., site tours, staff questionnaire and interviews) helped develop an understanding of the existing RWS system and assets, organizational structure, and potential priorities and goals for the program delivery. Pairing this orientation work with Carollo's industry expertise, an initial set of Guiding Principles was brought forward to the visioning workshop, where a diverse group of CRD staff provided input and refinement in a workshop setting.

This visioning workshop resulted in a draft set of Guiding Principles, which has been further refined and now presented for the Commission's consideration below.

Guiding Principles

1. Proactive, Risk-Informed Program Delivery

Projects are planned with foresight, early risk management, and flexibility to minimize disruption and stay on track.

> The Master Plan Program will be delivered with a culture of preparedness and anticipating challenges before they arise. This includes pre-planning and early risk mitigation to reduce disruption, maintain momentum, and ensure continuity of service throughout construction. Contingency planning, schedule resilience, and clear decision checkpoints will be embedded in the delivery methodology to keep the program adaptive, efficient, and on track.

2. Purposeful Design for Resilience and Operations

Infrastructure is designed to be safe, durable, cost-effective, and easy to maintain while meeting future needs.

> The infrastructure that is designed will be resilient, safe, and built to last without overbuilding or creating long-term operational burdens. The design approach will integrate value engineering, lessons learned from similar projects, and input from operators to ensure practical, maintainable, and cost-effective systems. Design decisions will balance capital and lifecycle costs, support safety and efficiency, and reflect both the needs of today and the challenges of tomorrow.

3. Organizational Readiness and Execution Excellence
Careful sequencing, strong internal capacity, and long-term planning ensure smooth and dependable implementation.

> The Master Plan Program delivery will ensure a balanced integration of internal talent in key roles alongside targeted third-party industry support. As internal staffing capacity is developed, succession planning and preservation of institutional knowledge will be prioritized to safeguard long term service continuity and uphold delivery excellence.

4. Financial Responsibility and Affordability
Reliable service is maintained through right-sized projects, diverse funding, and long-term financial planning.

> Infrastructure investments will be right-sized to match validated demand projections, balancing capital and long-term operating costs to avoid unnecessary rate burdens. Diverse funding sources, alignment with regional and municipal growth strategies, and transparent decision-making will help maintain affordability while safeguarding long-term system resilience

5. Strong and Inclusive Partnerships
Collaboration with First Nations, governments, regulators, and the public builds trust and shared success.

> Collaboration with First Nations, governments, regulators, the public, technical experts, and contractors is essential to build trust, align priorities, and achieve shared success. Engagement with First Nations reflects reconciliation and shared stewardship, ensuring cultural values and opportunities are respected. Partnerships with governing bodies align outcomes with regional strategies and streamline approvals. Working closely with technical experts and contractors applies best practices, value engineering, and lessons learned from others for efficient delivery. Transparent communication with the public builds understanding, encourages conservation, and strengthens investment in the program's long-term success.

In addition to the internal workshops, the CRD met with other utility owners who had delivered programs of similar scope and size. Some of these programs prioritized such items such as local procurement to simulate the local economy and potential revenue generating opportunities, as two examples. Although not specifically identified in the internal engagement work the CRD has undertaken, examples of how these priorities could translate into Guiding Principles are provided below as examples for the Commission's consideration.

6. Inclusive and Lasting Community Benefit (OPTIONAL)
Investment creates added value by supporting local businesses, Indigenous enterprises, and training opportunities.

> Guiding Principle 6 may require projects to be packaged into smaller scopes where local contractors could bid the work. This may require unique procurement policies, processes and contract language to prioritize supporting local or indigenous companies. This would require additional up-front effort and could increase project costs, limit expertise related to more complex work and extend program timelines but has the potential to support local

economies and improve public support of the projects.

7. Revenue-Generating Strategic Partnerships (OPTIONAL)
Innovative partnerships such as green energy or water reuse help generate revenue and strengthen system resilience.

> Guiding Principle 7 would require additional scope be added to the Master Plan projects, for example an energy recovery system at the proposed filtration plant. This principle would increase up-front capital costs (feasibility, design, construction), but has the potential to provide ongoing revenue, for which a cost-benefit analysis would be required. This Guiding Principle also has the potential to lower ongoing greenhouse gas emissions and reduce waste from the system but may also conflict with Watershed Protection initiatives.

The implications of including the two optional Guiding Principles (6 and 7) are discussed further below. By not including items such as the examples noted above it does not preclude these types of initiatives from being considered on a case-by-case basis, but they would not be a foundational driver across all the program delivery.

Next Steps

With the visioning finalized, the project team will use the guiding principles to finalize the Master Plan Implementation Project details. Upcoming work will refine and validate project details, risks, and sequencing; develop comprehensive scope, cost, and scheduling information; and evaluate delivery strategies through market engagement to recommend the most effective approaches. We anticipate presenting a draft of this implementation plan to the Commission for input in Q1 2026.

ALTERNATIVES

Alternative 1
That the Regional Water Supply Commission directs staff to proceed with the Master Plan Implementation Project using the 5 Guiding Principles as shown on the draft Tabletop Document.

Alternative 2
That the Regional Water Supply Commission directs staff to proceed with the Master Plan Implementation Project using amended Guiding Principles as directed.

Alternative 3
That this report be referred back to staff for additional information.

IMPLICATIONS

Alignment with Board & Corporate Priorities

The implementation of the proposed Master Plan program aligns with the CRD 2023-2026 Corporate Plan, and the updated 2025 RWS Strategic Plan. The RWS strategic and corporate plans and their goals were a major consideration in determining the proposed guiding principles.

Alignment with Existing Plans & Strategies

The draft Tabletop Document highlights the connection between the RWS 2025 Strategic Plan and the delivery of the RWS 2022 Master Plan program. The 2022 Master Plan was developed with the commitments of the Strategic Plan in mind, and the delivery of the program will be in alignment with these commitments.

Climate and Environmental Implications

One of the key goals of the implementation of the proposed Master Plan program is to reduce the potential impacts and mitigate risks of Climate Change. In addition, there are potential opportunities to look at innovative technologies or partnerships to look at energy recovery, reducing future greenhouse gases and reducing water waste.

Financial Implications

Several of the guiding principles emphasize the importance of financial sustainability, cost efficiency and long-term affordability for RWS customers. These principles collectively aim to ensure reliable service delivery while balancing short-term expenditures with long-term economic benefits.

Having a policy that considers innovative technologies, energy saving opportunities, and greenhouse gas reduction may enhance access to external funding opportunities. Having policies related to inclusive and lasting community benefit may also stimulate local economic development and foster public support; however, these benefits may be offset by increased planning and administrative requirements, extended implementation timelines, and higher capital or operational costs over time.

Overall, the financial implications of these guiding principles reflect a trade-off between upfront investment and long-term value, requiring careful consideration to align with both fiscal responsibility and strategic community outcomes

First Nations Implications

Numerous local First Nations have expressed a strong interest in providing input throughout the Master Plan program. The proposed Guiding Principles are designed to foster meaningful collaboration, emphasizing inclusive engagement and creating pathways for economic empowerment throughout program delivery.

Service Delivery Implications

The RWS Master Plan, implemented using the guiding principles, seeks to enhance system performance by improving service levels, increasing reliability, reducing risks, proactively responding to climate change and supporting future growth.

CONCLUSION

Following its release, the Regional Water Supply (RWS) 2022 Master Plan was formally endorsed by both the Regional Water Supply Commission (Commission) and the Capital Regional District (CRD) Board. The plan sets out a recommended capital improvement program comprising of 21 infrastructure projects designed to address critical risks to the region's ability to deliver clean,

reliable drinking water including climate change, population growth, and seismic vulnerabilities.

To advance the Master Plan Projects, the CRD has partnered with Carollo Engineers Canada to lead the Master Plan Implementation Project and develop a strategic roadmap for delivering this multi-decade capital program. As part of this effort, a draft Tabletop Document has been introduced, featuring a set of proposed Guiding Principles for consideration by the Commission.

These Guiding Principles are essential as they provide a clear framework for decision making, help prioritize investments, and ensure alignment across diverse teams and stakeholders over the life of the program. By anchoring the implementation in shared values and long-term objectives, the principles also promote transparency and accountability and reinforce public trust in how the CRD is stewarding these significant infrastructure investments.

We anticipate returning to the Commission to present the draft Master Plan Implementation Plan for input in Q1 2026. This plan will include comprehensive scope for the program, cost, and scheduling information; and proposed delivery strategies.

RECOMMENDATION

That the Regional Water Supply Commission directs staff to proceed with the Master Plan Implementation Project using the 5 Guiding Principles as shown on the draft Tabletop Document.

Submitted by:	Joseph Marr, P.Eng., Senior Manager, Infrastructure Engineering
Concurrence:	Alicia Fraser, P. Eng., General Manager, Infrastructure and Water Services
Concurrence:	Ted Robbins, B. Sc., C. Tech., Chief Administrative Officer

ATTACHMENT(S)

Appendix A: Draft Tabletop Document

Investing today to ensure reliable drinking water for generations to come

Planning for the Future

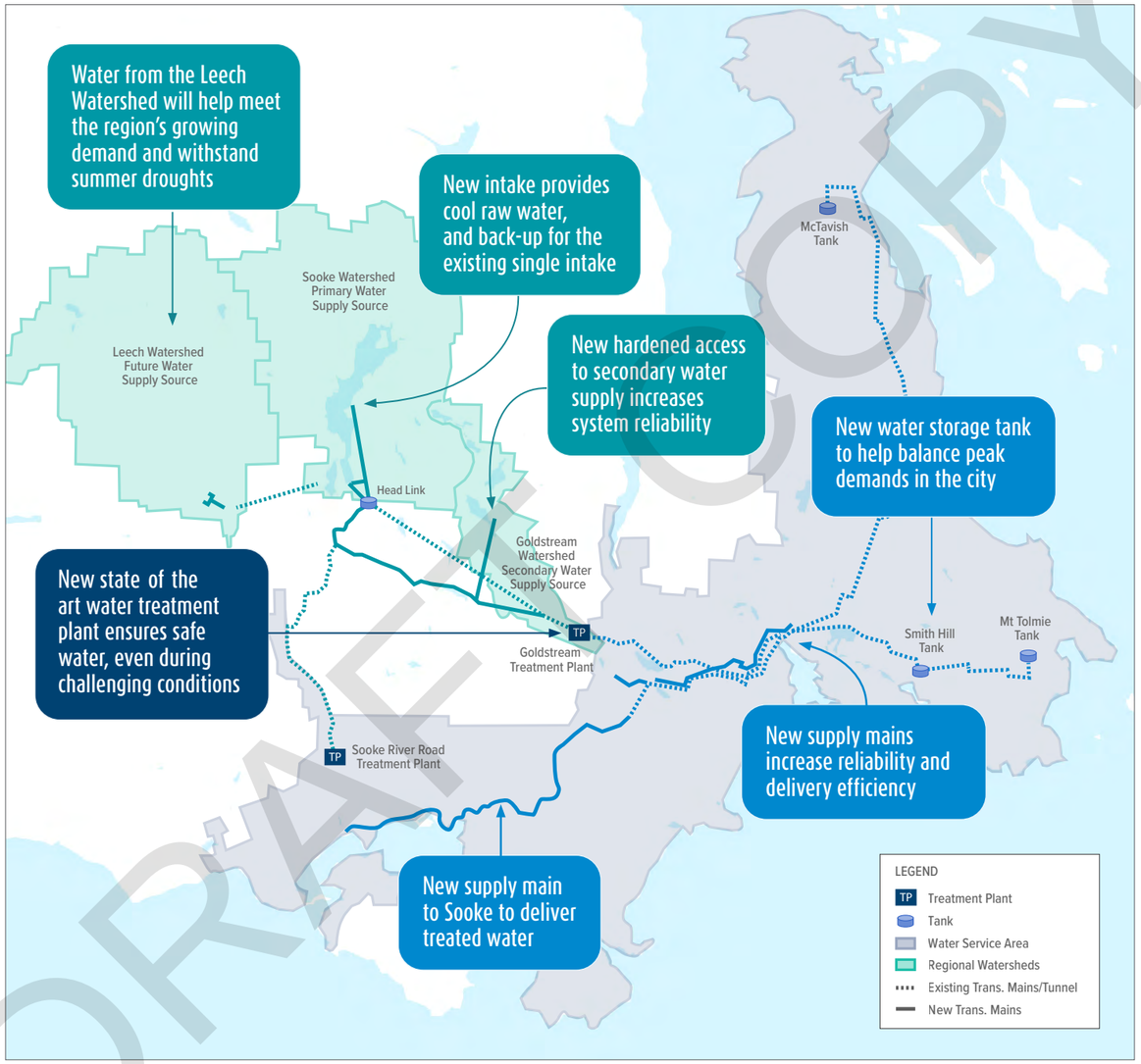
The Regional Water Supply (RWS) Service provides drinkable water to 430,000 people across the Region. As we plan for the future we are committed to:

- High quality, safe drinkable water
- An adequate, reliable, long-term supply of drinkable water
- Efficient, effective and innovation operation of the water system infrastructure

To fulfill these commitments, the RWS Master Plan lays out the roadmap of critical infrastructure projects designed to meet the needs of a growing community while proactively addressing evolving risks related to seismic activity and climate change.

This work represents a substantial investment over the next 20 years, reflecting CRD's commitment to long-term water security and resilience.

Implementation will be guided by the following principles. They were carefully developed to ensure Greater Victoria has a safe, reliable, and sustainable drinkable water supply for generations to come.



Delivering the RWS Master Plan

Project planning, design and construction will be strategically sequenced and staggered throughout the implementation period, with completion anticipated by 2045.

1. RAW WATER (PRE-TREATMENT) FACILITIES

New and upgraded facilities will greatly reduce risks from climate change and earthquakes. These projects include a new lake intake, raw water transmission mains and the incorporation of the Leech water supply.

2. WATER TREATMENT FACILITIES

Protecting the Sooke Watershed, together with treatment and disinfection, provides strong barriers that help keep drinking water clean and safe. A growing population and the use of new water sources with different treatment needs, combined with the impacts of climate change such as droughts, wildfires, and shifts in water quality, mean that additional treatment is essential. Additional treatment, such as filtration, will provide the flexibility to manage these changing conditions, ensuring clean and reliable drinking water continues to flow from the tap.

3. FINISHED WATER (POST-TREATMENT) FACILITIES

The majority of the existing transmission system piping and storage are not designed to modern standards, prone to breaks and may struggle to meet growing demands. New and upgraded facilities will improve water delivery efficiency and reliability.

Guiding Principles

1. PROACTIVE, RISK-INFORMED PROGRAM DELIVERY

Projects are planned with foresight, early risk management, and flexibility to minimize disruption and stay on track.

2. PURPOSEFUL DESIGN FOR RESILIENCE & OPERATIONS

Infrastructure is designed to be safe, durable, cost-effective, and easy to maintain while meeting future needs.

3. ORGANIZATIONAL READINESS & EXECUTION EXCELLENCE

Careful sequencing, strong internal capacity, and long-term planning ensure smooth and dependable implementation.

4. FINANCIAL RESPONSIBILITY AND AFFORDABILITY

Reliable service is maintained through right-sized projects, diverse funding, and long-term financial planning.

5. STRONG AND INCLUSIVE PARTNERSHIPS

Collaboration with First Nations, governments, regulators, and the public builds trust and shared success.

Making a difference...together

EEP 25-47

REPORT TO WATER ADVISORY COMMITTEE
MEETING OF TUESDAY, NOVEMBER 25, 2025

SUBJECT **2026-2035 Water Conservation Plan for Greater Victoria**

ISSUE SUMMARY

To present the 2026-2035 Water Conservation Plan for Greater Victoria to the Water Advisory Committee (WAC) for review and feedback.

BACKGROUND

The Capital Regional District's (CRD) water efficiency objectives are driven by corporate policies and strategic goals set out in the Water Supply Master Plan, the Regional Growth Strategy, and the Regional Water Supply Strategic Plan. The Strategic Plan sets new demand management goals to develop a water conservation plan and define demand baseline and targets.

In late 2024, the CRD retained Econics and Kerr Wood Leidal consulting engineers to facilitate the development of a ten-year Water Conservation Plan (Plan) for the Greater Victoria Drinking Water Service (GVDWS). Demand management staff provided significant input for the review of past programs and achievements and identified enhancements to existing programs and new programs that could be implemented in the future. A quantitative analysis of water production, consumption trends and demand forecasting was conducted. Infrastructure and Water Services staff provided operational input, ensured alignment with strategic priorities, and provided input on the modelling used in the development of the Plan. Development of the Plan was guided by the Province's Water Conservation Guide and North American industry best practices.

The 2026-2035 Water Conservation Plan for Greater Victoria (Appendix A) applies to the Regional Water Supply Service that serves Greater Victoria, including 13 municipalities, eight First Nations, and parts of the Juan de Fuca Electoral Area. The Plan builds on the past successes of the CRD's water conservation programs and refreshes program direction for the next decade towards helping residents, businesses, and institutions become more water efficient and partnering with municipal and First Nations water suppliers to improve demand management in the region. It sets out actions, establishes data-based targets, and outlines implementation strategies and schedules. The Plan is built around four goals:

- Lead and support collaborative water conservation best practices;
- Reduce outdoor water use and instantaneous peak demand;
- Foster community water stewardship and encourage efficient use; and
- Improve understanding of community water use through research and monitoring.

The Plan is being provided to the WAC and the Greater Victoria Demand Management Working Group for review and feedback prior to it being presented to the Regional Water Supply Commission in early 2026.

IMPLICATIONS

Environmental and Climate Implications

The Plan lays out detailed actions required to make progress on the four goals over the next ten years. Many actions are enhancements of existing approaches while others will develop new programs for implementation subject to budget availability. The following high priority actions will be implemented first because they are likely to provide large volumes of water savings relative to costs or address more urgent operational needs:

- Establish a regional demand management community of practice;
- Review the effectiveness of the Water Conservation Bylaw and implement new best practices as appropriate for the Capital Region;
- Enhance outdoor irrigation outreach including campaigns aimed at Water Conservation Bylaw compliance and at reducing instantaneous peak demand;
- Enhance the industrial, commercial and institutional Water Use Assessment Program;
- Phase out once-through cooling systems and promote best practices in other cooling technologies; and
- Update the CRD Residential Water Survey.

The CRD, as the water retailor for the Juan de Fuca Water System, identified two priority operational planning projects for early implementation:

- Investigate the potential impact of conservation-oriented water services pricing, and
- Pilot advance metering infrastructure in the Juan de Fuca Water System.

An adaptive management framework, which means learning from experience and responding as needed to fine tune delivery, will be utilized for Plan implementation. The following 2035 targets will be used to measure progress on Plan implementation:

- Target 1: Total Water Production – Reduce per capita water production from treatment facilities by 0.9% year-over-year to achieve a target of 300 litres per capita per day (LCD).
- Target 2: Residential Consumption – Reduce residential per capita consumption by 1.2% year-over-year to achieve a target of 200 LCD.
- Target 3: Instantaneous Peak Demand – Reduce the maximum change in instantaneous flow rate at 4:00 am from 46% to 20%.
- Target 4: Peak Season Demand – Maintain Maximum Day Demand at 300 megalitres per day (ML/day).

Best estimates from Implementation of the Plan are a reduction of total annual water production by 3-6 % and the maximum day demand (MDD) by 5-9 % in the GVDWS by 2035.

Social Implications

Education and outreach efforts identified in the Plan will require transitioning from the current information-intensive approach that heavily utilizes mass media to a more community-based social marketing (CBSM) approach involving more targeted outreach and improved performance measurement.

CBSM is a methodology for fostering sustainable behaviour change in the community. With residential water use accounting for 66% of total water consumption, the CBSM approach will utilize market research, implement smaller pilot projects to test methods and results prior to region-wide implementation and will emphasize personal engagement, removing barriers to conserving water and using proven tools for change to foster improved water conservation by residents.

Institutional, Commercial and Industrial Implications

The CRD has long-running, successful programs targeted at the industrial, commercial and industrial (ICI) sectors which are anchored by the Water Use Assessment program. The CRD will continue to provide free water use and efficiency audits to businesses and institutions and will enhance the program to improve post-audit implementation.

Other approaches to encourage water conservation for users in the Institutional, Commercial and Industrial sectors include phasing out Once-Through Cooling, piloting smart technology, and targeted outreach to high users around peak hour usage.

Intergovernmental and First Nations Implications

Key aspects of demand management take place at the water distribution system level and depend on the collaborative efforts of local government, First Nation and private retail water suppliers across the region. These efforts include management of non-water revenue, rate setting, land use development planning and various other activities. All retail water suppliers benefit from reduced consumption and improved management of non-revenue water through lower capital and operational costs, fewer service interruptions and unscheduled emergency callouts. Better consumption data helps optimize local infrastructure and development planning.

The 2026-2035 Water Conservation Plan for Greater Victoria focusses efforts on establishing a regional community of practice in collaboration with retail water suppliers to promote innovative non-revenue water management and improved understanding of community water use through research and monitoring. This will include sharing expertise, improved data quality, data accuracy and data sharing, and utilizing best practices. A renewed emphasis on collaboration will foster regular dialogue through workshops, technical exchanges, and joint pilot projects focused on leak detection, meter accuracy and system auditing.

The Demand Management program has established the Greater Victoria Demand Management Working Group, with representatives from local government, First Nations and private water retailors to improve collaboration. This group will be invited to review the Plan and will provide input at an upcoming workshop in December.

Financial Implications

With current budget allocation, staff can continue to deliver existing programs as well as complete the priority projects identified for immediate implementation in the Plan. Longer-term actions follow an adaptive management framework, building on knowledge gained from pilot projects and surveys, and allowing actions to be adjusted based on new data, progress reviews, community feedback, and cost-benefit analyses. This framework aims to ensure the plan remains responsive, resilient, and effective in advancing long-term water sustainability.

CONCLUSION

The 2026-2035 Water Conservation Plan for Greater Victoria sets out an action plan, establishes data-based targets, and outlines implementation strategies and schedules and refreshes program direction towards helping residents, businesses and institutions become more water efficient and partnering with municipal and First Nation water suppliers to improve demand management in the region. Implementation of this plan will facilitate adaptation to future pressures from climate change and will play an integral role in making the Capital Region more water sustainable.

RECOMMENDATION

There is no recommendation. This report is for information only.

Submitted by:	Glenn Harris, Ph.D., R.P. Bio., Senior Manager, Environmental Protection
Concurrence:	Luisa Jones, MBA, General Manager, Parks, Recreation & Environmental Services
Concurrence:	Alicia Fraser, P. Eng., General Manager, Infrastructure and Water Services

ATTACHMENT

Appendix A: 2026-2035 Water Conservation Plan for Greater Victoria

Greater Victoria
Water Conservation Plan - 2026-2035

November 2025

DRAFT V8

Prepared for

Making a difference...together

Prepared by

econics

With

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Table of Content

19 November 2025

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Table of Acronyms

Acronym	Definition
ADD	Average Day Demand
AMI	Advanced Metering Infrastructure
CRD	Capital Regional District
ICI	Industrial, Commercial & Institutional
JdF	Juan de Fuca Water System
GL	Gigalitre (1,000,000,000 litres; 1,000,000 m^3)
GL/year	Gigalitres/year
KWL	Kerr Wood Leidal
L	Litre
LCD	Litres per capita per day
MDD	Maximum Day Demand
ML	Megalitre (1,000,000 litres)
ML/day	Megalitres per day
ML/yr	Megalitres per year
MURB	Multi-Unit Residential Building
NRW	Non-revenue Water
PCIC	Pacific Climate Impacts Consortium

Executive Summary

Over many years, Capital Regional District (CRD) has successfully fostered efficient use of water in the Greater Victoria community through education, promoting water saving technologies, policy measures, and research. This Water Conservation Plan sets out a refreshed direction for 2026 to 2035. It provides a renewed program and suite of actions, establishes data-based targets, and outlines implementation strategies and schedules.

This plan applies to the Regional Water Supply Service that serves Greater Victoria, including 13 municipalities, eight First Nations, and parts of the Juan de Fuca Electoral Area.

Program Impact

Effective implementation of this plan will deliver many benefits for the Capital Region. Demand management is a cost-effective approach to improving water systems reliability and reduces the likelihood of exceeding capacity. This includes the regional water supply, treatment, and transmission systems, regional wastewater conveyance and treatment systems, and local water distribution and wastewater collection infrastructure.

Demand management complements the capital projects and operation and maintenance strategies already in place that are necessary to maintain system reliability and sustainability. It also encourages customers to actively participate in stewardship of water resources and aquatic ecosystems.

Water Conservation Plan Objectives

The CRD's water efficiency objectives are driven by a variety of corporate policies and goals set out in strategic documents such as the Water Supply Master Plan (2022) and the Regional Growth Strategy (2018). Most recently, the Regional Water Supply Strategic Plan (Draft February 2025) sets new demand management goals that include developing a water conservation plan and defining demand baseline and define targets.

Guided by this strategic direction, the following supporting objectives pertain specifically to this plan:

- continue to reduce per capita water production and consumption,
- manage seasonal peak demand, particularly during early morning periods,
- improve water use accounting and management of non-revenue water,
- ensure that water conservation program delivery is data driven and that impacts are measured and tracked,
- improve resiliency and encourage wise water use for the Capital Region as it adapts to climate change, enhances local food security, and prepares for the risk of disasters that might affect water infrastructure,
- enhance the CRD's reputation as a trusted steward of the region's water resources,
- help residents and businesses understand why they should conserve water and the ways that they can do so, ideally while also enhancing quality of life.

2026 to 2035 Water Conservation Program

The new program builds on the many past successes of the CRD water conservation program. The plan for the next decade emphasises helping residents become more efficient, working with businesses and institutions, and partnering with municipal and First Nation water suppliers. In many cases, the actions are enhancements of approaches already in place. In other cases, new programs will be developed and implemented subject to budget availability.

The following table provides a summary of the Water Conservation Plan goals and actions.

2026 to 2035 Water Conservation Plan Program Summary

Goal 1: Lead and support collaborative conservation best practices in water distribution systems	
1.1	Establish a regional non-revenue water management community of practice
1.2	Investigate the potential impact of conservation-oriented water services pricing in the Juan de Fuca Water System
1.3	Pilot advanced metering infrastructure in the Juan de Fuca Water System
1.4	Collaborate with local water suppliers to promote additional water efficiency best practices
Goal 2: Reduce outdoor water use and instantaneous peak demand	
2.1	Review the effectiveness of the Water Conservation Bylaw; based on results, implement new best practices appropriate for the Capital Region
2.2	Review Water Conservation Bylaw compliance and enforcement regime
2.3	Enhance outdoor irrigation outreach including campaigns aimed at Water Conservation Bylaw compliance and at reducing peak instantaneous demand
2.4	Develop “Healthy Landscapes” outreach pilot project
2.5	Continue native plant gardening workshops
Goal 3: Foster community water stewardship and encourage efficient use	
3.1	Continue print and online education campaigns and share learning resources
3.2	Attend community events to directly engage with residents
3.3	Promote the annual “Fix a Leak Week” campaign
3.4	Continue to deliver ‘Every Drop Counts’ school programs
3.5	Implement a multi-unit residential building water efficiency pilot project
3.6	Enhance the industrial, commercial, and institutional Water Use Assessment Program
3.7	Phase out once-through cooling systems; promote best practices in other cooling technology
Goal 4: Improve understanding of community water use through research and monitoring	
4.1	Participate in the Residential End Uses of Water Study
4.2	Update the CRD Residential Water Survey
4.3	Continue annual updates to the Regional Retail Water Use Database
4.4	Refine plan implementation through an adaptive management approach

Plan Targets & Implementation

The CRD will pursue realistic targets to measure progress toward achieving plan objectives.

Target 1: Total Water Production

- Reduce per capita water production from treatment facilities by 0.9% year-over-year to achieve a target of 300 litres per capita per day (LCD) by 2035

Target 2: Residential Consumption

- Reduce residential per capita consumption by 1.2% year-over-year to achieve a target of 200 LCD by 2035

Target 3: Instantaneous Peak Demand

- Reduce the maximum change in instantaneous flow rate at 4:00am from 46% to 20%

Target 4: Peak Season Demand

- Maintain Maximum Day Demand at 300 megalitres per day (ML/day) through 2035

Implementation of the measures in this plan is expected to reduce total annual water production in the Greater Victoria Drinking Water Service by 3% to 6% by 2035 compared with the status quo. It will also reduce maximum day demand (MDD) by 5% to 9% over the same period compared to status quo. Results will also be augmented by broader community trends including ongoing natural replacement of inefficient fixtures and appliances in homes and businesses, land use densification, and changing water use habits.

Priority Projects

The following actions are high priority for early implementation. Some of these measures are already underway. They are priorities because they are likely to provide large volumes of water savings relative to cost. They are also important because of other factors such as the urgency of reducing instantaneous peak demand associated with outdoor irrigation and the pending once-through cooling system regulatory ban.

Priority Projects for the Water Conservation Plan

#	Action
1.1	Establish a regional non-revenue water management community of practice
2.1	Review the effectiveness of the Water Conservation Bylaw; based on results, implement new best practices as appropriate for the Capital Region
2.3	Enhance outdoor irrigation outreach including campaigns aimed at Water Conservation Bylaw compliance and at reducing peak instantaneous demand
3.6	Enhance the industrial, commercial, and institutional Water Use Assessment Program
3.7	Phase out once-through cooling systems; promote best practices in other cooling technology
4.2	Update the CRD Residential Water Survey

Implementation will follow an adaptive management framework. This means learning from experience and responding as needed to fine-tune delivery.

By continuing to encourage efficient use, this plan will play an integral role in making the Capital Region more water sustainable. It will help residents and businesses control their water costs and may help extend the life of our current infrastructure in both our regional transmission and local distribution systems. It will also provide a range of other social, ecological and financial benefits.

1.0 Introduction

Over many years, Capital Regional District (CRD) has successfully fostered efficient use of water in the Greater Victoria community through education, promoting water saving technologies, policy measures, and research. The region has a proud history of advancing water conservation, dating back well over a century. In 1888, Victoria was among the first communities in North America to implement customer metering (Honey-Roses, Gill and Pareja, 2016). In 1992, CRD was an early adopter of outdoor watering schedules, starting first in the Western Communities then spreading throughout the region (CRD, 2021). During the 2000s, CRD pioneered development of industrial, commercial, and institutional water auditing and incentives for non-residential customers, becoming a national leader in this space. Through these and many related initiatives, CRD and its municipal partners continually demonstrate commitment to protecting regional water supplies.

Building on this historical success, this Water Conservation Plan sets out a refreshed program direction for 2026 to 2035. It sets out a suite of actions, establishes data-based targets, and outlines implementation strategies and schedules. The geographic scope includes the Greater Victoria Drinking Water System that serves 13 area municipalities, eight First Nations, and parts of the Juan de Fuca Electoral Area.

The plan is organized as follows:

- Section 2 is an overview of the CRD service area and profiles water use trends,
- Section 3 outlines CRD's objectives for water conservation and alignment with other corporate plans,
- Section 4 is a brief inventory of current programs,
- Section 5 outlines the 2026 to 2035 water conservation program under four goals,
- Section 6 describes the anticipated impact of the program,
- Section 7 provides a high-level implementation plan including targets, a schedule, early priorities, and a monitoring and evaluation framework.

How This Plan Was Developed

Creation of this updated plan commenced in late 2024. The first step involved a review of CRD's current conservation program including strengths, challenges and opportunities (see Appendix 2). Subsequent steps included quantitative analysis of water production and consumption trends, and demand forecasting. Work was facilitated by a series of workshops with CRD staff engaged in utility management and conservation program administration. These workshops looked at program objectives, targets, and measure selection. Plan development was guided by direction in the Province's Water Conservation Guide (Province of BC et. al., 2013, see Figure 1) as well as North American industry best practices as set out in AWWA (2006), AWWA (2013), Maddaus (2014), and Vickers (2001).

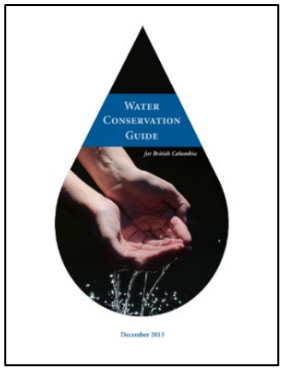

Figure 1: BC Water Conservation Guide

2.0 Service Area Overview and Water Use Profile

This section provides an overview of the CRD water supply and service areas and a water use profile.

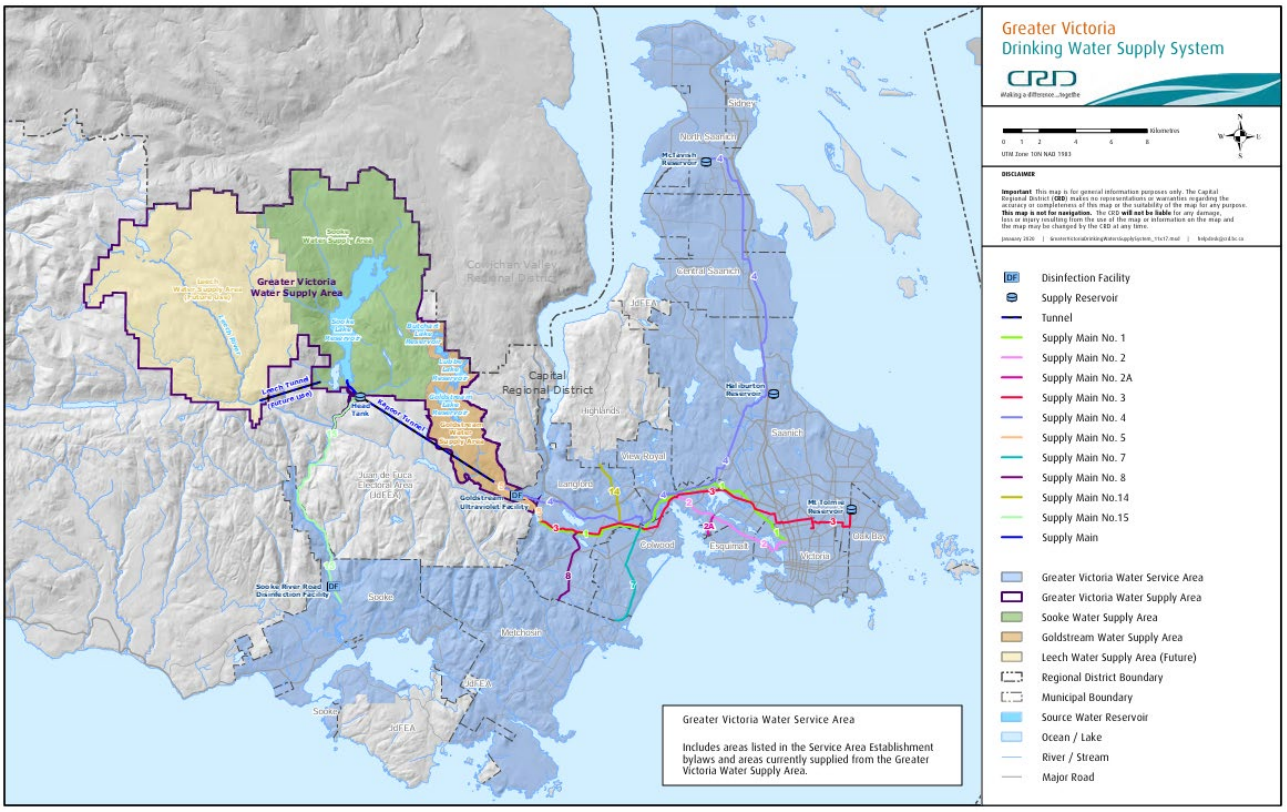

Figure 2: Greater Victoria Drinking Water Service System
Source: CRD, 2025

CRD provides wholesale water to the core area and peninsula in the Greater Victoria area. In addition to providing wholesale water, CRD is also the retail water supplier to six communities (View Royal, Highlands, Colwood, Langford, Metchosin, and Sooke) as well as parts of the Juan de Fuca Electoral Area (parts of East Sooke). [1]

Source water comes from two watersheds: Sooke and Goldstream. Sooke is the primary source with Goldstream as the secondary one. Leech Watershed is planned for future use. The three watersheds are shown in Figure 2 above.

Source water is routed to CRD's two disinfection facilities. The Goldstream Water Treatment Plant (previously referred to as Japan Gulch) disinfects all the water supplied to the Goldstream Service Area which includes all of Greater Victoria except for Sooke and East

[1] The term "retail water supplier" is used in this report to refer to provision of local services such as maintaining distribution systems and customer billing. In most cases, municipalities and First Nations provide this to their residents. However, through the Juan de Fuca Water Distribution Service, CRD itself fills this role for local municipalities in the Western Communities. As well, City of Victoria provides retail water services to Township of Esquimalt residents.

Sooke. The Sooke River Road Treatment Plant disinfects water for the Sooke Service Area, consisting of the communities of Sooke and East Sooke.[2]

2.1 Water Use Profile

This sub-section provides an overview of recent water use trends in the Capital Region. This analysis was completed to guide design of updated conservation programs and to help understand the likely impact of further investment in this area. Additional analysis and the methodology can be found in Appendix 1.

Population

Change in total water demand is in part a function of population growth. Figure 3 outlines regional population over the last ten years. The growth rate was about 2% per year.[3]

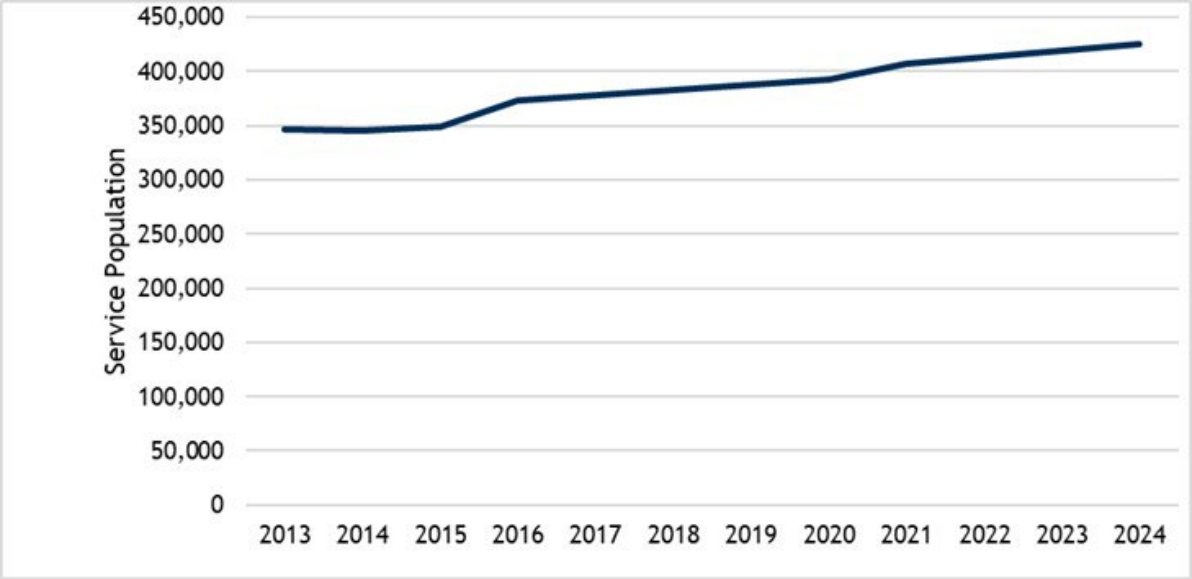

Figure 3: CRD Water Service Population Per Year (2013 – 2024)

Water Production

Historical daily water production from the Goldstream and Sooke treatment facilities was provided by CRD staff. Figure 4 shows the total water production per capita, measured in litres per person per day (LCD) over the past decade. Results are quite stable though generally trending downward. The average for this period also aligns closely with findings in the Water Supply Master Plan (Stantec, 2022).

Additional information on water production from treatment facilities, including total production (i.e., not expressed on a per capita basis), can be found in Appendix 1.

[2] Additional information on water sources can be found at: www.crd.ca/programs-services/water/greater-victorias-water-supply

[3] CRD's planning department projects a future growth rate of 1.66% per year.

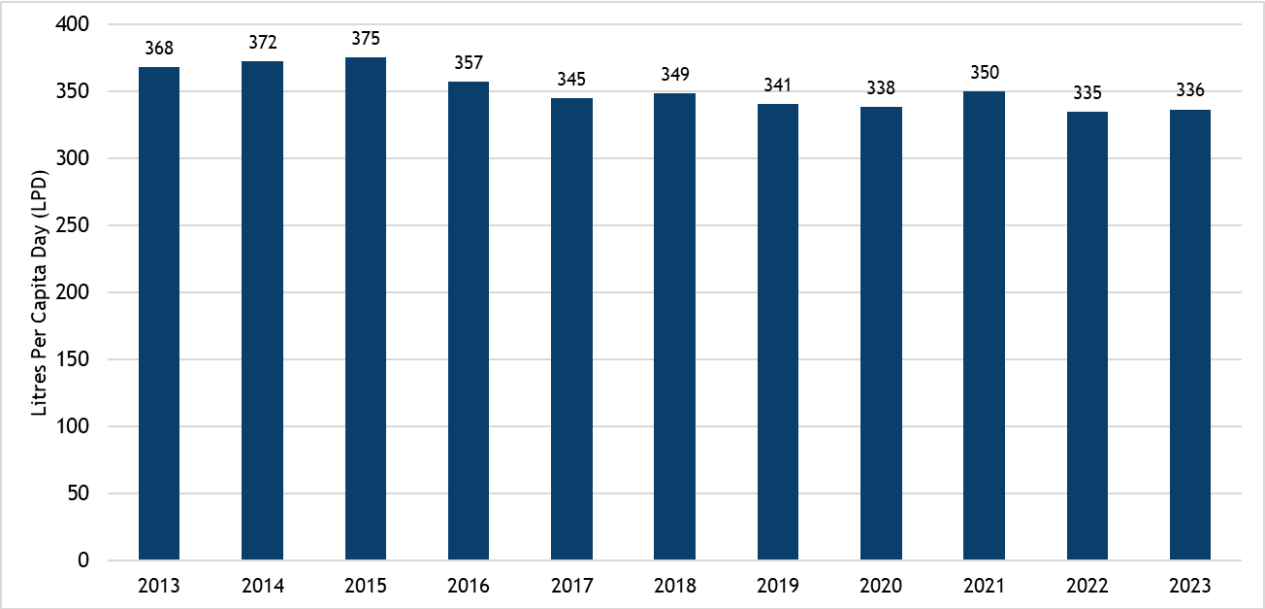

Figure 4: Total Water Production Per Capita (LCD)

Production data was reviewed to develop baseline and seasonal flow estimates. We assume that seasonal water usage occurs from April to October inclusive. Figure 5 splits annual water usage into base and seasonal. Baseline flows are slightly increasing in recent years after many years of steep decline.

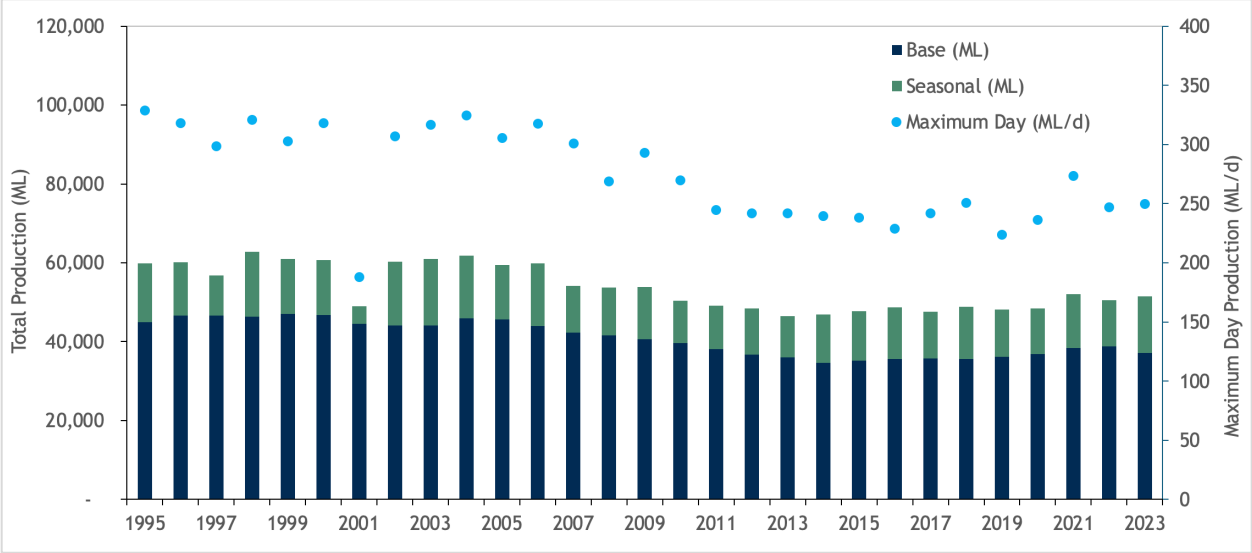

Figure 5: Annual Base, Seasonal & Maximum Day Water Production

The figures below show water consumption trends on a regional basis, established by analysing data from customer water meters. This data is provided to CRD by retail water suppliers each year. Trends for specific communities are shown in Appendix 1.

Regional consumption on a per capita basis is relatively stable, with a slight decrease of 5% between 2013 (334 LCD) and 2023 (316 LCD) as seen in Figure 6. Figure 5 shows increasing

total water consumption (i.e., the sum of all meter readings) of 11% from 2013 (46,469 ML) to 2023 (51,428 ML). This increase is expected, and it indicates that some but not all of the 21% population increase over this period has been offset through decreasing per capita retail consumption.

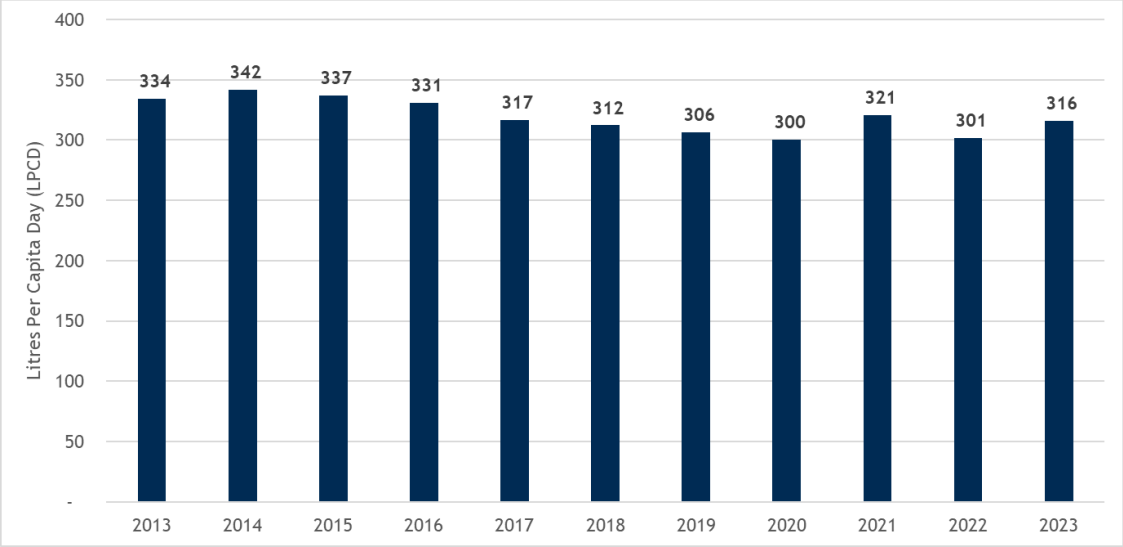

Figure 6: Regional Retail Water Consumption Per Capita (2013 to 2023), LCD

The following two figures disaggregate residential, agriculture, and industrial/commercial/ institutional demand between 2019 and 2023 on a regional level. Figure 7 illustrates that residential usage increased in 2020 and non-residential decreased correspondingly because of pandemic impacts, a trend seen across North America during this time. Both Figure 7 and Figure 8 indicate that residential use is the highest water using sector by a wide margin.

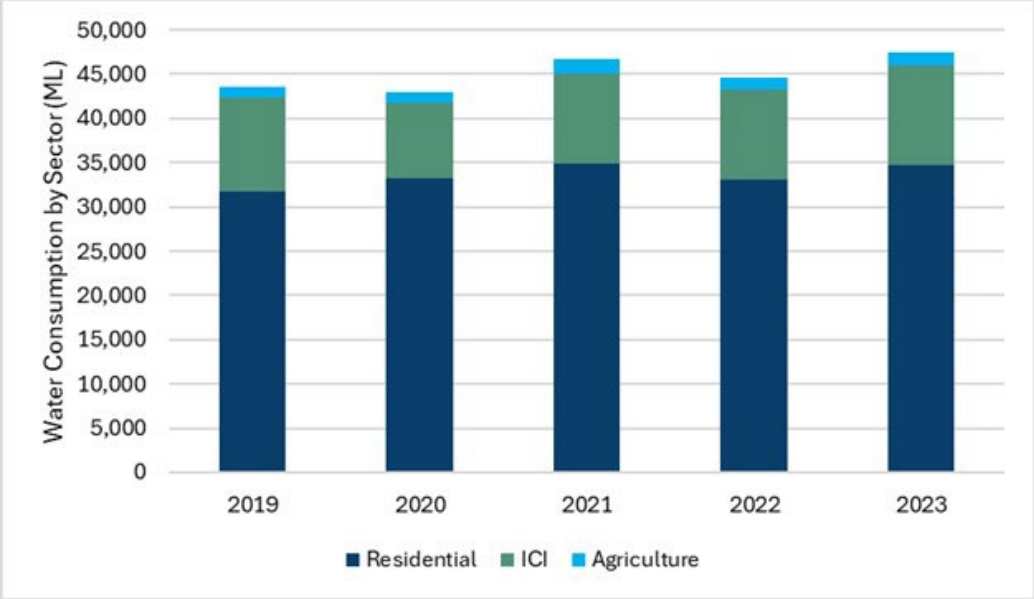

Figure 7: Water Retail Consumption by Sector

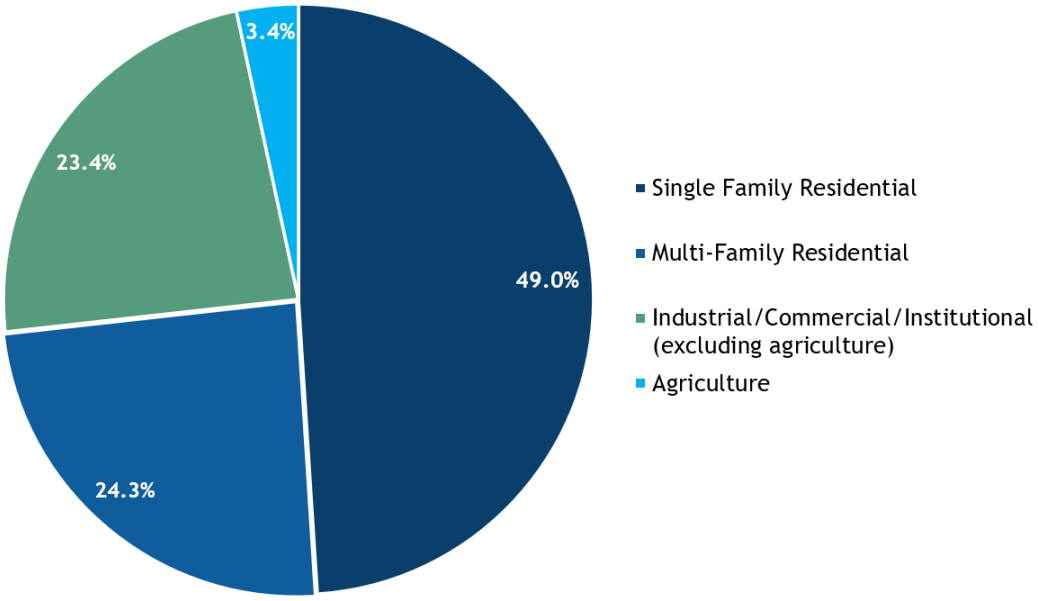

Figure 8: Regional Retail Usage Breakdown (2023)

Figure 9 shows historical consumption by sector. This indicates a 10% overall growth since 2019, 53% growth in multi-family residential since 2011, and 27% growth in institutional demands since 2011. Note that in the early 2010s there is a significant portion of water use that was coded as "unknown" (i.e., no billing code assigned). It is likely that some of this use should be attributed elsewhere such as to multi-family homes, explaining in part the significant increase in that sector.

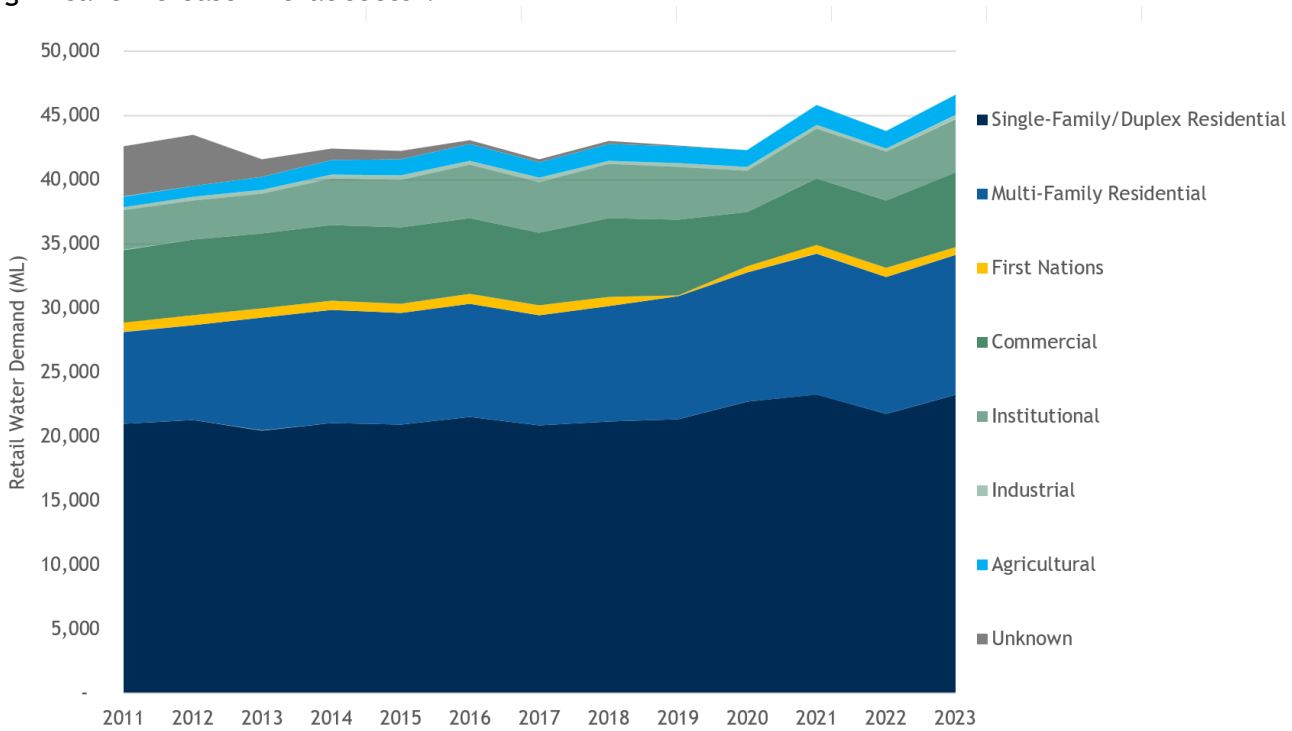

Figure 9: Retail Consumption by Sector (2011 to 2023)

Non-Revenue Water

Non-revenue water results for CRD are shown in Figure 10, including both the distribution and transmission systems. This is water that has been "lost" before it reaches the customer. It is the difference between the amount of water that is produced by a water utility and the amount of water that is billed to customers. Non-revenue water has three components:

- “unbilled authorized consumption” which includes water used in distribution system flushing, fire fighting, and similar types of demand,
- “apparent losses” due to water theft, metering inaccuracies and the like, and
- “real losses” principally made up of leakage in transmission mains, storage facilities, distribution mains, or service connections.

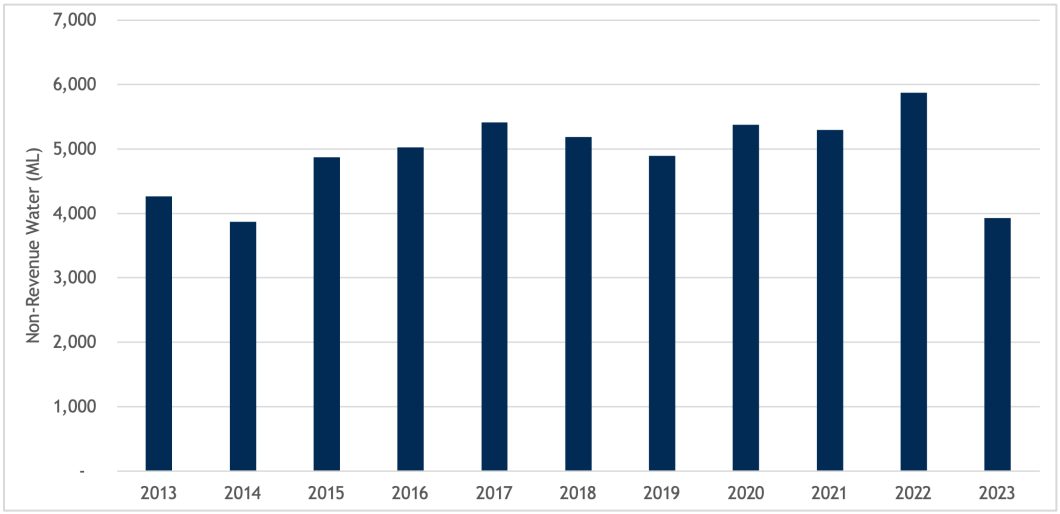

Figure 10: Non-Revenue Water

Analysis & Summary

The foregoing review identified several observations and conclusions:

- Residential water demand is the largest water user and makes up 73% to 77% of water usage based on the past five years of water data.
- The impacts of the COVID-19 pandemic on water use can be seen in that residential demand increased during 2020 and industrial, commercial, and institutional decreased correspondingly; it is not yet clear whether this trend will stabilize or diminish.
- Victoria/Esquimalt and Saanich are the largest water users, which is expected as these areas correspond with the greatest population.
- Per capita consumption among the region has remained relatively stable; however, since 2020 overall water usage has gone up with increased population.
- Non-revenue water is approximately 8% to 12% including both the distribution and transmission systems. This in line with trends we see in similar North American jurisdictions.
- Since about 2020 (i.e., since the pandemic), seasonal water usage from April to October inclusive has generally increased. Again, it is not yet clear whether this trend will stabilize or diminish.

3.0 Water Conservation Plan Strategic Alignment and Objectives

CRD's efficiency objectives are driven by a variety of corporate policies and goals. This section summarizes guiding direction found in key strategic documents.

CRD 2023-2026 Board Priorities (2023)

The CRD Board Priorities confirm the organization's vision, mission, and mandate. It sets the long-term strategic direction to respond to community needs. The following priority supports continued effort in water demand management:

Priority 3: Climate Action & Environment

Initiative 3c: Increase resilience, community and adaptation planning to address climate related risks and disasters

Initiative 3d: Support energy efficient and low carbon buildings across the region

CRD Regional Water Supply Strategic Plan (2025)

The CRD Regional Water Supply Strategic Plan (February 2025 Draft) defines how CRD will allocate resources to manage, maintain, and safeguard the water supply, transmission system, and catchment lands. Conservation is a key component of this strategy as seen in the following:

Commitment 2: Provide an adequate, reliable, long-term supply of drinkable water

Priority 3: Optimize our available water supply through water conservation

Near-Term Actions

- Define the "by sector" demand baseline and define long term targets.
- Develop a water conservation plan.

Medium-Term Actions

- Assess baseline data to define targets and develop a multi-year demand management strategy.
- Develop policy and bylaws to support effective water conservation and maximizing water supply.
- Investigate opportunities for creating shared and consistent data sets with municipalities to facilitate analysis and trend monitoring.

Longer-Term Actions

- Continuously refine policy and practices to adjust demand management to optimize water supply.
- Identify and study existing and future stressors on water demands to refine water use trends.

CRD Water Supply Master Plan (2022)

CRD's Water Supply Master Plan recommends 21 major projects to implement over the next 30 years to meet future water supply and treatment needs. The Plan recognizes that reducing demand will extend the life of the existing water sources and key infrastructure (Stantec, 2022, p. 234).

Recommendation 8: [CRD] should continue with demand management programs to enable [the Regional Water Supply] to optimize the use of their available sources. Continued public education, [industrial, commercial, and institutional] programs and lawn irrigation management will extend the life of…water sources.

CRD Regional Growth Strategy (2018)

The CRD Regional Growth Strategy was developed in partnership by municipalities and the Regional District. This framework identifies social, economic and environmental objectives. The following priority area supports water conservation:

Priority Area 2: Environment and Infrastructure **Objective 2.2:** Manage regional infrastructure services sustainably

CRD Climate Action Strategy (2021)

The Climate Action Strategy articulates CRD's climate action vision that, through collective action, will eliminate emissions and foster healthy and resilient communities and natural areas now and in the future. Relevant goals include the following:

Goal 2: Sustainable Land Use, Planning and Preparedness Support the region on its pathway to livable, affordable and low-carbon communities that are prepared for climate change. **Goal 4:** Low-Carbon and Resilient Buildings and Infrastructure Accelerate energy efficiency, emission reductions and enhanced resilience in CRD buildings and infrastructure. Support and encourage the same for all buildings and infrastructure across the region.

Setting Our Table: CRD Food & Agriculture Strategy (2016)

The CRD Food and Agriculture Strategy provides recommendations to support the development and future success of food and agriculture in a way that is collaborative, strategic, systemic, and economically viable. Relevant actions are listed below:

Recommendation 6: Maintain affordability and improve access to irrigation water for food and agricultural operations

Associated Actions

- Continue to provide access to irrigation water and affordable agricultural water rates.
- Encourage innovation in water-conservation techniques, facilitate access to funds for investment in infrastructure (retention ponds, drip irrigation), and encourage conservation activities.
- Encourage increased investment and innovation by producers in water conservation technologies and techniques resulting in lower water use.

3.1 Objectives for the 2026-2035 Water Conservation Plan

Driven by the direction in these strategic documents, the following supporting objectives drive this Water Conservation Plan:

- continue to reduce per capita water production and consumption,
- manage seasonal peak demand, particularly during early morning periods,
- improve water use accounting and management of non-revenue water,
- ensure that water conservation program delivery is data driven and that impacts are measured and tracked,
- improve resiliency and encourage wise water use for the Capital Region as it adapts to climate change, enhances local food security, and prepares for the risk of disasters that might affect water infrastructure,
- enhance CRD's reputation as a trusted steward of the region's water resources, and
- help residents and businesses understand why they should conserve water and the ways that they can do so, ideally while also enhancing quality of life.

4.0 Brief Overview of Current Conservation Programs

The actions recommended in this plan build on decades of work by CRD and its municipal partners to help residents manage their water use. This section provides a very brief inventory of current actions, many of which will continue under the updated program. Readers wanting more information can consult Appendix 2 (Existing Program Review).

CRD offers a range of programs targeted specifically at residential customers, who account for the lion's share of water consumption in the region. Relevant examples include:

- **Outreach and education**: dissemination of education resources through mass media, print, and online channels.
- **Community events**: staff tend booths at seasonal events such as farmers markets, community fairs, and other regional festivities; in 2024, staff supported 34 such events.
- **Native plant gardening workshops:** in-person, three-hour introductory workshops in the spring and fall, delivered in collaboration with Swan Lake Nature Sanctuary,
- **School programs:** in-person programming for grades two or five and provision of "Every Drop Counts" learning resource kits to grade two teachers.
- **"Fix a Leak Week" kits:** Each March, staff distribute home water conservation kits at no cost through venues such as municipal halls as part of an annual national campaign.
- **Giveaways and rebates:** CRD offers various low-cost giveaway items to residential customers including rain gauges, toilet dye tabs, shut off hangers, tap aerators, and shower timers. Historically, it has also offered rebates for water saving products.

CRD also offers several long running and successful programs targeted specifically at industrial, commercial and institutional customers. These include the following examples:

- **Water Use Assessment Program:** free sector-specific audits for non-residential customers to help them understand where water is used in their facilities and cost-benefit analysis of conservation measures.
- **Once-through cooling system programs:** the CRD Board approved an amendment to the Water Conservation Bylaw to prohibit the use of water for once-through cooling effective July 2028; to support this, CRD provides resources and case studies, and offers a rebate program to customers who replace inefficient systems.
- **Water saving product giveaways:** staff provide non-residential customers with tap aerator, pre-rinse spray valves, and other products at no cost.
- **Industrial, commercial, and institutional outreach and education:** in conjunction with the residential program, CRD disseminates information through print and online channels to help non-residential customers understand and reduce their water use. Recent efforts have focused on peak demand and once-through cooling.

Finally, CRD implements the following measures to benefit all types of customers:

- **Water Conservation Bylaw:** CRD implements seasonal lawn watering restrictions each year. To encourage compliance CRD also starts a "seasonal priming" communications campaign in spring to remind people that restrictions will come back in force. In in 2024 CRD modified the bylaw to address increases in instantaneous peak demand in early morning hours.
- **Water efficiency research:** CRD supports various research projects including, for example, participation in the Water Research Foundation's Residential End Uses of Water update and ongoing annual updates to the Retail Water Use Database.

The region's municipalities and retail water suppliers (including CRD itself) also have responsibilities for some key aspects of demand management. Notably, they oversee retail water and wastewater service pricing, metering and customer data collection, and managing non-revenue water.

5.0 2026 to 2035 Water Conservation Program

This section sets out the new and continuing actions that CRD and its partners will implement over the next decade to attain the objectives set out in Section 3.1. The next phase of the program places strong emphasis on helping residents become more efficient, working with businesses and institutions, and partnering with retail water suppliers. In many cases, the actions are enhancements of approaches already in use. In other cases, new programs will be developed.

The goals and actions put forward were selected through a series of project team workshops in late 2024 and 2025. These included CRD staff engaged in utility management and conservation program administration. Work was facilitated with Econics' Measures Assessment Tool. This inventories 165 water conservation measures that have been compiled based on examination of programs across North America, as well as reviews of leading best practices manuals and guidelines. This tool was used to assess CRD's current demand management programs, evaluate potential future measures, and inform the design of updated water conservation strategies.

Measures were compared qualitatively based on the following:

- financial efficiency (cost to water savings ratio),
- implementation ease,
- measurability,
- target community acceptability,
- participation rate,
- energy conservation and green house gas abatement,
- stormwater retention,
- reduced wastewater discharge,
- contribution to organizational profile,
- implementation control, and
- peaking factor reduction.

In addition, the following factors specific to CRD's situation were considered:

- program continuity (generally, it is usually more cost effective to continue an existing program that has the potential to deliver sustained future water savings rather than launching a brand-new program due to the up-front costs and risks),
- the current program budget,
- opportunities to target historically underexploited sectors or program areas (for example, the multi-unit residential sector or areas led by retail water suppliers),
- diversity of measure types (educational, incentives, regulatory, etc.) and sectors (residential, non-residential, non-revenue water),
- best practices in other North American jurisdictions.

Some options were eliminated from in-depth consideration. Notably, source substitution options, including broad scale greywater reuse and rainwater harvesting, do not form a core part of this plan. This is due to factors such as the high costs associated with installation, treatment, and maintenance. Additionally, the Greater Victoria climate poses challenges. The

region experiences long dry summers, meaning harvested rainwater is often unavailable when it is most needed.

Going forward, rainwater harvesting remains an important option outside the Greater Victoria Drinking Water Service System, particularly in supply constrained parts of the Southern Gulf Islands. For this reason, CRD continues to fund rebates for this technology in this part of the region through Transition Salt Spring. CRD will also continue to support innovative source substitution projects on a case-by-case basis, for example through its industrial/commercial/institutional programs and at discrete development areas.

Finally, the project team completed quantitative analysis to forecast program impact. This considered the baseline usage analysis as summarized in section 2.1 and the anticipated cumulative impact of the programs outlined below. This analysis informed the program targets set out in section 7.1 below.

The resulting actions are organized around the following four goals:

Goal 1: Lead and support collaborative conservation best practices in water distribution systems

Goal 2: Reduce outdoor water use and instantaneous peak demand

Goal 3: Foster community water stewardship and encourage efficient use

Goal 4: Improve understanding of community water use through research and monitoring

Elaboration on these goals is provided in the following pages.

Goal 1: Lead and support collaborative conservation best practices in water distribution systems

Some key aspects of demand management take place at the water distribution system level. In the Juan de Fuca Water Distribution Service, CRD itself acts as retail water supplier for all or part of six municipalities. Elsewhere in the Greater Victoria area, CRD depends on the effort of partner municipal and First Nation retail water suppliers, which are responsible for various activities that can have significant implications for demand management including management of non-revenue water, rate setting, land use development planning, and more. This presents opportunities that are typically underutilized as means to conserve water compared to the education and regulatory-based measures that CRD has focused on in recent years.

Like CRD, retail water suppliers benefit from reduced consumption. They may enjoy lower capital and operational costs for service provision. Improved non-revenue water management may lead to fewer service interruptions and unscheduled emergency callouts. Better information about consumption can also help them optimize local infrastructure and development planning.

CRD can support local demand management and data gathering efforts in various ways, for example by sharing best practices, facilitating technical communities of practice, or through more formal arrangements such as service agreements. It can also "lead by example" in the Juan de Fuca System.

Actions

Action 1.1: Establish a regional non-revenue water management community of practice

CRD will canvas interest among retail water suppliers in establishing a regional community of practice to promote more innovative non-revenue water management. For example, this may include active leak detection or pressure management. This working-level forum will share expertise, data, and best practices. It will foster regular dialogue among utility staff through workshops, technical exchanges, and joint pilot projects focused on subjects such as leak detection, meter accuracy, and system auditing. By creating a structured platform for peer learning and coordinated action, CRD will aim to build regional capacity, reduce water losses, and support consistent implementation of non-revenue water strategies across jurisdictions.

Non-Revenue Water Management: What is Best Practice?

Industry associations such as the American Water Works Association and the Alliance for Water Efficiency distribute extensive guidance, technical guidance, and training on water distribution retail best practices. This includes non-revenue water management (see, for example, AWWA, 2025), water and wastewater rate setting (see AWWA, 2017), and advanced metering infrastructure (see Alliance for Water Efficiency, 2023).

CRD can also follow the lead of other jurisdictions that have adopted innovative technology. In Canada, this includes, for example, City of Halifax's long-running and highly successful water loss control program (see Mosley, 2022) or the recently launched advanced metering infrastructure pilot project in City of Vancouver.

Action 1.2: Investigate the potential impact of conservation-oriented water services pricing in the Juan de Fuca Water System

As part of its pending retail rate review, CRD will investigate the potential impact of conservation-oriented water services pricing in the Juan de Fuca Water System. This will entail conducting a comprehensive analysis of how different rate structures may influence customer behavior, affordability for households and businesses, and long-term revenue stability. This evaluation will include reviewing consumption trends, modeling alternative pricing scenarios, and assessing equity impacts across different user groups.

CRD staff will engage with the six member municipalities in this service area and the Juan de Fuca Water Distribution Commission to ensure that any proposed changes align with other regional goals while maintaining financial resilience and service accessibility.

Action 1.3: Pilot advanced metering infrastructure in the Juan de Fuca Water System under the planned meter replacement program

CRD will pilot advanced metering infrastructure in the Juan de Fuca Water System in the near term as part of its planned meter replacement program, aimed at modernizing service

delivery over the long term. This proven and increasingly prevalent technology enables real-time data collection, allowing for more accurate billing, early leak detection, and improved water conservation through detailed consumption insights. By replacing aging meters with smart devices, CRD will enhance operational efficiency, reduce non-revenue water losses, and empower customers with timely information to manage their usage.

Action 1.4: Collaborate with local water suppliers to promote additional water efficiency best practices

As noted above, beyond managing non-revenue water, local water suppliers are responsible for various activities that can have significant implications for demand management. This includes:

- setting rates for water services (most customers in the region are charged based on the volume they use, so will respond to rate changes by conserving to save money),
- transitioning to automated metering infrastructure,
- collecting meter data to measure water use,
- enforcing building and plumbing codes,
- most land use decisions,
- implementing efficiency practices in municipal facilities and green spaces, and
- supporting water source substitution (greywater reuse and rainwater harvesting) at the development scale.

CRD will canvas interest among the region's local water suppliers in advancing efficiency efforts across some or all these topics. Depending on the feedback received, CRD may expand the scope of the non-revenue water community of practice described under Action 1.1 or develop parallel communities of practice if more appropriate. It may also develop regional guidance or best practices, facilitate data sharing, or support innovative pilot projects on behalf of constituent municipalities and First Nations.

CRD can also share learnings from best practices implemented in the Juan de Fuca water system, including from the activities described under Action 1.2 and Action 1.3 towards building region-wide efforts in these areas.

More information on how CRD will collaborate with local water suppliers to enhance data management and water use accounting can be found below under Goal 4 in the next section.

Goal 2: Reduce outdoor water use and instantaneous peak demand

CRD was an early adopter of outdoor watering regulations and has promoted irrigation efficiency for many years through a combination of regulation and education (see Appendix 2: Existing Program Review for details). Active enforcement of the Water Conservation Bylaw is currently limited, but residents are reminded of requirements each spring through a "seasonal priming" advertising campaign, and reported awareness of requirements is relatively high.[4]

[4] In 2017 market research, 78% of residents said they are aware of the CRD Water Conservation Bylaw. This is quite high given that not all residents have a garden (e.g., apartment dwellers) and that only 45% of residents that have a lawn reported watering it at all (see Metroline and Econics, 2017).

As demonstrated in Appendix 1, water use in the region goes up sharply in the summer, primarily driven by lawn and garden watering in response to low rainfall. This will only be exacerbated by climate change. As well, prevalence of outdoor irrigation systems is very high in the Capital Region. In 2017 market research, 37% of CRD residents that have a lawn or garden reported owning an in-ground irrigation system (Metroline and Econics, 2017). This is nearly double the rate under comparable national statistics - in 2015, 19% of Canadians reported having a "sprinkler system" (Statistics Canada, 2015).

The growing popularity of automatic irrigation contributes to sharp midweek spikes in demand on the hour in the early morning (particularly at 4am and 5am). This places significant pressure on treatment, transmission, and distribution infrastructure. Reducing this is a high priority. In recent years, CRD has delivered this message through the annual "Make the Switch" campaign, which encourages residents who have automatic irrigation systems to water at different times overnight.

Irrigation Bylaws: What is Best Practice?

Emerging best practice with watering bylaws in Canada is shifting towards reducing the number of days a week and times of day that people can irrigate. Notably, Metro Vancouver recently moved to "weekend morning only" watering (Metro Vancouver, 2025). Similarly, Region of Waterloo in Ontario only allows watering one day per week based on the last digit of a customer's address (Region of Waterloo, 2025). These systems are consistent with recent academic studies, which find that reducing the time windows that people can irrigate substantially boosts water savings relative to more traditional "evens and odds" systems like the one currently used by CRD (see, for example, Finley and Basu, 2020; Morkel and Nemati, 2024).

Actions

Action 2.1: Review the effectiveness of the Water Conservation Bylaw; based on results, implement new best practices appropriate for the Capital Region

CRD will continue to implement the Water Conservation Bylaw and educate customers to encourage compliance.

Quantitative analysis will be completed to estimate the impact of further enhancements to the Water Conservation Bylaw. Options to investigate include:

- reducing the number of days per week residents can water (for example, limiting to one day per week based on the last digit of house numbers);
- extending the annual schedule to start restrictions earlier in the year (e.g., at start of April) and end later (e.g., at end of October); and/or,
- new requirements tailored specifically for automatic systems (e.g., specifying different start times or different days for these systems).

Based on the results of this investigation, CRD will determine if updates to the Bylaw are merited and implement accordingly. Updates may take inspiration from emerging national best practice (see the "Irrigation Bylaws: What is Best Practice?" text box, above) but will also ensure that potential new measures are appropriate to the unique climate, demographics, and water use culture in the Capital Region. The goals are to both reduce

overall demand from irrigation and to reduce instantaneous peak demand in the early morning.

Action 2.2: Review Water Conservation Bylaw compliance and enforcement regime

In collaboration with bylaw staff, water conservation program staff will review the present approach to enforcement to determine if more active effort is required to improve compliance. This will be informed by results of updated market research (see Action 4.2, below), which will indicate current levels of community awareness and adherence to requirements. Ensuring compliance with watering hours to reduce instantaneous peak demand will be a priority. The review will also be informed by decisions about enhancements to the current bylaw system under Action 2.1.

Action 2.3: Enhance outdoor irrigation outreach including campaigns aimed at Water Conservation Bylaw compliance and at reducing peak instantaneous demand

CRD will develop new education tactics to teach residents how they can have healthy and attractive landscapes that use less water, focusing particularly on customers that have automatic irrigation systems.

This includes the annual "seasonal priming" outreach campaign that promotes compliance with the Water Conservation Bylaw. It also includes the "Make the Switch" campaign, focused on reducing instantaneous peak demands.

Planned enhancements will employ proven community-based social marketing methods. This involves understanding what prevents people from conserving water through market research, piloting targeted programs, and scaling successful initiatives across communities to promote lasting lifestyle shifts (see McKenzie-Mohr, 2011). More information on community-based social marketing and how CRD will deploy this in the future can be found under Goal 3 (Foster community water stewardship and encourage efficient use), below.

Action 2.4: Develop "Healthy Landscapes" outreach pilot project

Starting with a pilot project, CRD will develop an "healthy landscapes" education program to promote water wise gardening best practices (e.g., hydroscaping, xeroscaping, use of native plants, etc.). Depending on results, region-wide implementation may follow.

The new program will be developed with inspiration from best practices in leading North American jurisdictions, such as the long standing Healthy Landscapes Program delivered by City of Guelph or Region of Peel's Fusion Landscaping® training in Southern Ontario.

Action 2.5: Continue native plant gardening workshops

CRD will continue to provide popular and well-received native plant gardening workshops in collaboration with Swan Lake Nature Sanctuary. This program will continue at the same level of effort as in recent years, with about ten seminars offered in the spring and fall.

Goal 3: Foster community water stewardship and encourage efficient use

Balancing conservation efforts across both residential and non-residential sectors is essential to achieving sustainable water use. To be effective, this requires a coordinated approach that leverages a diverse set of policy tools—including public education campaigns, financial incentives, and regulatory measures—to influence behavior and improve efficiency. As we implement demand management programs, it is equally important to foster a broader ethic of water stewardship within the community, encouraging individuals and organizations to view water not just as a utility, but as a shared resource that demands collective responsibility and long-term care.

Residential customers continue to account for the great majority of water consumption in the region. Given the importance of this group, CRD will continue to innovate and refresh its residential education and outreach programs. Long running and successful community initiatives will continue under this Water Conservation Plan with various enhancements.

Research suggests that there are untapped water conservation opportunities in multi-unit residential developments such as apartment buildings and townhouse complexes. This sector is historically underserviced by demand management programs. Initially aiming programs at low-income households, including social housing complexes, supports both water conservation and service affordability goals.

The non-residential sector – industrial, commercial and institutional customers - accounts for over a quarter of the region's water consumption. Both local and national evidence suggests that there are economical opportunities for many of these customers to both improve water use efficiency and reduce their operating costs.

Activity under this goal will primarily focus on efficiency in the indoor setting but will also complement projects under Goal 2 (Reduce outdoor water use and instantaneous peak demand).

Actions

Action 3.1: Continue print and online education campaigns and share learning resources

CRD will continue to distribute water conservation content through a robust mix of print and digital resources including fact sheets, manuals, giveaways, and targeted materials for both residential and non-residential audiences. Content will remain accessible via the CRD website (https://www.crd.ca/environment/water-conservation). Staff will also continue to use social media to share information.

For a complete discussion of CRD's current outreach efforts, see the Existing Program Review in Appendix 2.

CRD outreach staff have noted that traditional mass media channels are not always ideal for isolating specific water using market segments, like homes with automatic irrigation systems. Future efforts will focus on more precisely defining and targeting demand management outreach to specific groups. Updated programs will employ more sophisticated outreach methods based on community-based social marketing principles (see the "Water Conservation Education: What is Best Practice?" text box, below).

Action 3.2: Attend community events to directly engage with residents

CRD staff will continue to staff booths seasonally at events such as farmers markets, community fairs, and other regional festivities. Events are designed to be interactive and include giveaways and games for children. Information on programs such as watering restrictions and leak detection is offered on request.

Going forward, event outreach will be modified to focus on attaining of more specific and measurable objectives. For example, this may include prioritising identifying booth visitors that have automatic irrigation systems, providing them with information on how to optimize irrigation scheduling, then measuring the follow up rate after the event. To do this will require enhanced training for seasonal staff and designing new survey instruments for table visitors.

Action 3.3: Promote the annual "Fix a Leak Week" campaign

Each March, CRD will continue to participate in the yearly "Fix a Leak Week" national campaign to educate homeowners about leak detection and repair. Staff will continue to distribute home conservation kits through venues such as municipal halls. This effort will continue to be supported with print and digital ads and a social media burst.

Water Conservation Education: What is Best Practice?

Community-based social marketing is a methodology for fostering sustainable behaviour change in the community. It has been adopted by leading demand management programs across Canada. This a practical approach that emphasizes personal engagement, removing barriers, and proven tools for change. This approach starts with understanding what prevents people from conserving water, then systematically addressing barriers to promote lasting lifestyle shifts. Specifically, it entails:

- market research: outreach is informed by the best available information on why residents continue to engage in specific water use behaviours, and particularly the barriers that prevent change.
- pilot projects: prior to launching large new education projects, smaller, precisely designed pilot projects are conducted to test methods; results are quantitatively measured, and the program is refined based on results.
- tools of change: emphasis is placed on employing tools proven to result in behaviour change including social norming, commitments, and prompts.

CRD can also lean on best practice guidance from industry associations. Notably, the Alliance for Water Efficiency offers various resources to share emerging best practice. For example, it shares articles, webinars, and curriculum material from some of the preeminent school-based water conservation education programs across North America.

Action 3.4: Continue to deliver "Every Drop Counts" school programs

CRD will continue to deliver school programs to promote water conservation and other sustainable behavior. The CRD Education Coordinator provides "Every Drop Counts" kits for grade two teachers, in-person sessions for grades two and five, and outreach on topics like waste management, watershed health, and climate action. Schools can also borrow a drinking water and wastewater model for classroom use and outreach events.

More detail on planned outreach program enhancements can be found in Appendix 4.

Action 3.5: Implement a multi-unit residential building water efficiency pilot project

Starting with small scale water use audit pilot projects at a small number of accounts, CRD will develop a program to encourage efficiency in multi-unit buildings.

The approach will be templated on the existing industrial/commercial/institutional Water Use Assessment Program but will also include educational elements for homeowners and tenants developed by CRD's Environmental Stewardship and Initiatives team.

Depending on audit results, target end uses may include communal irrigation systems, shared laundry facilities, leak repair, or toilet replacement in individual dwellings.

The program will initially target low-income developments and impact on water use will be carefully measured. Depending on results, region-wide implementation may follow. Findings will be used to guide the development of future campaigns directed at residents living in these buildings.

Action 3.6: Enhance the industrial, commercial, and institutional Water Use Assessment Program

CRD has a long running and successful suite of programs targeted at the industrial, commercial, and institutional sector. These are anchored by the Water Use Assessment Program, wherein customers receive free inspections of facilities, followed by a report that outlines cost effective ways to conserve (see Appendix 2: Existing Program Review for details).

In recent years, staff have noted several challenges with the audit program. Specifically, customers are often slow to implement recommendations. This is attributed to a variety of internal administrative and financial factors within these organizations including staff turnover, low engagement by senior leaders and financial managers, and that audit recommendations can be initially costly and complex. See Appendix 4 (Industrial, Commercial & Institutional Program Direction) for further evaluation of these challenges.

CRD will continue to provide free water use and efficiency audits to businesses and institutions but will enhance this program to improve post-audit implementation and customer satisfaction. Planned improvements include the following:

- enhance the recruitment phase before audits to better screen and qualify candidate organizations prior to program entry,

- engage a broader cohort within organizations during recruitment, including senior managers and financial administrators, to gain broader buy-in,
- trial different approaches to secure customer commitment to implementing recommendations after audit are complete,
- pilot emerging flow monitoring technologies to better understand water use and detect leaks, and
- integrate audit recommendations with participants' asset renewal plans and financial payback expectations, potentially requiring multi-year implementation cycles and ongoing contact with participants.

More detail on planned program enhancements can be found in Appendix 4.

Action 3.7: Phase out once-through cooling systems; promote best practices in other cooling technology

Once-through cooling systems in facilities like restaurants, supermarkets, care homes, and other commercial settings use drinking water for equipment like ice machines, walk-in coolers, and wok stoves, then discharge that water directly into the sewer. While simple to install, these systems waste large volumes of water and can be very costly to operate, making them less efficient than modern alternatives like air-cooled or recirculating systems. Effective July 2028, CRD's Water Conservation Bylaw (CRD Bylaw No. 4099) will prohibit the use of water for once-through cooling. To prepare for this transition, CRD must develop a compliance and enforcement plan, improve the incentive program currently available to replace once-through cooling, and create an inventory of remaining systems across the region.

CRD will implement a series of actions to prepare for the pending once-through cooling system ban in 2028. Planned tasks include the following:

- determine the prevalence of once-through cooling systems through research, fieldwork, and engaging with refrigeration contractors; develop an accurate inventory of establishments that continue to use once-through cooling equipment;
- developing metrics and a methodology to better report water savings from replacement of once-through cooling systems;
- adjust the existing Once-Through Cooling Equipment Replacement Rebate Program to improve uptake; and,
- in collaboration with CRD Bylaw staff, develop a compliance and enforcement strategy ahead of the regulatory ban.

After work on the phase out of once-through cooling systems is approaching completion, focus can shift to related technologies such as evaporative cooling towers—another significant end use with potential for efficiency gains. These systems, common in commercial and industrial settings, offer opportunities for water savings through improved maintenance practices, system upgrades, and operational changes. By drawing on successful programs implemented in other jurisdictions and leveraging technical guidance and resources from organizations such as the Alliance for Water Efficiency (see the text box below), facility managers can reduce water use while maintaining performance.

Industrial, Commercial, and Institutional Programs: What is Best Practice?

Industrial, commercial, and institutional audit programs like CRD's remain a mainstay of most of the foremost water conservation programs across North America. In Canada, these include City of Guelph, Region of Waterloo, Region of Peel, and York Region. There are many more examples across the USA. Some leaders also offer similar audit and incentive programs to their multi-unit residential customers, including, for example, Waterloo and Guelph. CRD staff will continue learn about successful practices for these sectors through ongoing membership in forums such as the Canadian Water and Wastewater Association's Water Efficiency Committee and the Alliance for Water Efficiency.

CRD's plan to phase out once-through cooling is in step with a similar move by City of Vancouver, effective in 2020. Staff continue to engage with each other about development of their respective compliance and enforcement efforts.

Looking further ahead, the Alliance for Water Efficiency has developed tools to support efforts to promote conservation in evaporative cooling towers including Cooling Tower Estimating Model and a Cooling Tower Audit Tool. As well, a number of US jurisdictions including Los Angeles Department of Water and Power, San Francisco Public Utilities Commission, and the Chicago Metropolitan Water Reclamation District have promoted cooling tower efficiency through rebate programs, technical guidance, and water audits.

Goal 4: Improve understanding of community water use through research and monitoring

CRD conducts or supports research projects to improve water conservation program delivery and infrastructure planning broadly. This research provides insights into community consumption patterns, enables development of efficient demand management programs, and helps predict future water needs.

Actions

Action 4.1: Participate in the Residential End Uses of Water Study

CRD will continue to participate in the Water Research Foundation's Residential End Uses of Water Study update. Kicked off in 2024, this will update research completed in 1999 and 2016. The methodology for this multi-year, continent-wide project entails disaggregating information from high-frequency data loggers into end uses (toilet flushing, showering, etc.). In this round, it will study both single-family and multi-family homes.

Action 4.2: Update the CRD Residential Water Survey

Market research helps us understand how residents use water and enables more targeted outreach. This can inform decisions about how much effort to invest in initiatives such as Water Conservation Bylaw compliance and enforcement or the various other programs detailed in this plan.

CRD last completed its residential water survey in 2017. This will be updated with particular focus on outdoor water use habits. For example, the research will determine automatic

irrigation systems ownership rates including by municipality/geographic area and by key demographics (age, income, and household size). It will also improve understanding of how automatic irrigation systems are typically programmed (e.g., the schedule, who programs them, how often the program is modified, etc.).

The updated market research will also revise increasingly dated regional statistics on indoor water use behaviour and technology, attitudes towards conservation, and awareness of CRD programs.

Action 4.3: Continue annual updates to the Regional Retail Water Use Database

Local water suppliers are responsible for customer billing including collecting meter data. As such, effective water use accounting in the region requires working in partnership. This means establishing clear data specifications, protecting privacy and personal information, and ensuring data quality control and accuracy.

CRD program staff will continue to assemble and analyse meter data from retail water suppliers around the region to understand consumption trends. Planned enhancements include the following:

- collaborate with all retail water suppliers and billing software vendors to improve quality of water consumption data,
- explore opportunities to pilot the use of advanced metering infrastructure and meter data logging devices (see Action 1.3, above),
- establish common “master” water use datasets and tools for operations, engineering, finance and demand management uses, and
- clarify personal data requirements to ensure protection of customer information.

More detail on these planned enhancements can be found in Appendix 5.

Action 4.4: Refine Plan Implementation Through an Adaptive Management Approach

Implementation of the CRD’s 2026–2035 Water Conservation Plan will be guided by an adaptive management framework that emphasizes continuous learning and refinement. This means that program delivery will not be static; instead, actions will be adjusted as new information, monitoring results, and community feedback become available. By embedding flexibility into the plan, the CRD can ensure that conservation initiatives remain effective under changing conditions such as climate variability, population growth, and evolving infrastructure needs.

To keep the plan accountable and results-driven, progress will be reviewed at least every five years using improved quantitative performance management tools. These reviews will measure outcomes against the plan’s established performance targets for water production, residential consumption, peak demand, and seasonal use. The findings will inform decisions about scaling up successful initiatives, modifying underperforming measures, or introducing new approaches. In this way, the adaptive management framework ensures that the plan remains both responsive and resilient, steadily advancing the region toward long-term water sustainability.

5.1 Water Conservation Plan Summary

Table 1, below, provides a summary of the Water Conservation Plan goals and actions.

Table 1: 2026 to 2035 Water Conservation Plan Program Summary

Goal 1: Lead and support collaborative conservation best practices in water distribution systems	
1.1	Establish a regional non-revenue water management community of practice
1.2	Investigate the potential impact of conservation-oriented water services pricing in the Juan de Fuca Water System
1.3	Pilot advanced metering infrastructure in the Juan de Fuca Water System
1.4	Collaborate with local water suppliers to promote additional water efficiency best practices
Goal 2: Reduce outdoor water use and instantaneous peak demand	
2.1	Review the effectiveness of the Water Conservation Bylaw; based on results, implement new best practices appropriate for the Capital Region
2.2	Review Water Conservation Bylaw compliance and enforcement regime
2.3	Enhance outdoor irrigation outreach including campaigns aimed at Water Conservation Bylaw compliance and at reducing peak instantaneous demand
2.4	Develop “Healthy Landscapes” outreach pilot project
2.5	Continue native plant gardening workshops
Goal 3: Foster community water stewardship and encourage efficient use	
3.1	Continue print and online education campaigns and share learning resources
3.2	Attend community events to directly engage with residents
3.3	Promote the annual “Fix a Leak Week” campaign
3.4	Continue to deliver ‘Every Drop Counts’ school programs
3.5	Implement a multi-unit residential building water efficiency pilot project
3.6	Enhance the industrial, commercial, and institutional Water Use Assessment Program
3.7	Phase out once-through cooling systems; promote best practices in other cooling technology
Goal 4: Improve understanding of community water use through research and monitoring	
4.1	Participate in the Residential End Uses of Water Study
4.2	Update the CRD Residential Water Survey
4.3	Continue annual updates to the Regional Retail Water Use Database
4.4	Refine plan implementation through an adaptive management approach

6.0 Benefits of Plan Implementation

Benefits of conservation vary from community to community depending on capital expansion plans, operating costs, energy use, the current demand profile, the water loss rate, and environmental drivers, among other factors. However, some typical environmental, financial, and community benefits CRD residents might gain from implementation of this plan include the items listed in Table 2, below.

Table 2: Benefits of Water Conservation

Community Benefits • Enhanced resilience to prolonged drought and a changing climate • Retained water in reservoirs for firefighting and other emergency needs • Potentially enhanced drinking water quality, particularly during times of shortage • Greater equity and fairness (those who waste and put excessive demand on the system will pay more than those who conserve) • Promotion of a stewardship ethic within the community • Offers ways for individuals to reduce their own ecological footprints	**Financial Benefits** • Compliments the Water Master Plan by offering a toolkit to minimize increased water rates/bills • Reduced operations and maintenance costs • Reduced costs for CRD and for residents from reduced energy use with less water pumping and heating • Reduced peak demand – the point at which water use is greatest (usually hot summer days) - provides the opportunity to downsize new pipes, pumps, treatment plants and reservoirs, resulting in significant cost savings
Environmental Benefits • Reduced chemical use in water and wastewater treatment • Reduced sewage disposal to the environment • Reduced energy use and greenhouse gas emissions due to reductions in water treatment and pumping • Enhanced stormwater attenuation on the land during heavy rainfall events (for example, improved soils in water efficient gardens hold water longer) • Maintained environmental flows for streams, fish, and aquatic ecosystems	**Policy & Legislative Linkages** • Supports CRD priorities as set out in strategic documents including the CRD Board Priorities (2023), the Regional Growth Strategy (2018), the Regional Water Supply Strategic Plan (2025), and the Water Supply Master Plan (2022) (see Section 3) • Required for eligibility for many Provincial and Federal Government infrastructure grant programs • Contributes to meeting regulatory obligations under the BC *Water Sustainability Act*, the *Drinking Water Protection Act* and the *Environmental Management Act*

Effective implementation of this plan will deliver many benefits for the Capital Region. Demand management is a cost-effective approach to improving water systems reliability and reduces the likelihood of exceeding capacity. This includes the regional water supply, treatment, and transmission systems, regional wastewater conveyance and treatment systems, and local water distribution and wastewater collection infrastructure.

To yield such tangible benefits, water conservation measures must achieve durable and measurable reductions in demand relative to “business as usual”. For infrastructure planning purposes, CRD must continue to rely on demonstrated, actual water use trends. This points to the need for effective implementation, which is discussed in the next section.

7.0 Implementation

This section describes how the Water Conservation Plan will be implemented. It also provides a framework for monitoring, evaluation, and continuous improvement.

7.1 Water Conservation Plan Targets

CRD will pursue realistic water production and consumption targets. Four key performance targets are set out below. Additional information on how these were established can be found in Appendix 6.

Target 1: Total Water Production

Reducing the amount of water produced at CRD's water treatment facilities, measured on a per capita basis, is a key goal of this Plan.

Reduce per capita water production from treatment facilities by 1% per year to achieve a target of 300 LCD by 2035 (see Figure 11)

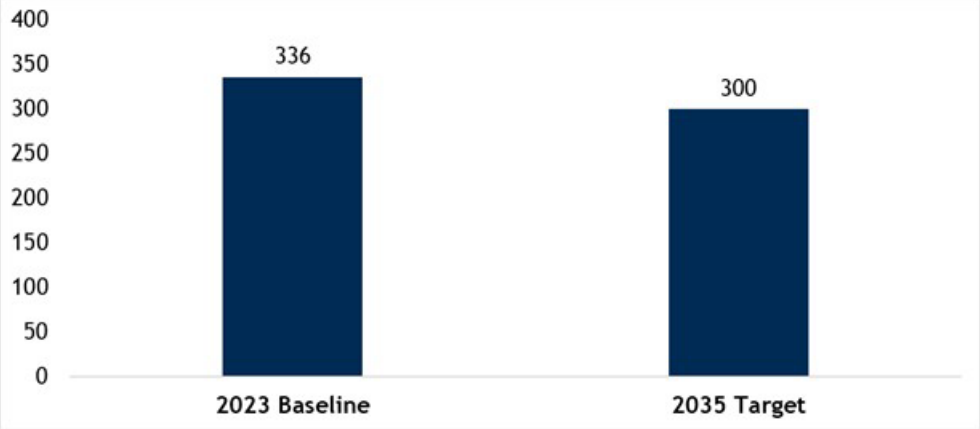

Figure 11: CRD Per Capita Water Production Target (LCD)

Target 2: Residential Consumption

Residential per capita consumption is a widely accepted standard benchmark for measuring of water efficiency program impact.

Reduce residential per capita consumption by 1.2% year-over-year to achieve a target of 200 LCD by 2035 (see Figure 12)

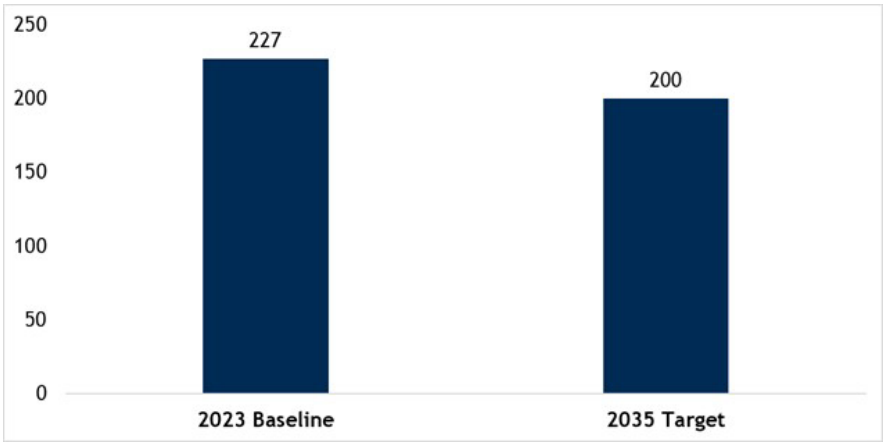

Figure 12: CRD Residential Per Capita Water Consumption Target (LCD)

Target 3: Instantaneous Peak Demand

Reducing instantaneous peak demand in the early hours of the morning, much of which is attributable to automatic irrigation systems, is a key goal of this plan.

Reduce the maximum change in instantaneous flow rate at 4:00am from 46% to 20% (see Figure 13)

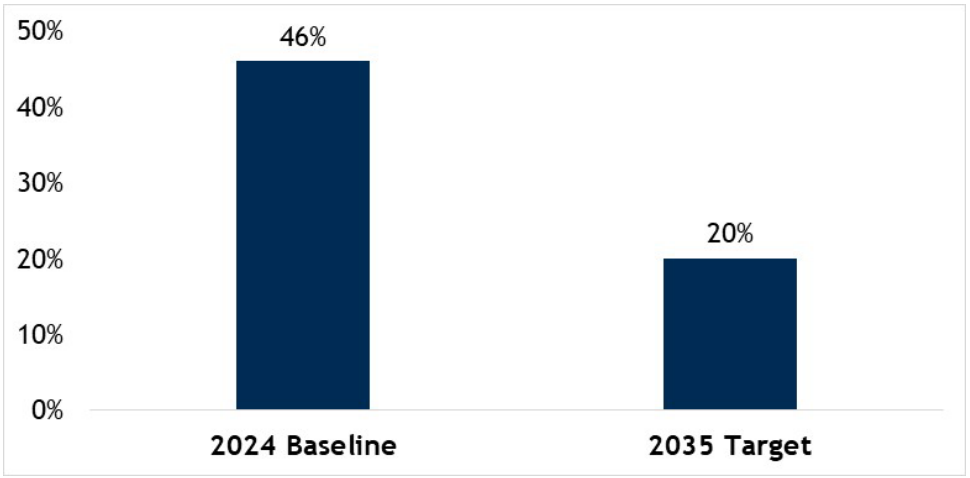

Figure 13: CRD Instantaneous Peak Demand Target at 4:00 am

Target 3 is measured as the difference from 4:00am to 4:05am and is equivalent to a reduction in the maximum rate of change in instantaneous flow in the transmission system from 9% per minute to 4% per minute. Note that this does not imply that the goal is to simply shift the peak flow from 4:00am to 4:05am but rather to reduce the peak demand generally and to spread the flow increase over a longer period (for example, by encouraging those who continue to irrigate with automatic systems to set timers to different times).

Target 4: Peak Season Demand

Controlling peak season demand, measured by change in the Maximum Day Demand (the day in a year with the highest total daily water production) is an important goal for most communities. This is particularly important locally given the Capital Region's hot, dry summers and relatively high seasonal demand.

Maintain Maximum Day Demand at 300 megalitres per day (ML/day)

7.2 Monitoring and Evaluation

Indicators from the targets set out above are summarized in Table 3. Several additional activity measures are also listed, as these have been tracked historically by staff over many years. Continuing to do so will provide additional insight into long-term program success.

Table 3: Program Indicators & Metrics

Key Performance Indicators	
Total Water Production	Per capita water production (LCD)
Residential Consumption	Residential per capita water consumption (LCD)
Instantaneous Peak Demand	Change in instantaneous peak flow
Peak Season Demand	Maximum Day Demand (MDD) in ML/day
Additional Activity Measures	
Community Events	Number of community events per year
ICI Facility Audits	• Number of facilities audited • Estimated & actual annual water savings (m^3/year)
School Outreach	Number of class presentations delivered per year

Additional diagnostic indicators for specific initiatives may be developed during program planning and implementation. For example, these may include:

- base and seasonal components for total production and residential consumption in addition to annual per capita average,
- change in residential and industrial/commercial/institutional sub-category annual retail demands,
- non-revenue water and infrastructure leakage indices in each retail water distribution system including CRD's Juan de Fuca Water System.

7.3 Implementation Schedule

A schedule for implementation is set out in Table 4 below. This may be modified as requirements are more clearly defined.

Table 4: Water Conservation Plan Implementation Schedule

		2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Goal 1: Lead and support collaborative conservation best practices in water distribution systems											
1.1	Non-revenue water community of practice*	■									
1.2	Conservation-oriented pricing study for JdF		■								
1.3	AMI pilot project in JdF		■								
1.4	Additional local water supplier best practices			■							
Goal 2: Reduce outdoor water use and instantaneous peak demand											
2.1	Water Conservation Bylaw review*	■									
2.2	Water Conservation Bylaw C&E review		■								
2.3	Enhance outdoor irrigation outreach*	■									
2.4	"Healthy Landscapes" pilot project		■								
2.5	Native plant gardening workshops										
Goal 3: Foster community water stewardship and encourage efficient use											
3.1	Print and online education campaigns										
3.2	Community events										
3.3	Annual "Fix a Leak Week"										
3.4	'Every Drop Counts' school programs										
3.5	Multi-unit residential pilot project			■							
3.6	Enhance Water Use Assessment Program*	■	■								
3.7	Cooling system efficiency*										
Goal 4: Improve understanding of community water use through research and monitoring											
4.1	Residential End Uses of Water Study										
4.2	CRD Residential Water Survey*	■					■				
4.3	Regional Retail Water Use Database										
4.4	Adaptive management framework										

* Note that, by design, most actions will be initiated in the earlier years (2026 to 2028). Activities in years beyond 2028 will be directed based on results from early implementation under the adaptive management framework discussed under Action 4.4.

Legend

■	Action Initiation
■	Ongoing implementation
*	Early priority

AMI: Advanced Metering Infrastructure
JdF: Juan de Fuca Water System
ICI: industrial/commercial/institutional

7.4 Priority Projects

The actions listed in Table 5 are high priority for early implementation, some of which are already underway. This is because they are likely to provide high water savings relative to cost. It is also driven by other factors such as the urgency of reducing instantaneous peak demand associated with outdoor irrigation and the pending once-through cooling system regulatory ban.

Table 5: Priority Projects for Water Conservation Plan Early Implementation

#	Action
1.1	Establish a regional non-revenue water management community of practice
2.1	Review the effectiveness of the Water Conservation Bylaw; based on results, implement new best practices appropriate for the Capital Region
2.3	Enhance outdoor irrigation outreach including campaigns aimed at Water Conservation Bylaw compliance and at reducing peak instantaneous demand
3.6	Enhance the industrial, commercial, and institutional Water Use Assessment Program
3.7	Phase out once-through cooling systems; promote best practices in other cooling technology
4.2	Update the CRD Residential Water Survey[5]

Several other actions, listed in Table 6, may also be expedited for early implementation, but this must be coordinated with operational planning in the Juan de Fuca Water System. These initiatives will deliver water savings only within that system initially but may lead to significant region-wide savings if they are also ultimately adopted by other local water suppliers.

Table 6: Priority Projects for the Juan de Fuca Water System

#	Action
1.2	Investigate the potential impact of conservation-oriented water services pricing in the Juan de Fuca Water System
1.3	Pilot advanced metering infrastructure in the Juan de Fuca Water System

7.5 Estimated Water Savings

Implementation of this water conservation plan is expected to reduce total annual water production in the Greater Victoria Drinking Water Service by 3% to 6% by 2035 compared with the status quo. It will also reduce maximum day demand (MDD) by 5% to 9% over the same period compared to status quo.

To derive these estimates, key quantified measures include:

- the non-revenue water community of practice to tighten audits and bulk metering (estimated region-wide non-revenue water reductions of 5–10%, equivalent to roughly 0.5–1.0% of annual supply and 0.3–0.6% of MDD);
- the Water Conservation Bylaw review and update, along with supporting education and compliance and enforcement activity (Actions 2.1, 2.2, 2.3), will reduce wasteful

[5] Statistically reliable information from the residential water survey about irrigation system ownership rates and barriers to behavior change is essential for designing effective outreach under Action 2.3, hence Action 4.2 appears as a priority action here.

irrigation practices (estimated to cut annual demand 1–2% and MDD 3–6%, phased in 2028–2031);
- expanded industrial, commercial and institutional and multi-unit residential water use assessments (covering ~21% of water production), adding ~5 ML/year improvements that amount to ~0.1% of annual demand by 2035);
- a regulated phase-out of once-through cooling (roughly 100 units, eliminating 70–90% of ~300 ML/year use, equal to ~0.2–0.3% of annual demand and ~0.2% of MDD, realized between 2026 and 2029).
- an ongoing education and outreach social-marketing effort (Actions 2.4, 2.5, 3.1, 3.2, 3.3, 3.4) is estimated to deliver an additional 1–2% reduction by reducing residential leakage and prompting behaviour change and fixture upgrades; attaining this result is predicated on transitioning to a community based social marketing approach as described in Appendix 3, improved performance monitoring, and increased investment in communications; half of some program savings from education measures are assumed durable (i.e., due to fixture replacements) while other savings may decay without sustained follow-up.

Research, data-collection, and monitoring actions (Actions 4.1, 4.2, 4.3) do not directly contribute to water savings, but are essential to target, measure, and sustain reductions. Similarly, this plan identifies several pilot projects that will initially be delivered on a small scale or specifically in the Juan de Fuca system (Actions 1.2, 1.3, 1.4. 3.5). Water savings from these pilots will initially be relatively small, so are not included in modelling. However, over time these could grow to significantly reduce total water production should be prove successful and scale up to region-wide delivery.

These measures, if maintained, will produce durable, long-term reductions in system losses, seasonal peaks, and overall demand.

Furter detail on how these estimates were derived can be found in Appendix 7.

7.6 Program Resourcing

With current budget allocation, staff can continue to deliver existing programs as well as complete the priority projects identified for immediate implementation in Table 5, above. Resourcing of longer-term actions will follow an adaptive management framework, building on knowledge gained from pilot projects and research, allowing actions to be adjusted based on new data, progress reviews, community feedback, and cost-benefit analyses. This framework aims to ensure the plan remains responsive, resilient, and effective in advancing long-term water sustainability.
Education efforts described throughout this plan (Actions 2.3, 2.4, 2.5, 3.1, 3.2, 3.3, 3.4) will require transitioning from the current information-intensive approach that heavily utilizes mass media to a community-based social marketing approach involving more targeted outreach and improved performance measurement (see Appendix 3 for details). This will likely require increased resourcing and increased support from CRD's Corporate Communications & Engagement Division.

7.7 Responsibilities & Governance

Implementation of this plan will be led by CRD. Retail water suppliers will be responsible for matters within their jurisdiction, notably water service pricing, customer metering, and managing non-revenue water (including system loss) within their respective distribution networks. Success will depend on the organizations working together collaboratively to implement key actions.

With respect to the organizational structure used to deliver this plan, responsibility for water demand management is currently diffused across CRD departments. Responsible areas include Corporate Communications and Engagement, Environmental Protection, and Infrastructure and Water Services. CRD will review this current structure to ensure that there is clear accountability for program outcomes and efficiency. This review will look to ensure that coordination of efforts such as outreach/education, data collection, impact measurement, and allocation or resources is optimized.

As described under Action 4.4, implementation will follow an adaptive management framework. This means learning from experience and responding as needed to fine-tune delivery. Progress towards targets set out in Section 7.1 will guide this.

Regular progress reports will be provided to the Regional Water Supply Commission. Staff may also periodically seek advice from residents and other stakeholders as appropriate, including through the Water Advisory Committee.

Improving water use data and information as recommended in this plan (see Goal 4) will enable accurate measurement of performance targets. Based on this, the Water Conservation Plan will be reviewed and updated on a 5-year cycle.

8.0 Conclusion

By continuing to encourage efficient and responsible water use, this Water Conservation Plan will play an integral role in making the Capital Region more water sustainable. It will help residents and businesses control their water costs and may help extend the life of our current infrastructure in both our regional transmission and local distribution systems. It will also provide a range of other social, ecological and financial benefits.

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Greater Victoria
Water Conservation Plan - 2026-2035

Compiled Appendices

October 2025

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List of Appendices

Appendix 1

Water Use Profile Methodology & Additional Analysis

Appendix 1: Water Use Profile Methodology & Additional Analysis

This appendix provides the methodology used for the water use profile analysis provided in Section 2 of the Water Conservation Plan. It also provides more detailed analysis of some aspects of water production and consumption, including some local results for Greater Victoria municipalities.

Water Use Analysis Methodology

This sub-section provides an overview of the methodology used to review the water demand and supply data received from CRD.

Data

The following data was provided to the project team by CRD:

- service population for 2016 to 2040 (recorded and projected data),
- daily production data from Japan Gulch and Charter's Creek (assumed to be Goldstream and Sooke respectively), and
- total Annual Billed Water Consumption by service area and category (2019 to 2023).

The Regional Water Supply Master Plan (Stantec, 2022), Climate Projections for the Capital Region (PCIC and CRD, 2024), and previous work by KWL on CRD demand forecasting and water use accounting were also referenced.[1]

Assumptions & Limitations

The reader should be aware of the following assumptions and limitations:

- The water profile review is based on the data provided and is intended to provide a snapshot of the water demand and supply. It is not a detailed water use accounting or forecast.
- It is assumed that the data provided is reliable. Only basic data cleansing and quality control has been completed.
- Historical water production was provided from Goldstream Treatment Plant, which services Greater Victoria, and the Sooke Treatment Plant, which services Sooke and parts of the Juan de Fuca Electoral Area.

Analysis Methodology

The following summarizes the methodology used to review the water profile of the CRD:

1. reviewed population growth for the region and municipalities,
2. reviewed billed water consumption by service area and categories in various forms (e.g. litre per capita per day (LCD), annual demand per community etc.) to identify patterns and correlate trends to possible events,
3. reviewed and calculated non-revenue water on a regional scale,
4. analyzed baseline and seasonal flows, and

[1] For full bibliographic references and web links, see Section 9 of the main report.

5. developed a simple business case analysis methodology for enhanced demand management based on potential for deferral of CRD Water Supply Master Plan (2022) projects that are triggered by capacity limitations of the existing regional water supply system (see Section 6 of the Water Conservation Plan).

Bulk Water Sales to Select Municipalities

This sub-section provides information on historical bulk water sales from the CRD to Greater Victoria municipalities. In the cases of Colwood, Landford, Highlands, Metchosin, Sooke and View Royal retail sales are used as a proxy because bulk sales information was not readily available.

Figure A1-1: City of Victoria & Township of Esquimalt Historical Bulk Water Sales (ML/year)

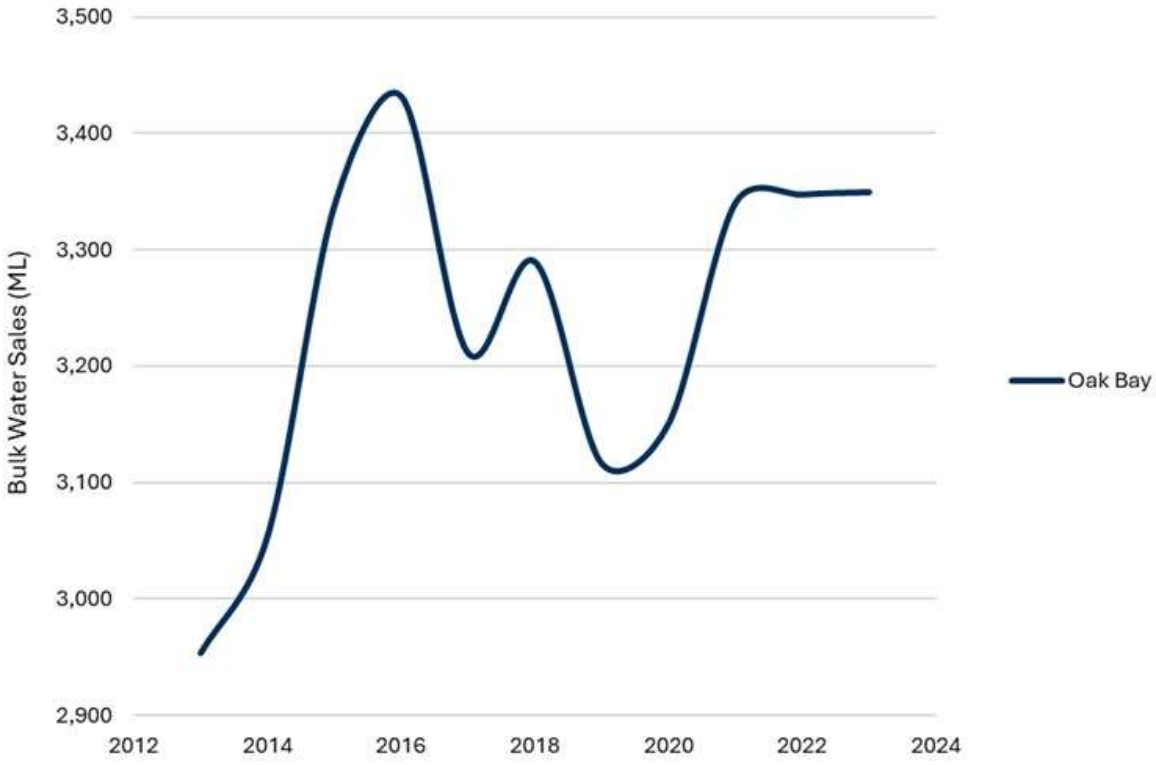

Figure A1-2: City of Oak Bay Historical Bulk Water Sales - 2013 to 2023 (ML/year)

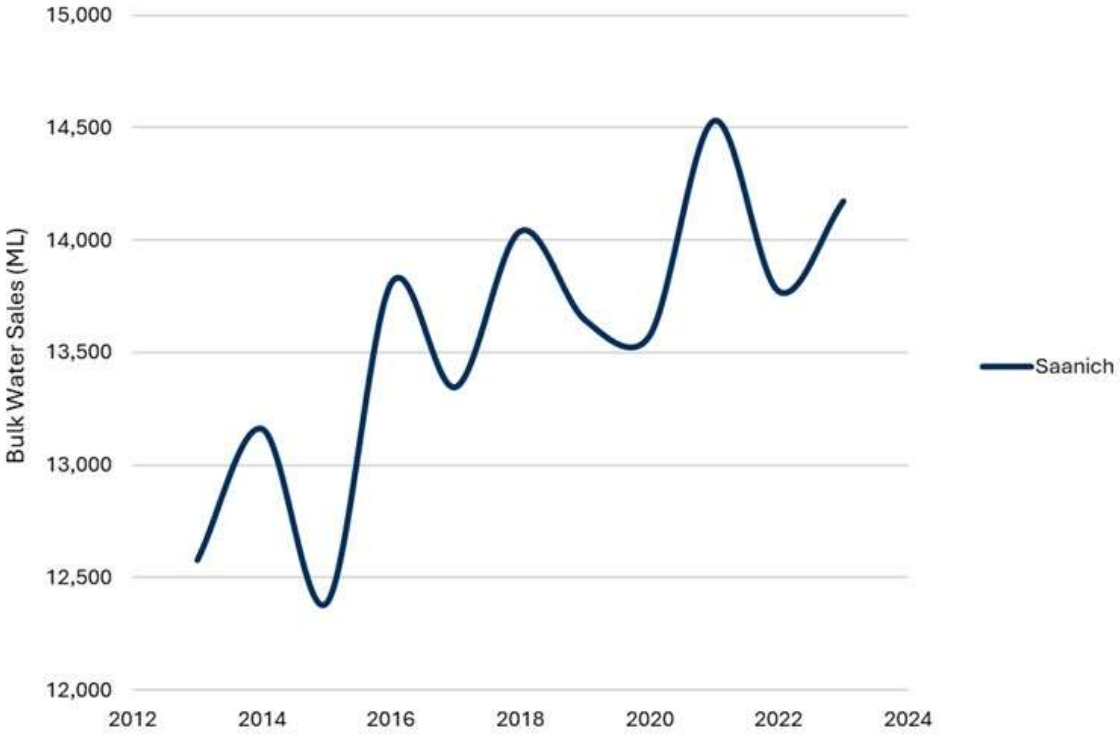

Figure A1-3: District of Saanich Historical Bulk Water Sales - 2013 to 2023 (ML/year)

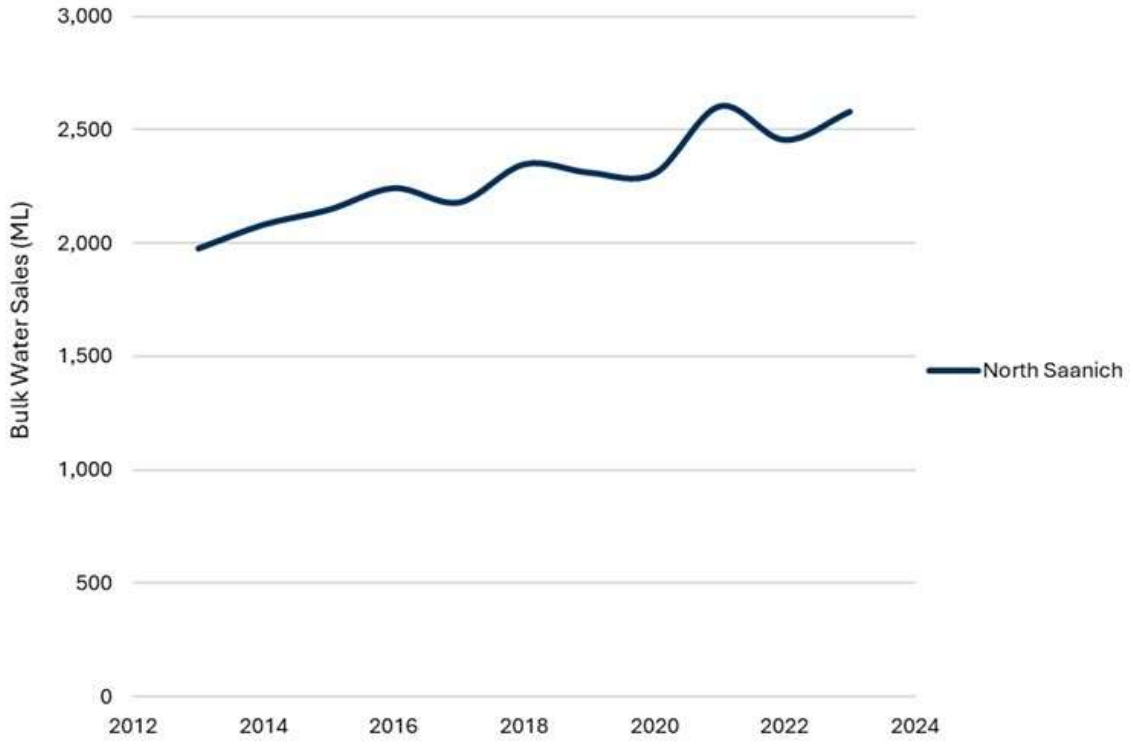

Figure A1-4: District of North Saanich Historical Bulk Water Sales - 2013 to 2023 (ML/year)

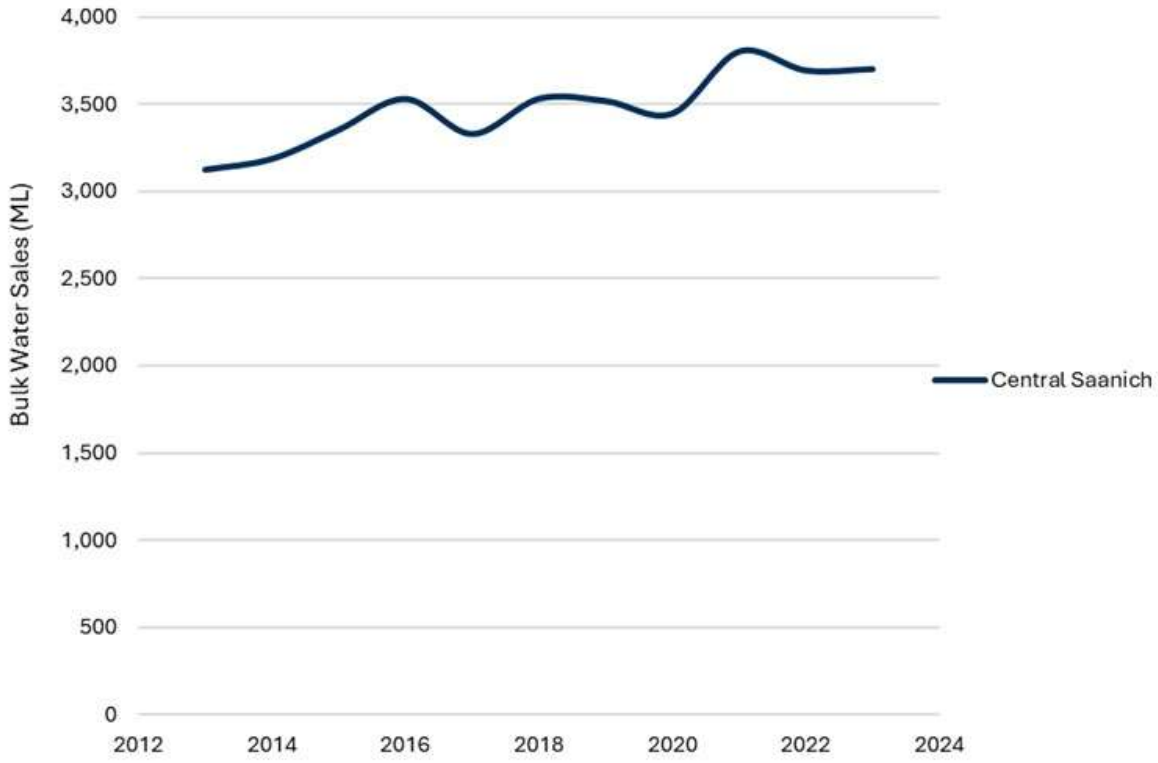

Figure A1-5: District of Central Saanich Historical Bulk Water Sales - 2013 to 2023 (ML/year)

Figure A1-6: City of Sidney Historical Bulk Water Sales - 2013 to 2023 (ML/year)

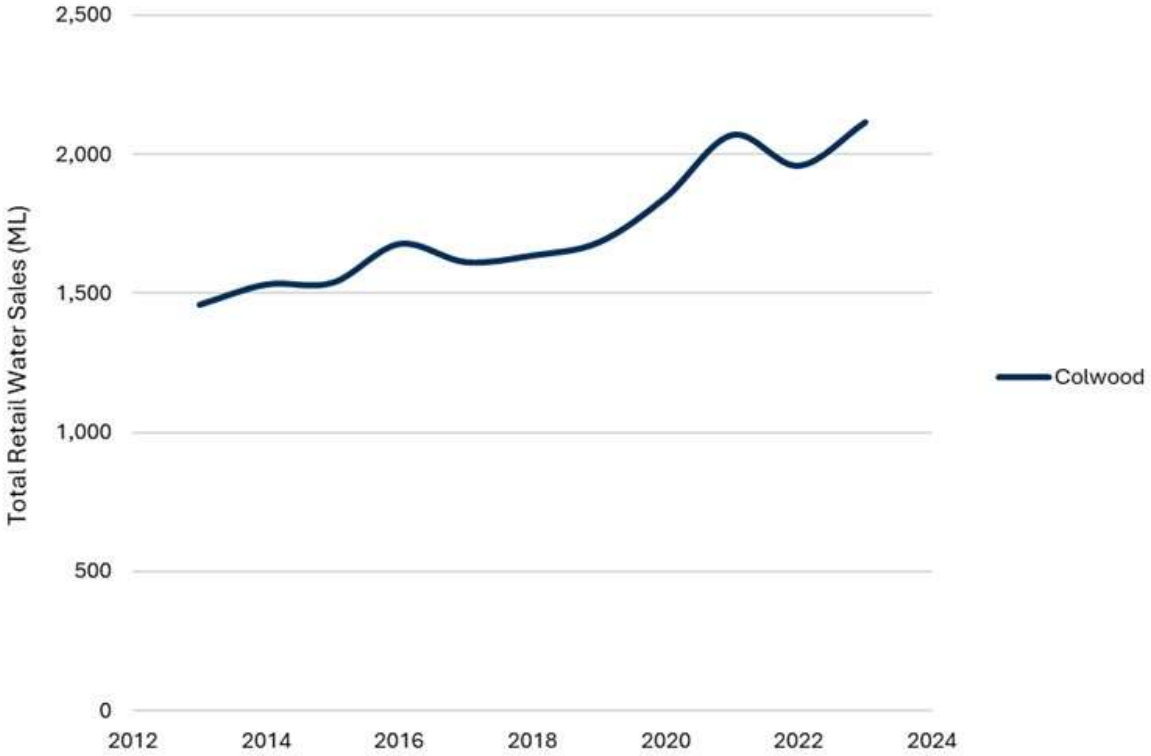

Figure A1-7: City of Colwood Historical Total Retail Water Sales – 2013 to 2023 (ML/year)

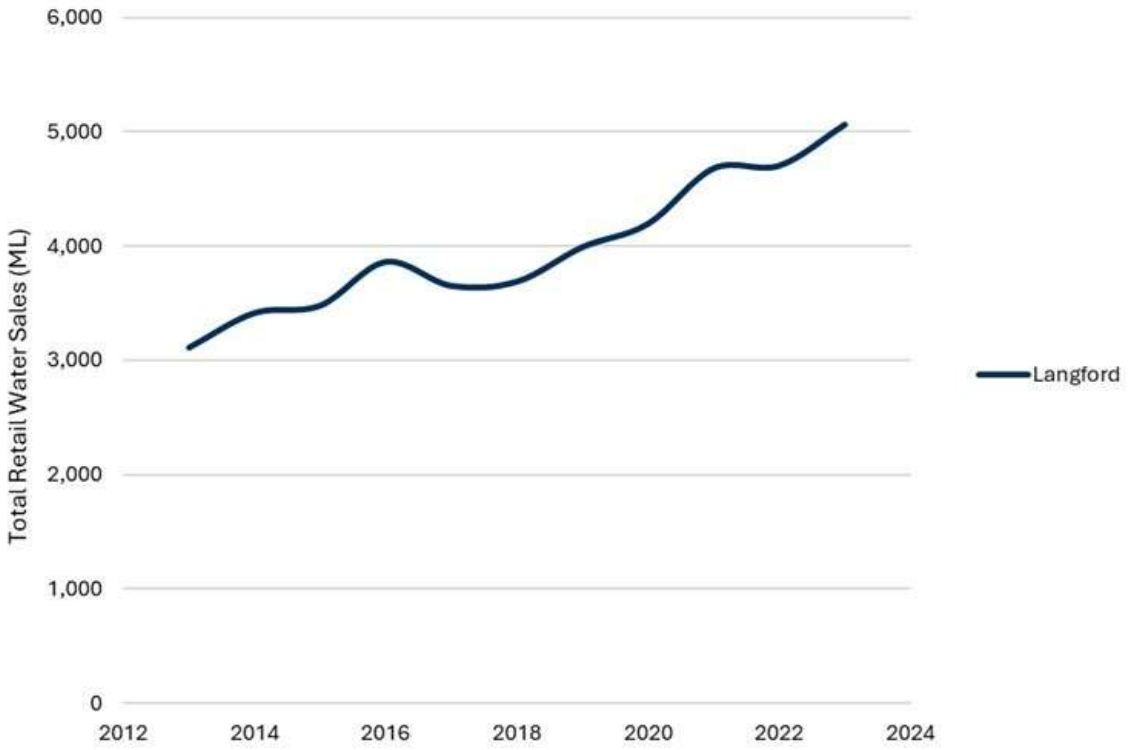

Figure A1-8: City of Langford Historical Total Retail Water Sales – 2013 to 2023 (ML/year)

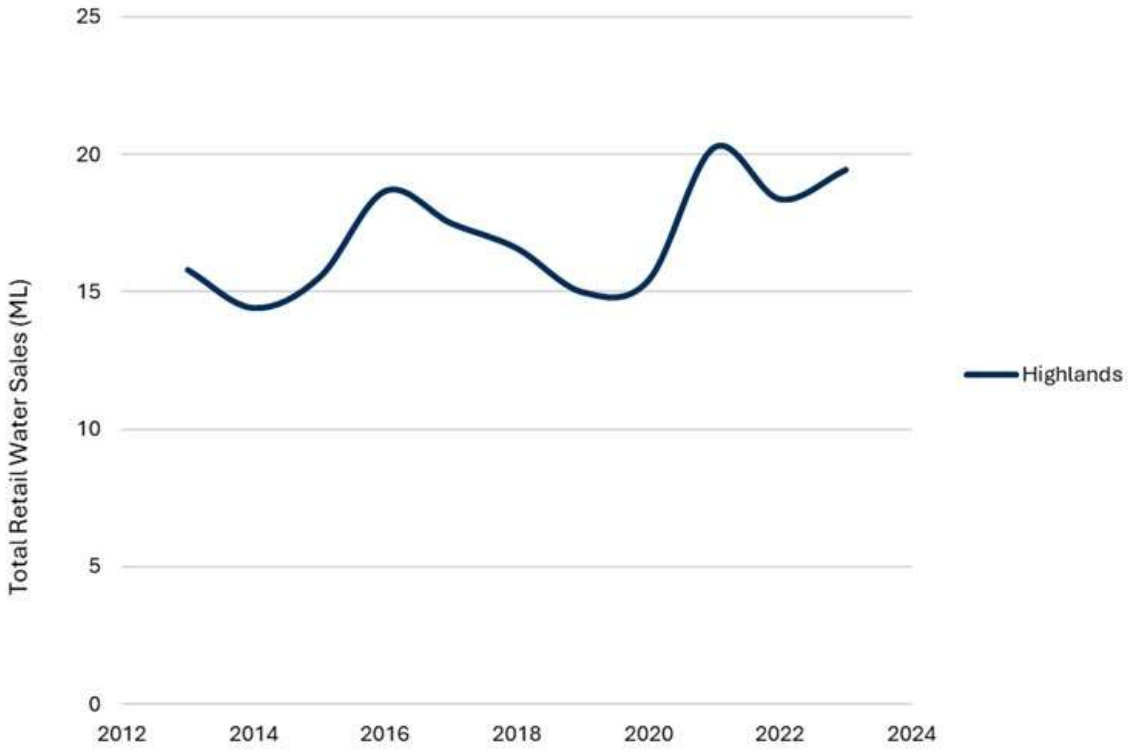

Figure A1-9: District of Highlands Historical Total Retail Water Sales – 2013 to 2023 (ML/year)

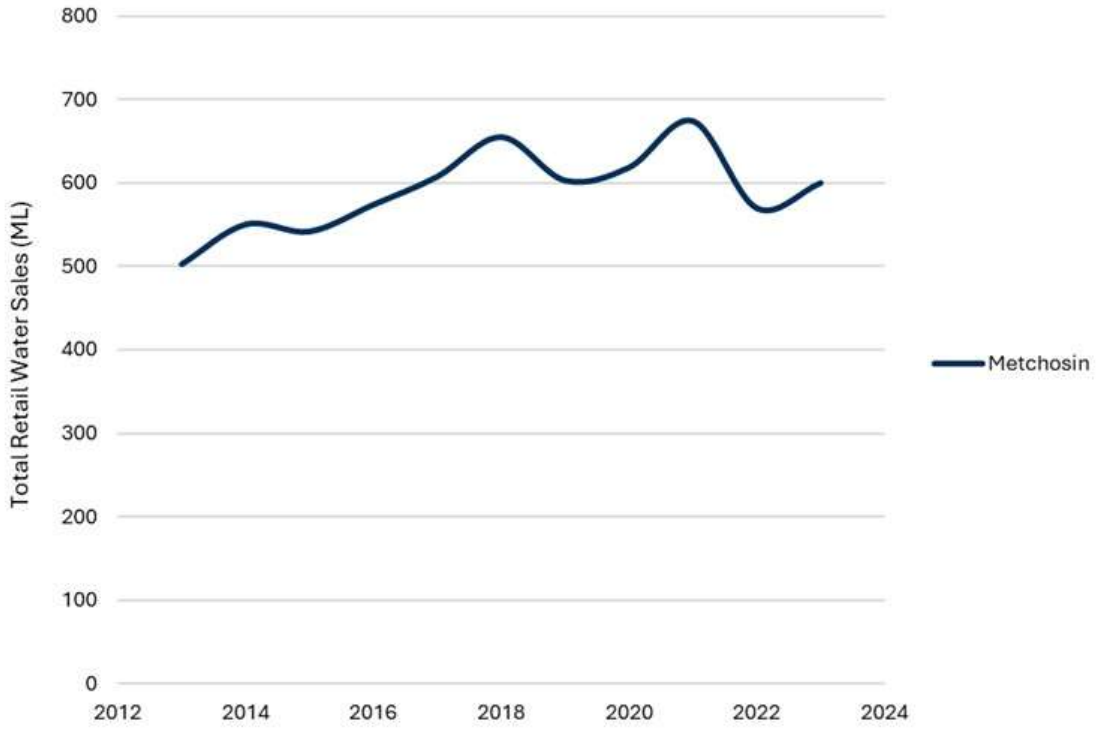

Figure A1-10: District of Metchosin Historical Total Retail Water Sales – 2013 to 2023 (ML/year)

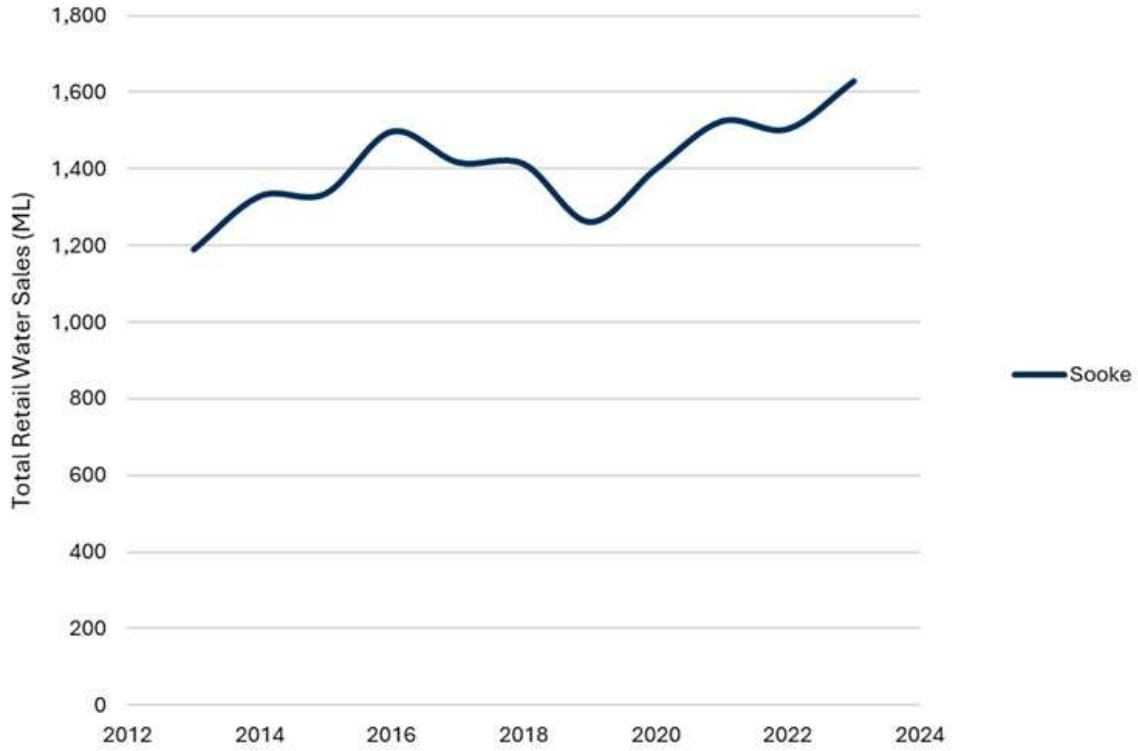

Figure A1-11: District of Sooke Historical Total Retail Water Sales – 2013 to 2023 (ML/year)

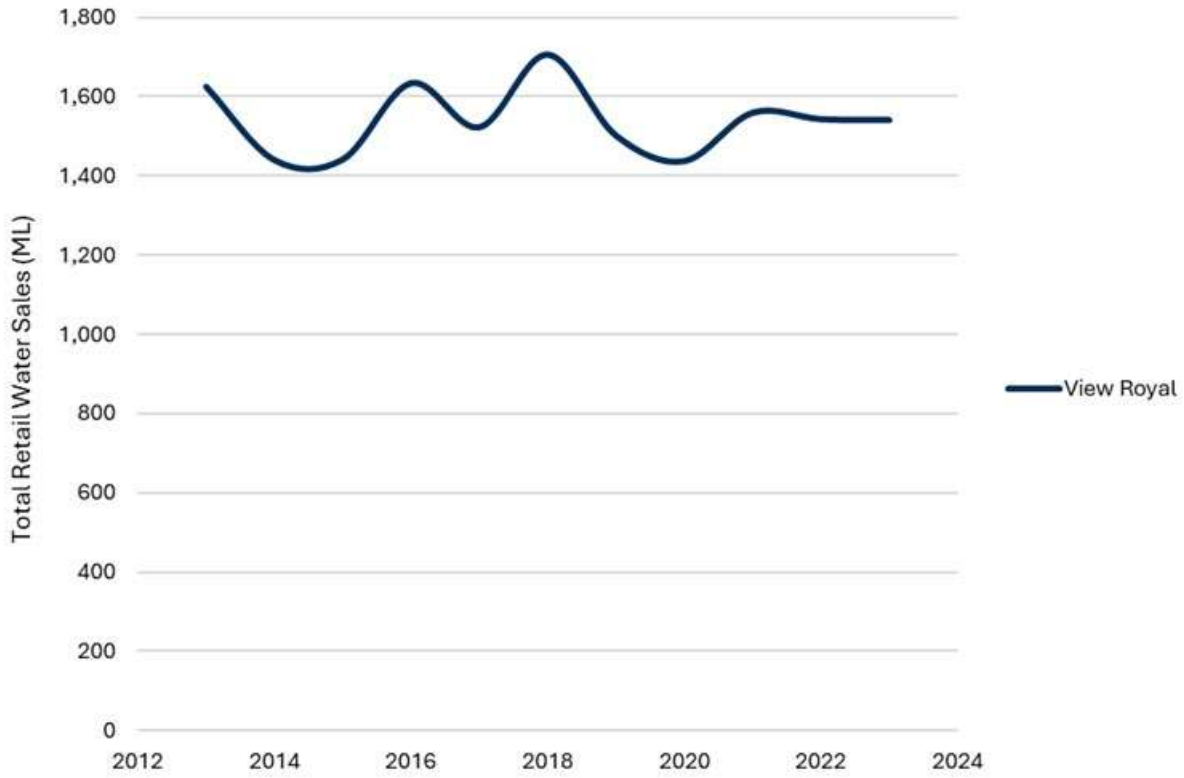

Figure A1-12: Town of View Royal Historical Total Retail Water Sales – 2013 to 2023 (ML/year)

CRD Water Production Analysis

The following figures show total water production from CRD water treatment facilities overlaid with average daily temperature for City of Victoria. Not surprisingly, the peaks and valleys of the water production data correspond with annual temperature fluctuation.

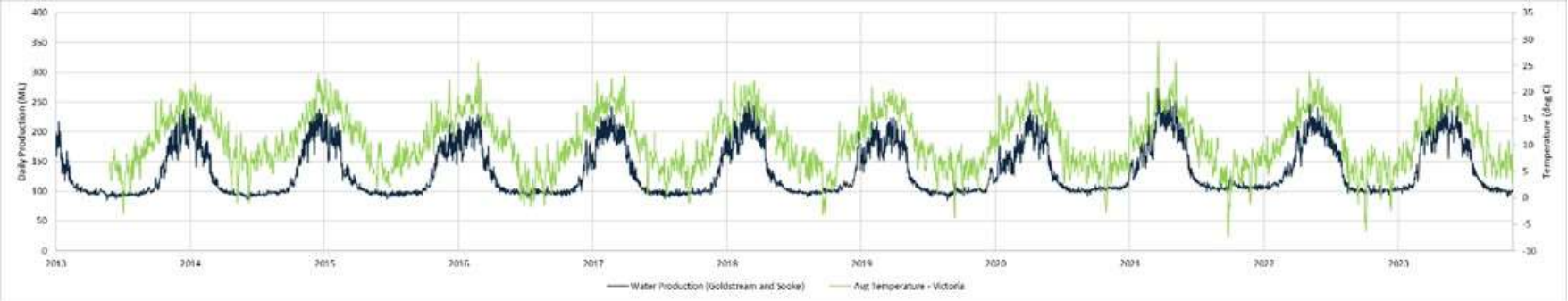

Figure A1-13: Daily Water Production & Annual Victoria Temperature (All CRD Treatment Facilities)

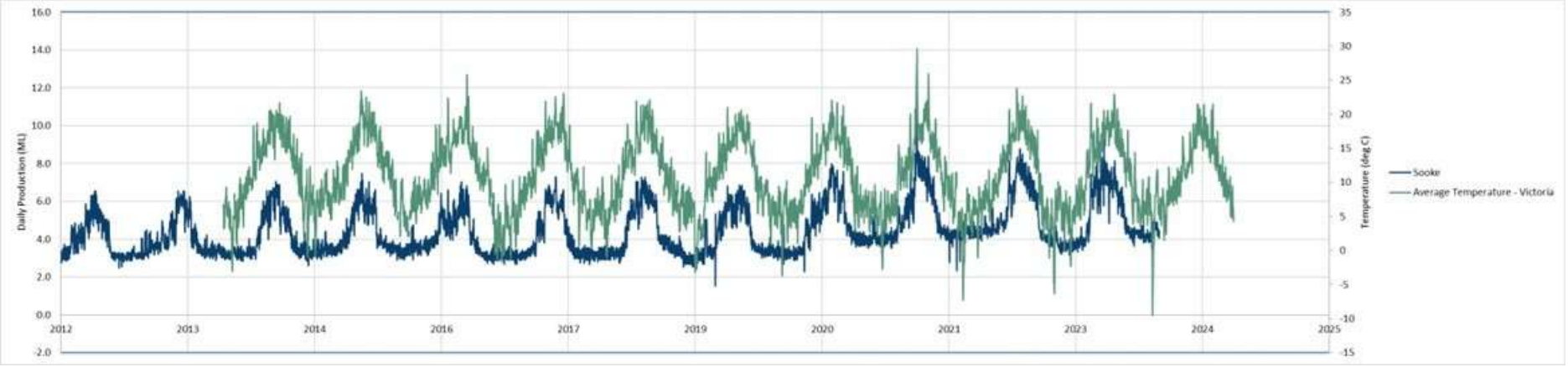

Figure A1-14: Daily Water Production & Annual Victoria Temperature (Sooke Treatment Facility)

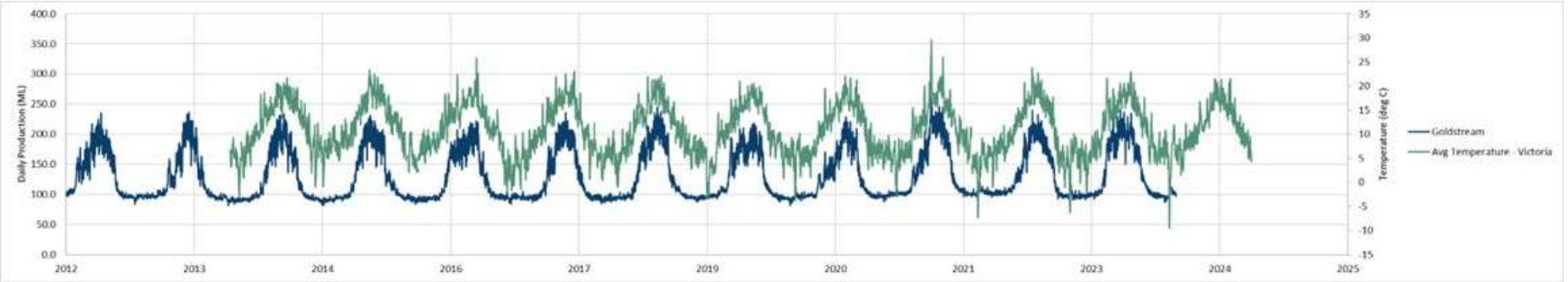

Figure A1-15: Daily Water Production & Annual Victoria Temperature (Goldstream Treatment Facility)

Appendix 2

Existing Program Review

Appendix 2: Existing Program Review

MEMO

To:	Kriti Wilson, Demand Management Coordinator, CRD
cc:	Danielle Bassett, Danielle Buckle, Marie Irwin, Jody Watson, CRD Environmental Services
From:	Kirk Stinchcombe, Managing Director, Econics
Date:	27 January 2025
Re:	Existing Program Review: Capital Regional District Water Conservation Program

1. Introduction

In Fall 2024, the Capital Regional District (CRD) Demand Management Program initiated development of a new Water Conservation Plan. This plan, scheduled for completion in early 2025, will set goals, data-based targets, implementation strategies, and guide community engagement. This plan is for the Greater Victoria Water Supply Service and the 13 municipalities that rely on the CRD for regional water conservation messaging.

The new plan will be based in part on various programs that are already successfully underway. It will then be refined by drawing on current best practices from Canada and around the world. As such, an obvious starting point is looking at the current program's strengths and the opportunities for improvement.

This memo, the *Existing Program Review*, will serve as an appendix to the new plan. It provides an inventory and assessment of CRD's current water efficiency efforts. The goal is to provide a foundation for evaluating how the current program might be further developed and improved going forward.

This memo has two main parts. First, it inventories key elements of the current program. Second, it looks at program strengths, opportunities, and challenges.

1.1 Limitations

The reader should be aware of several limitations. First, due to scope constraints, this work is not a formal or comprehensive audit of CRD's current water efficiency program. Rather, it is a general review informed by examination of documents, marketing collateral and other resources, as well as by a structured workshop and numerous informal discussions with staff.

Second, this summary focuses on program highlights – major initiatives, achievements and identified challenges. It should be noted that a great deal of additional water conservation work has been completed by CRD staff and partners over several decades, more than can be detailed here.

Third, no attempt is made in this memo to systematically quantify the overall impact of these programs on community water demand. Quantitative analysis on water consumption will be provided in the Water Conservation Plan itself later in the project.

2. Water Efficiency Program Inventory

In this section, CRD's water efficiency program elements are inventoried using Econics' 5E Framework (see Figure A2-1). This is simply a convenient way of organizing program components to understand how they work together as parts of a complete package. Each 5E theme deals with a different facet of water efficiency, and they complement each other. A water service provider that invests in effort under each theme is more likely to have a comprehensive approach that will achieve sustained community water use reductions. The 5Es are as follows:

1. **Education tools** involve giving information to customers to help them understand how they use water and how to make changes.
2. **Encouragement tools** provide customers with incentives with tangible value. Examples include cash rebates, home audits, low-cost access to plumbers, or giveaways such as lawn watering gauges and outdoor water saving kits.
3. **Enforcement tools** involve judicious use of regulatory instruments like watering restrictions, building and plumbing codes, and product performance standards.
4. **Economic tools** focus on providing financial incentives through effective water and wastewater pricing and similar mechanisms.
5. **Engineering approaches** focus on technology adoption, either by customers (for example, rainwater harvesting or on-site water recycling) or by the water service provider itself (for example, system loss management).

Figure A2-1: The 5E's of Demand Management

2.1 Education

Education tools provide information to residents about water efficiency through various channels "from the classroom to the family room to the boardroom". This category includes traditional education, marketing and advertising, and communication through customer service staff, elected officials, and other spokespeople.

Poorly executed community education and marketing efforts often have little or no impact on changing behavior. However, well-executed campaigns that employ carefully constructed messages, target specific behaviors, and emphasize personal contact can be tremendously successful. Outreach also lays a foundation for effective implementation of other tools.

2.1.1 Program Branding

Most aspects of the program are branded under the corporate "CRD – Making a difference…together" wordmark (see, for example, Figure A2-2). Design consistently displays the corporate white, aqua, and green color palette. In a few cases, the supporting "Every Drop Counts!" wordmark also appears, notably with collateral aimed at children.

Figure A2-2: Example of CRD Water Conservation Program Branding

Marketing collateral is generally visually compelling, consistently branded, gives appropriate acknowledgement of the sponsoring organization (i.e., CRD) through logo placement and meets contemporary design standards. This is true of both print and electronic material.

2.1.2 Print & Online Education Material

Dissemination of educational materials through both print and online channels is a significant focus for CRD's program (CRD, 2024a). There is an extensive library of resources available through the corporate website (www.crd.bc.ca/education/water-conservation). Select examples include:

- a collection of fact sheets targeted at residential customers, suitable for either print or online use on topics such as rainwater harvesting, native plants, lawn health, etc.
- an attractive and comprehensive Homeowner's Guide to Outdoor Water Use manual (CRD, 2011);
- various giveaway items for adults and children (fridge magnets, water shut off hangers, stickers, etc.);
- web page targeted at industrial, commercial, and institutional (ICI) customers with various resources including fact sheets for offices, commercial car washes and restaurants and pubs; and,
- a detailed Waterwise Irrigation Handbook (CRD, nd), currently only available electronically, which staff contemplate updating.

In addition to the website, staff also push information out through corporate social media (Facebook, Instagram, X). However, a review of these platforms indicates that water conservation faces much internal competition for space in these channels from CRD's many other programs.

2.1.3 Community Events

CRD staffs booths seasonally at events such as farmers markets, community fairs, and other regional festivities (see Figure A2-4). Typically, these are staffed by auxiliary summer staff, often students, who also provide similar support to other Environmental Services program areas. Events are designed to be interactive and include giveaways and games for children. Information on programs such as watering restrictions and leak detection is offered on request. CRD also provides unstaffed displays at retail locations such as garden centres on an ad hoc basis (see Figure A2-3).

Figure A2-3: Example Retail Display
Photo Credit: CRD

Figure A2-4: CRD Community Event Booths
Photo Credit: CRD

Figure A2-5 shows annual effort for community events, noting that this work was curtailed in 2020 and 2021 by the COVID pandemic, and has gradually ramped up since.

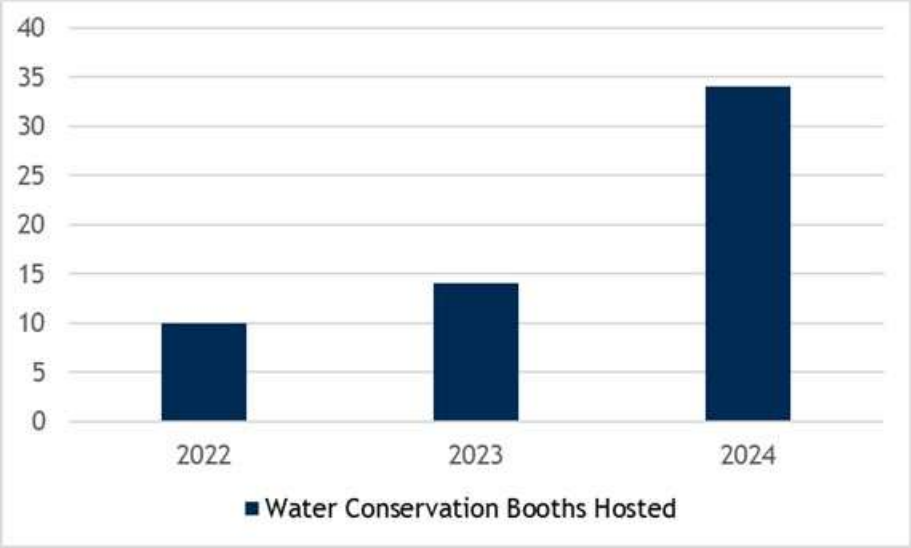

Figure A2-5 Annual Community Event Effort (2022-2024)
Source: CRD, 2024e

In addition, CRD also has five Water Stations that event organizer can use at events. Community members use these to fill up personal water bottles. For example, in the summer of 2023, these stations were deployed at 15 different events or to event organizers (CRD, 2024a). When possible, stations are accompanied by water conservation outreach materials.

CRD also provides in-person, three-hour introductory native plant gardening workshops in the spring and fall, delivered in collaboration with Swan Lake Nature Sanctuary. A virtual option is also offered in the fall. Annual effort for this program is shown in Figure A2-6. Again, effort in 2020 and 2021 was curtailed by the pandemic.

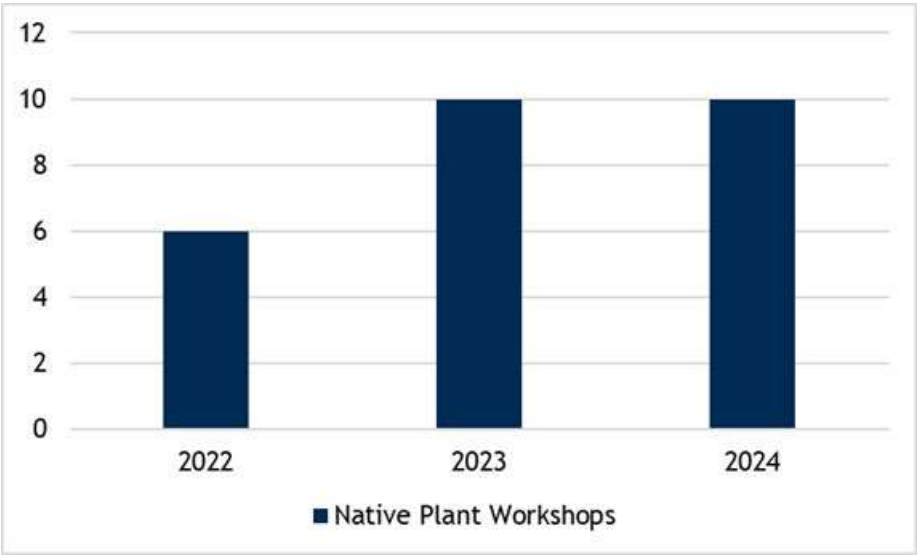

Figure A2-6: Native Plant Workshops by Year (2022-2024)
Source: CRD, 2024e

2.1.4 School Programs

School programs are delivered through CRD's Communications team, who staff an education coordinator position. They offer "Every Drop Counts" learning resource kits to grade two teachers. The kit includes lesson plans, digital resources, books, and demonstration materials. The education coordinator is also available to deliver in-person programming for grades two or five through one hour or 45-minute sessions. This person also provides outreach to schools about other environmental priorities such as solid waste management, watershed health, and climate action. As well, there is a drinking water and wastewater model that can be signed out by schools and is used at outreach events.

Annual effort for water conservation aspects of the school program is shown in Figure A2-7.

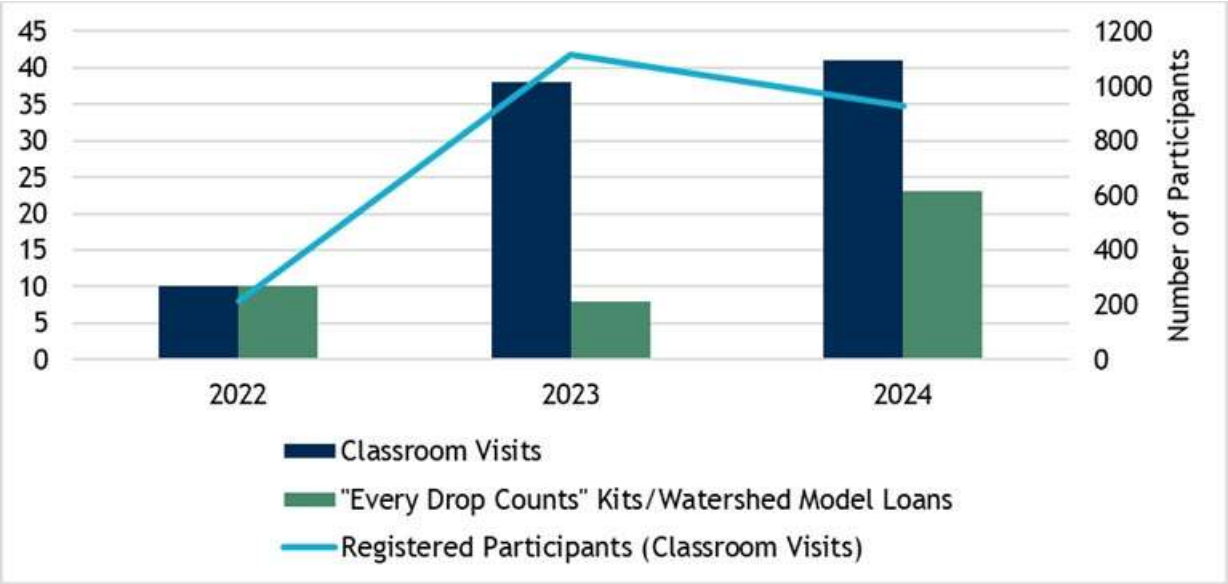

Figure A2—7: "Every Drop Counts" School Program Effort by Year (2022-2024)
Source: CRD, 2024e

2.2 Encouragement

Encouragement tools include incentives like product rebates, home audits, low-cost access to plumbers or giveaways. Incentives might be offered to customers of all kinds in both residential and non-residential settings. Research from the fields of environmental psychology and social marketing shows that such instruments can have a substantial impact on changing behavior.

2.2.1 Giveaways & Rebates

CRD offers various low-cost giveaway items to residential customers including rain gauges, toilet dye tabs, shut off hangers, tap aerators, and shower timers. More expensive items (shower heads, outdoor water savings kits) are also available but are not heavily promoted. These items are distributed mainly through the community events discussed in Section 2.1.3.

Hardware items such as tap aerators and pre-rinse spray valves are also available to ICI customers and may be promoted through an audit program (discussed in Section 2.5.1).

CRD, in partnership with North Salt Spring Waterworks District (NSSWD), also provides rebates to residents of Salt Spring Island and the Southern Gulf Islands who install rainwater harvesting systems. However, this incentive is not available to customers in the Regional Water Supply System, so is outside of the scope of the water conservation plan under development with this particular project.

2.2.2 Fix A Leak Week Kits

Each March, CRD participates in "Fix A Leak Week", an annual national campaign that educates homeowners about leak detection best practices. Staff distribute Fix a Leak kits throughout the region through venues such as municipal halls (see Figure A2-8). Residents can pick these up at no cost. Kits include toilet dye tabs, a bag to measure the flow rate of the showerhead, a new aerator for a faucet, and educational material. This effort is supported with print and digital ads and a social media burst.

Figure A2-8: Fix a Leak Week Kit & Display
Photo Credit: Victoria News

2.2.3 Once-Through Cooling Rebate Program

CRD currently offers rebates to ICI customers who swap out inefficient once-through cooling systems with new air-cooled ones, as follows:

- $600 to eliminate a mid-sized condensing unit;
- $300 to replace a mid-sized ice maker;
- up to $2,500 per account to replace equipment such as industrial air conditioners, wok stoves, coolers, and larger ice machines.

This incentive is intended to support the pending region-wide once-through cooling ban (discussed in Section 2.3.2, below). Unfortunately, to date the program is significantly underspent. Exploring options to improve uptake is a goal for the water conservation plan.

2.3 Enforcement

Enforcement tools involve judicious use of regulatory instruments such as watering restrictions, plumbing codes, and product performance standards. Regulatory approaches are often highly cost effective because they can make significant contributions to cutting demand without requiring large operational budgets for water service providers (excepting enforcement costs).

2.3.1 Water Conservation Bylaw

CRD implements seasonal lawn watering restrictions each year under its Water Conservation Bylaw (CRD, 2016). Restrictions can escalate in the event of drought or other shortages and are tied to supply conditions at the Sooke Lake Reservoir. Under ordinary conditions, "Stage 1" restrictions allow lawn watering two days per week, from 1 May to 30 September, on an "evens and odds" house number system. Residents may water in the morning or the evening. Established trees, shrubs, flowers, and vegetable gardens can be watered on any day.

Figure A2-9: Example Social Media Post to Support Watering Restrictions Compliance
Source: CRD, 2024d

The bylaw schedule was amended in April 2024 to include a wider range of lawn watering times for programmable irrigation systems. The intent is to reduce the instantaneous demands that occur on the top of the hour on watering day mornings and to spread out the demand from irrigation systems over a larger timeframe (CRD, 2024a).

CRD introduces a "seasonal priming" communications campaign each spring to remind residents that restrictions will come into effect and what their watering days are (CRD, 2024g). Channels include radio, print, online, Spotify ad placements, and social media (see, for example, Figure A2-9).

CRD's enforcement and compliance efforts focus on the latter (i.e., compliance) by raising awareness through the annual advertising campaign and other outreach. Warning letters may be issued on a complaints basis as required. Repeat offenders may be ticketed. However, this is rarely done, which is wholly appropriate if other compliance efforts prove successful, and consistent with the approach taken in most jurisdictions we work with.

The current restrictions system appears to work well. It should be noted, however, that best practice jurisdictions are moving away from this traditional "evens and odds/mornings and evenings" system to more strict requirements such as "mornings only" (e.g., Metro Vancouver) or "one day per week" (e.g., Region of Waterloo). This would also be an option

for CRD if there is sufficient organizational and political will, noting that the schedule was already modified very recently.

2.3.2 Once-Through Cooling System Ban

The CRD Board has approved an amendment to the Water Conservation Bylaw (CRD Bylaw No. 4099) to prohibit the use of water for once-through cooling within the Regional Water Supply System, effective July 2028. This ban will apply to residential, commercial, and institutional properties unless an exemption is issued.

To support this pending regulatory change, CRD provides technical resources online, has prepared four "champion stories" (case studies of businesses that have successfully retrofitted equipment; see Figure A2-10), and is supporting the rebate program outlined in Section 2.2.2, above.

Staff note that additional compliance and outreach effort will be required ahead of 2028.


Conservation Case Study

Strathcona Hotel saves dollars, gas & water

Capital Regional District |

When the Strathcona Hotel upgraded their refrigeration system to air cooled with boiler heat recovery, they achieved payback in under two years. Here is their story.

"Between 2010 and 2013 our water and gas bill increased by approximately $38,000! One significant flaw in our building was the cooling system for our refrigerators and freezers which relied on running water, and then went right down the drain (once-through cooling). For us, the solution was a closed-looped water cooling system.

In 2014 we started to build this system in our six-story building. While most cooling was needed at the lower and street level, we needed to install a cooling tower on the roof. The entire project took nine months to complete and cost approximately $150,000. Fortunately, we were able finish the project with little interruption to our business.

Now the great news: We realized an instant savings in our water consumption to the tune of about $50,000 annually and as an added bonus we received a $5,000 CRD rebate. A further "unexpected" bonus was realized in our gas consumption: we installed a suitcase-sized heat exchanger near our hot water boilers that allowed us to "dump" compressor coil heat into our hot water tanks. Now our hot water tanks only need gas to bring the water temperature up to 45°C from 32°C instead of from 8°C. The savings have been incredible, dropping our annual gas bill by about $35,000.

Together, the combined annual savings in our water and gas consumption are about $85,000 and payback took less than two years. We all know that utility costs are going nowhere but up so the sooner you invest in your property's efficiency the better off you will be."

– Grant Olson, Co-Owner & General Manager, Strathcona Hotel, Victoria, BC

For more about helping your business save water, call 250.360.3101 or visit www.crd.bc.ca/cwi

Figure A2-10: Example Once-Through Cooling Conservation Case Study
Source: CRD, 2024e

2.4 Economics

Effective volume-based water and wastewater pricing are key economic tools that encourage water use efficiency through the incentive of saving money. Other economic tools include tax rebates, low interest loans, and targeted investment by public agencies.

Unlike the various other programs and incentives discussed above that are offered directly by CRD, water billing is undertaken independently by each municipality or water services retailer. CRD acts as a wholesale provider of water and wastewater services to local municipalities who then set retail service rates that account for both regional bulk water and wastewater costs and capital and operational costs incurred locally for distribution. It is these retail costs (for both water and wastewater) that residents see on water bills and respond to when making water use decisions or when thinking about purchasing efficient products.

Given this situation, detailed investigation of the water efficiency potential of conservation-oriented pricing is not part of the scope of this review. We are also unable to comment on the extent to which any water service retailer's current charges meet the long-term costs of sustainably funding their water systems.

Nevertheless, Figure A2-11 provides a snapshot of the current situation in the region. It compares residential water costs of all water service retailers in the Regional Water Supply System. Note that this shows water charges only (i.e., fixed and volume-based sewer charges are not incorporated). Where a water service retailer has a fixed charge component, this is shown on the bottom of the bar in blue, with variable charges on the top in green. The figure shows combined water and wastewater costs at different consumption levels – 15, 25, and 45 cubic meters. For reference, a family of four consuming an average of 200 liters per person per day would consume a little less than 25 cubic meters in a month.

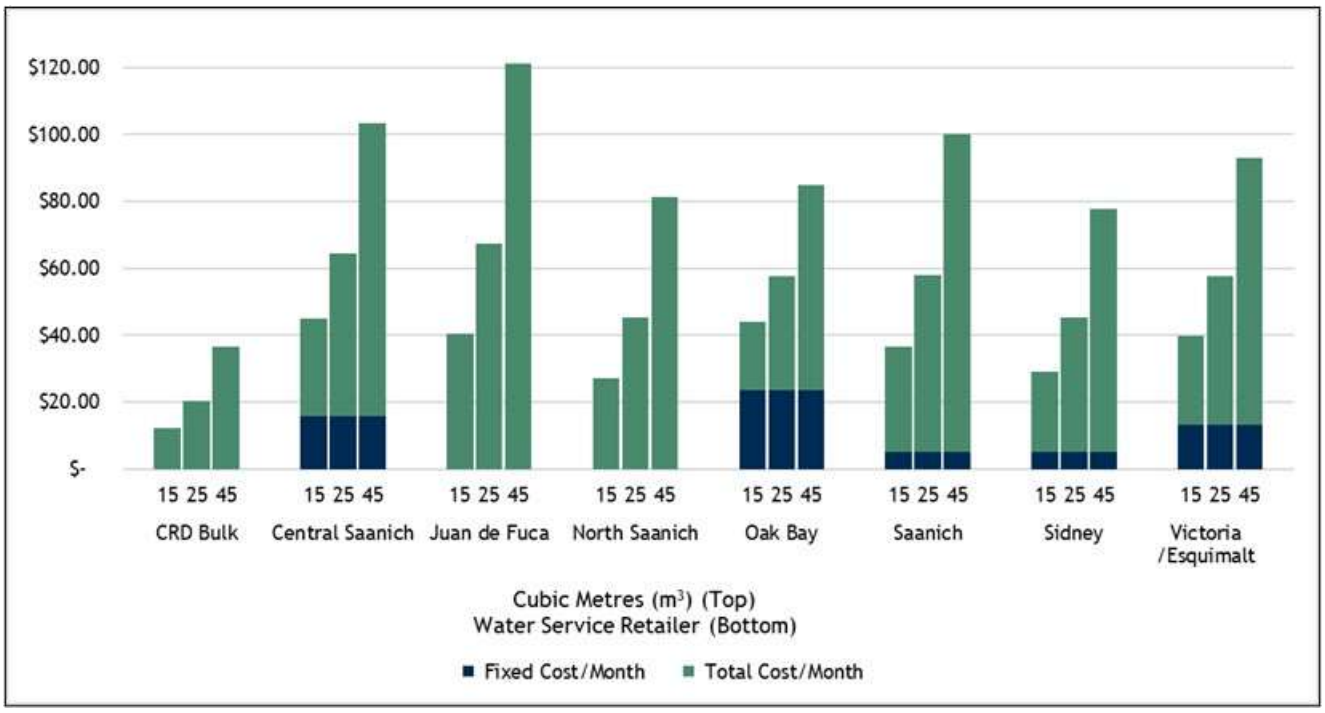

Figure A2—11: 2024 Residential Water Costs Across Water Service Retails in the CRD*
Sources: see Table 4.1 on p. 30 below

Disclaimer: Water and wastewater rates are subject to frequent changes. As well, communities rarely have similar supply availability, infrastructure composition, operating costs, or demand characteristics. Interpretation of the information in Figure 11 should therefore be viewed with the understanding that direct comparisons of water service systems are not usually possible and that there are a number of current and historical explanations for how rates are set in any one community. This community cost comparison is provided for general information purposes only and should not be relied on in isolation for making management decisions. See Section 4.1 for sources.

2.5 Engineering

Engineering approaches use emerging technology and techniques to reduce total system demand. Examples include advanced pressure and leakage management, water reuse, rainwater harvesting, smart metering, and various in-home or business technologies, sometimes involving retrofit projects for existing facilities.

2.5.1 Industrial, Commercial & Institutional Programs

ICI facilities are typically the largest individual consumers of water in any community. As such, they are an attractive target for engineering-oriented conservation programs and incentives.

The CRD offers free water use and efficiency audits to businesses. These audits help the recipients understand where water is used within their facilities and provide cost-benefit analysis of conservation measures. CRD has conducted over 40 water use audits at facilities including food services, offices, retail, schools, municipal buildings, and hospitality.

Actual audit work is outsourced to expert contractors through a competitive selection process. Program staff also follow up with representatives of facilities that have received assessments in previous years to assess progress on recommendations and support implementation.

Staff take a sector-by-sector approach to recruiting participants. For example, in 2024 the audit program is focusing effort on secondary and middle schools.

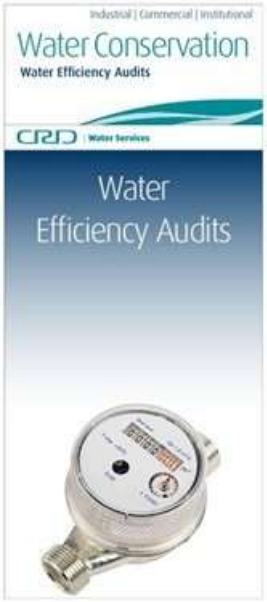

Figure A2-12: Audit Promotional Brochure
Source: CRD, 2024e

Figure A2-13 shows annual uptake for the audit program and projected water savings. CRD averages just under seven audits per year (excluding 2020), limited by budget availability. No audits were completed in 2020 due to the pandemic. Projected water savings in 2017 was significantly higher than the norm, primarily because a number of high use businesses achieved greater saving mainly due to replacement of once-through cooling systems. 2024 projected water savings estimates have not yet been completed at time of writing.

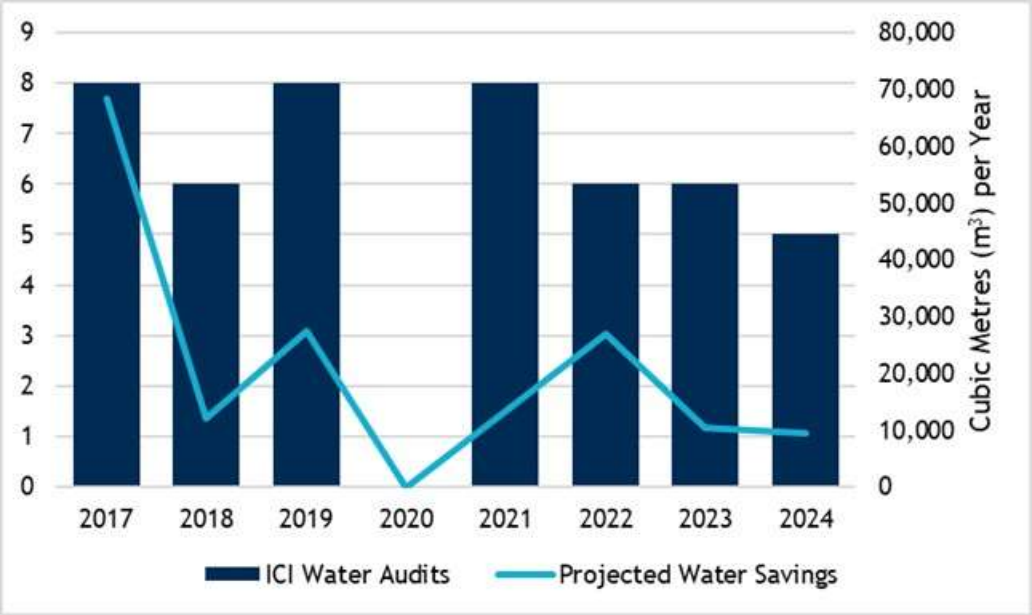

Figure A2-13: ICI Audit Program Annual Uptake & Projected Water Savings (2017-2024)
Source: CRD, 2024f

CRD also supports its ICI customers with a Commercial Aerator Replacement Program. A technician will come to any business or institution and assess faucets on all hand wash sinks. If the faucet is not operating at maximum efficiency, the aerator will be replaced with a new low flow model at no cost.

Finally, CRD continues to work toward elimination of once-through cooling in the region through the Rebate Program discussed in Section 2.2.1 and the pending regulatory ban discussed in Section 2.3.2.

2.5.2 Water Efficiency Research

CRD conducts or supports various research projects to support water efficiency programs. Some prominent recent examples include the following:

- participation in the Water Research Foundation's pending Residential End Uses of Water update;
- Water Use in the Capital Region Tourism Sector (Econics and Kerr Wood Leidal, 2022);
- Water Sub-metering to Promote Water Efficiency: A Survey of Existing Literature and Local Case Studies (Sher, 2016);
- On-Demand Hot Water Systems Research Brief (CRD, 2016b);
- Ongoing annual updates to the regional Retail Water Use database.

3. Analysis

Based on the inventory presented above, this section provides a high-level qualitative assessment of strengths, challenges, and opportunities we see in CRD's current water efficiency program. This is based on our experience working with similar programs across North America as well as best practices as outlined in key industry publications such as AWWA (2006), AWWA (2013), BC Government et. al. (2013), Maddaus (2014), and Vickers (2001).

3.1 Program Strengths

Strengths are internal characteristics of the organization that give it an advantage. CRD can count the following among these:

- By Canadian standards and taken as a whole, the current water efficiency program is robust, long running, and comprehensive, with coverage across all the 5E's of demand management.
- The program is mature with a long implementation history. Over time, elements that once made sense but no longer do have been phased out (e.g., various residential rebates). Other program elements (e.g., school programs, watering restrictions, community events) have achieved more-or-less "steady state" implementation and appear well accepted by their target markets.
- Program design and branding is clean, contemporary, and (mostly) consistent. It appears that there is good adherence to a corporate style guide. CRD as an agency is almost always clearly identified as the sponsor in brand execution. Designers have avoided the common pitfall of creating prolific and confusing sub-brands for different program areas.
- The watering restriction regime was recently reviewed and updated; each year, staff implement a predictable and extensive "seasonal priming" outreach campaign to raise awareness of restrictions. Based on market research we have conducted in CRD in the past (Econics and Metroline, 2017) and more recently elsewhere in Canada we predict relatively high resident awareness, acceptance, and compliance with requirements.
- Unlike many comparable parts of British Columbia (notably the Lower Mainland), all customers in the region are fully metered and service retailers charge for water services by volume.
- The school education program is mature and consistent with Canadian standard practice. It appears well resourced and is regularly enhanced with new elements (e.g., a recently updated watershed model).
- CRD has developed strategically important partnerships with several external organizations including local municipalities, industry partners (e.g., water audit providers) and others (e.g., local school districts, Swan Lake Nature Sanctuary). These partnerships reduce staff workload and provide a foundation for future joint initiatives.
- The ICI audit program is well established. Responsible staff have a good grasp on what works and where improvements might be merited. The pending region-wide ban on once-through cooling systems is consistent with emerging North American best practice.

3.2 Program Challenges

Challenges are either internal features that place the organization at a disadvantage or can cause difficulties. Examples in CRD's case include:

- CRD does not directly control some key aspects of holistic demand management program planning and delivery. Most notably, with the exception of communities in the Juan de Fuca Water Distribution System, local municipalities are responsible for non-revenue water management and setting water rates. As well, local municipalities have lead responsibility for most aspects of land use planning, including development approvals, building code inspections, and setting landscape bylaws. As a result, if CRD wants more active application of the many policy tools available in these areas, it must work through partnerships.
- Partially because of the limited number of tools under CRD's control (and, we suspect, partially due to budget limitations), the CRD demand management program currently focuses heavily on outreach and education. This is not necessarily a problem, and virtually all water conservation programs rely on education tools to a greater or lesser extent. However, there is strong evidence from the fields of psychology and education that, in order to measurably and materially change sustainable behaviour, community outreach programs must be very carefully designed and executed (see, for example, McKenzie-Mohr, 2011).
- Program web pages are beginning to look a bit dated relative to best practice and are not always easy to navigate.[2] Web content tends to be information intensive rather than offering a compelling user experience that will make searchers want to stay on the site. Again, research suggests that simply providing more information does not correlate with measurable behaviour change.
- The program's access to CRD corporate social media channels is limited because it competes with many other parts of the organization for space on these platforms. To illustrate, at time of writing, the most recent post directly related to water conservation that we could find on CRD's Facebook page (a post about the benefits if using native plants in gardens) was over two months' old.
- Outreach through community events (booths and tables) generally uses a passive approach that focus on distributing information through handing out print material or conversation with semi-skilled spokespeople. Best practice would see these opportunities used for more specific and measurable goals. For example, this might involve shifting to focus more on information collection (e.g., completing anonymized surveys on iPads), more systematically marketing specific programs or goals, or, within the boundaries of privacy legislation and policy, enrolling visitors on-the-spot in specific programs, then following up with them later to measure uptake and impact on behavior and water use.
- Generally, there could be more focus on measuring program impact. Where measurement is happening, it tends to focus on activities (e.g., number of events) rather than outcomes (e.g., volume of water saved). In fairness, this is a challenge we

[2] To illustrate, the top listed link for a Google search using the search terms "CRD water conservation" brings a resident to a page focused mainly on watering restrictions (www.crd.bc.ca/service/drinking-water/water-conservation). From this page, the navigation path to the water conservation parent page at www.crd.bc.ca/education/water-conservation, where many additional resources can be found, is not clearly laid out. (There is a link, but it is buried in page copy, and we suspect would be easily missed.)

see with most of the programs we have worked with. Measuring the impact of water conservation programs is challenging, and particularly so for CRD given that it does not have direct access to water meter data for most of its customers.

- Staff express frustration with some aspects of ICI-focused programs:
  - While participation in early stages of the ICI audit program is relatively healthy, there are issues with program completion by participants (i.e., actually implementing recommended retrofits and process changes). This is problematic given the up-front cost of the assessments. Again, this is a phenomenon we have seen with many of the program we have worked with that have similar offerings.
  - Uptake of the recently launched once-through cooling rebate program is well below target, which is concerning in light of the looming regulatory ban. The reasons for this are not entirely clear; however, it may be explained in part by structural challenges with the restaurant and hospitality industry that may be difficult to overcome with the current rebate design. This program is proving resource intensive relative to the water savings return.
- The regional watering restriction regime was very recently updated, so there may be little appetite to revisit this in the immediate future. Currently, CRD follows a traditional "evens & odds/mornings & evenings" approach. Best practice is shifting toward more limited watering regimes such as "mornings only" (e.g., Metro Vancouver) or "one day a week" (e.g., Region of Waterloo). Recent academic research suggests that these best practices approaches are more likely to result in material water savings (see, for example, Finley and Basu, 2020).
- Related to the point above, operational staff complain that peak demand in summer mornings is a growing concern because of operational capacity constraints. Programs that can shift some types of demand (e.g., lawn irrigation in the morning) to other times of the day will be of interest.

3.3 Program Opportunities

Opportunities are internal or external factors that might be leveraged to improve program performance. In the CRD's case, these include the following:

- With available budget from the undersubscribed once-through cooling rebate and staff interest in innovating, it may be an ideal time to pivot the ICI program. There are opportunities to target new end uses or to pilot new ways of recruiting participants to boost the chances that efficiency improvements will be fully implemented.
- Recent and upcoming research efforts (e.g., the 2022 tourism sector research, the pending WRF residential end uses of water research) can be leveraged to guide program planning based on empirical evidence.
- Expecting that education and outreach will continue to be a significant focus of the program in the future, CRD can look at best practice in other North American markets to inform website updates that offer a more compelling user experience and fresh guidance to residents.
- A compliance plan for the once-through cooling system ban has not yet been developed. There is a "clean slate" to develop a plan that will clearly communicate requirements to affected businesses and lead to higher levels of compliance.
- More effort could be directed toward working with water service retailers on best practices around less utilized demand management tools. This might include system loss management, conservation-oriented water and wastewater pricing, and water efficient land development practices.

- Related to the point above, there may be additional opportunities to work with water service retailers to reach out to high volume residential users. This could involve more sophisticated, targeted offers, particularly as automated metering infrastructure gradually becomes the norm over time.
- Within the organization, there may be opportunities to better inform staff in other areas and senior leaders about the business case for water demand management and its role in supporting the Water Master Plan.

Insights gained through this program review will be used to guide development of the new Water Conservation Plan in the next stages of the project.

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4.1 Regional Water Service Retailers Water Rates Sources

Water Service Retailer	Water Rates Information Source
Victoria/Esquimalt	https://www.victoria.ca/home-property/utilities/utility-rates-billing
Oak Bay	https://www.oakbay.ca/municipal-services/taxes-utilities/utilities/water-sewer-rates
Saanich	https://www.saanich.ca/EN/main/community/utilities-garbage/your-utility-bill/your-utility-bill/charges-explained.html
North Saanich	https://northsaanich.ca/wp-content/uploads/0118-Water-Rates-Consolidated-Bylaw-August-2023.pdf
Central Saanich	https://www.centralsaanich.ca/sites/default/files/2024-05/2175%20Fees%20and%20Charges%20Bylaw%202024.pdf
Sidney	https://www.sidney.ca/services/water-sewer-and-storm-drains/water-and-sewer-utility-charges/
Juan de Fuca System	https://www.crd.bc.ca/service/drinking-water/billing-accounts/account-balance-and-payments

Appendix 3

Residential Customer Outreach Program Direction

Appendix 3: Residential Customer Outreach Program Direction

Residential customers account for the great majority of water use in the Capital Region. Not surprisingly, much of CRD's water conservation effort is directed toward this group.

In recent years, budget allocation has focused heavily on outreach through mass media including print, radio and online platforms, as well as use of social media and staffed tables at community events. While these channels are often used by demand management programs across North America, they suffer from well-established limitations including the following:

- specific market segments (e.g., homes with scheduled irrigation systems) are not easily isolated and targeted, implying inefficient advertising spend,
- research from the fields of environmental psychology and marketing shows that providing information alone is unlikely to result in behaviour change - to achieve this, one must employ more proven outreach methods,
- the demand management program's access to CRD's social media platforms - crucial channels for reaching some audiences - is quite limited and competes with many other program areas,
- mass media advertising is ill suited to grabbing enough attention to "explain the why" of demand management – that is, to tell residents why they should be motivated to conserve or undertake other behaviour change,
- the impact that messaging through these channels makes on reducing water demand is difficult to measure directly.

Given these various challenges, program staff are highly motivated to refresh the residential outreach program and explore more innovative ways to reach target audiences.

Key Elements of Refreshed Program Direction

Below are planned elements of a refreshed direction for CRD's residential outreach programs. This direction is based on findings from two in-person workshops with responsible staff, as well as the project consulting team's experience with similar programs across Canada and elsewhere. The key elements are:

- Effort will be directed to more precisely define and direct demand management outreach at specific market segments. For example, there is currently high interest in reaching the following group, which accounts for a very small fragment of the total market, precisely defined as follows:
    - *Owners of single-family homes with automatic irrigation systems that have programmed timers, and who irrigate regularly, do not already have their system programmed to irrigate at off peak hours, and are amenable to changing this programming.*

- Outreach will be more driven by principles of community based social marketing (see McKenzie-Mohr, 2011) including the following:

    - market research: outreach will be informed by the best available information on why residents continue to engage in specific water use behaviours, and particularly the barriers that prevent people from changing.

  - pilot projects: prior to launching large new projects, smaller, precisely designed pilot projects will be conducted to test methods; results will be quantitatively measured, and the approach will be refined based on results.
  - tools of change: emphasis will be placed on employing tools proven to result in behaviour change including social norming, commitments, and prompts.

- Emphasis on two-way communication with customers will increase. This means providing more opportunities for customers to ask questions about programs, engage in conversations about why conservation is important, tell CRD about the barriers that prevent change, and measure the impact that programs have. This can be mediated through online forums, increased direct interaction, and more creative use of staffed tables at summer events.

- More attention will be devoted to measuring outcomes, particularly behaviour change and water use reductions. This will include measurement through customer meters, market research studies based on random participant selection, surveys of program participants, and new technology (e.g., flow monitoring, GIS, etc.).

- Residents often tell staff that they understand the need for various actions but need more step-by-step guidance (e.g., how to convert grass to meadow, design their own native plant garden, fix their own irrigation system, etc.). This "how to" information needs to be better incorporated into outreach collateral.

Implementation & Next Steps

Based on the key elements outlined above, next steps are as follows:

1. Staff will revise plans for the spring 2025 advertising and mass mail campaign to more precisely target homes likely to have irrigation systems. For example, this may include using a mailing list already available within CRD and/or directing mail outs to geographic areas with demographics that correlate with irrigation system ownership.

2. Staff will revise plans for staffed tables at the summer events to focus on one or a small set of specific objectives. This will require enhanced training/mentoring for seasonal staff and designing a new survey instrument for table visitors.

3. Staff will clarify how resident data can be collected and used for water conservation program delivery. For example, this may include water use information, results from surveys of program participants, and information collected at staffed event tables. Among other things, this will include clarifying requirements for setting up mailing lists or for direct outreach to residents.

4. CRD will seek in-depth training opportunities on community based social marketing including high-level training (e.g., short seminars) for managers and leaders that need familiarity with the concepts and methods.

5. Staff will investigate updating the CRD Residential Water Survey, which has not been completed since 2017, including looking into potential overlap with the survey already planned for pending participation in the Water Research Foundation Residential End Uses of Water (V3) study.

Appendix 4

Industrial, Commercial & Institutional Program Direction

Appendix 4: Industrial, Commercial & Institutional Program Direction

The non-residential sector accounts for over a quarter of the region's water consumption. Both local and national evidence suggests that there are still opportunities for many of these customers to improve their water use efficiency and reduce operational costs.

CRD has a long running and successful suite of programs targeted at industrial, commercial, and institutional customers. These are anchored by the audit program, wherein customers receive free inspections of their facilities by a contracted qualified professional, followed by a report that outlines cost effective ways to save water. Other program elements include the following:

- rebates for replacement of once-through cooling systems and a pending ban of once-through cooling systems;
- customer education and outreach to encourage reduction in peak demand, delivered in conjunction with residential programs;
- supporting demand management efforts of retail water suppliers and multi-use residential property managers;
- tap aerator and pre-rinse spray valve giveaways; and,
- leak detection and smart metering device pilot studies.

In recent years, staff have noted several challenges with the water use audit portion of the program, particularly that customers are often slow to implement audit recommendations. This is attributed to a variety of internal administrative and financial factors within participating organizations. Issues include staff turnover, low engagement by senior leaders and financial managers, and the fact that audit recommendations can sometimes be costly and complex.

Key Elements of Refreshed Water Audit Program Direction

This section lists the key elements of a refreshed direction for the industrial, commercial, and institutional audit program. This direction is based on findings from two in-person workshops with responsible CRD staff and the consulting team's experience with similar programs across Canada and elsewhere. Key elements are:

- The program will continue to be anchored by technical facility water use audits, completed by contracted professionals.

- The recruitment/engagement phase of the audit program will be enhanced to place much more emphasis on screening and qualifying candidate organizations prior to entering them into the program.

- A guiding philosophy of the enhanced program will be that, if a participant is not experiencing some kind of specific pain point related to their water, they will be unlikely to fully implement audit recommendations. Therefore, fully understanding their motives for participating is crucial, noting that motives may go beyond simply saving money.

- CRD program staff will seek to engage a broader cohort of people within candidate organizations during the recruitment phase. This should include senior managers and financial administrators, with the goal of ensuring broad buy-in to participation and post-audit implementation.

- CRD staff will pilot different approaches to securing customer commitment to implement cost effective recommendations after audits are completed. These will include better communicating the full value proposition and tying recommendations to other goals such as affordability, future liability, and business values/corporate responsibility

- Where incentives continue to be available (such as the once-through cooling retrofit rebates currently on-offer), these will be more tightly focused on motivating implementation of audit recommendations.

- Greater attention will be devoted to understanding and integrating with participant's asset renewal plans and financial payback expectations. A potential approach would be to review audit participants' capital plans with them every 5 years or so to identify projects that have high potential for improving efficiency (ideally using the water audit to quantify potential savings). This may require that implementation of audit recommendations takes place on multi-year cycles, necessitating ongoing contact and relationships with participants.

- In recent years CRD has recruited participants mainly on a sector-by-sector basis (e.g., schools in one year, hotels in another). Going forward, it will trial new recruitment methods with the goal of identifying more highly motivated participants. These may include: advertising, seeking referrals from past participants, reengaging past participants, more active recruitment of source control program customers, or using enhanced analysis of retail billing data.

- CRD will explore the benefits of using new technology like meter data logging devices and advanced metering infrastructure to provide better information about where and when water is consumed within facilities.

Implementation & Next Steps

Based on the key elements outlined above, next steps are as follows:

1. Program staff will develop a formal, written business process handbook that will include recruitment, audit, and follow up stages. Included in this will be a customer qualification screening tool designed to gauge likelihood of implementing results post audit. This document will be continuously improved based on outcomes.

2. Staff will conduct informal but well-planned trials and pilot projects to test different approaches in the following areas:
    - format of pre-audit agreements with participating organizations (ranging from formal to informal),
    - methods of engaging leaders and financial managers in participant organizations, and

- participant recruitment and selection using the methods listed above (advertising, referrals, etc.).

3. Staff will explore options for targeting and marketing currently under-subscribed once-through cooling rebates to better incentivize audit participation and implementation.

4. CRD's audit program contract will be renewed or re-issued following CRD's procurement policies and process. Contract requirements will be modified as required to reflect the changes in program direction set out here.

5. Organizationally, CRD staff will develop a plan to improve management of industrial, commercial, and institutional data including retail billing data. The goal is to improve both recruitment and measurement of program results (i.e., water savings after participation). It is noted that depends on the ability to modify service agreements with water service retailers in the region. More information on this task is provided in Appendix 5 (Water Use Data, Information, and Accounting).

Appendix 5

Water Use Data, Information & Accounting

Appendix 5: Water Use Data, Information & Accounting

CRD depends on accurate data and information to make decisions about investment and timing of demand management programs and infrastructure planning more broadly. Fortunately, it has access to very good information about how residents use water including both quantitative data from meters and from residents themselves through market research. A non-exhaustive list of current and planned information and data sources can be found in the following table:

Table A5-1: Sources of Water Use & Conservation Data and Information

Information Source	Examples
Water production data from treatment facilities	• Treatment plant master meters • Retail bulk water meters • Instantaneous water demand data
Customer consumption data	• Customer meters (provided by region water service retailers though the annual Retail Water Database) • WRF Residential End Uses of Water study (pending) • Smart home water monitoring systems (e.g., Flume) • Advanced Metering Infrastructure (AMI) data (emerging best practice) • Industrial/commercial/institutional customer end use and consumption data from the ICI audit program
Market research	• Statistically reliable market research studies based on large samples and random selection of participants • Market research data collection through programs (e.g., events, workshops)
Other	• Water audits based on American Water Works Association M36 Manual methodology • GIS studies (e.g., overlaying water consumption data with demographic and planning layers)

Because water service retailers are responsible for customer billing, including collecting meter data, effective water use accounting in the region means working in partnership. This requires establishing clear data specifications, protecting privacy and personal data, and ensuring data quality control and accuracy.

With this in mind, while preparing the Water Conservation Plan, various challenges with water information and data were identified. These include the following:

- The Retail Water Database is a fundamentally important dataset for planning and evaluating demand management strategies and progress toward overall objectives. However, the current state of the data collected annually from retailers necessitates high effort to compile and "clean" a master CRD dataset each year. This is due to data quality and consistency issues including inconsistent use of billing codes, miscoded accounts, use of different units of measure, and differing billing cycles (which makes it difficult to align consumption trends between communities). Some of these issues arise due to lack of standardization and some due to different billing systems. Solving these issues will require working collaboratively with retailers and likely formalizing best practices through updated service agreements.

- Historically, CRD regularly commissioned robust, statistically reliable market research studies on water use behaviour and attitudes; however, this has not been undertaken since 2017.
- Water service retailers regularly communicate with residents about leaks on private property as part of billing processes, but there are no formal systems in place for CRD to gain information about the extent of this or for CRD to optimally support retailers with things like leak detection and repair outreach material.
- Results from analysis of non-revenue water levels can vary due to different water use accounting practices and use of different data sets.
- Opportunities to collect market research information from residents at very low cost and effort are not capitalized on, for example through tables at community events.
- Important new technology and best practices are emerging with the development Advanced Metering Infrastructure and smart home monitoring systems, but there is no region-wide plan to ensure that this is implemented consistently or in a timely manner.

Given these various challenges, program staff are highly interested in refreshing the CRD's approach to data and information management related to water conservation.

Key Elements of Refreshed Program Direction

Below are planned elements of a refreshed direction. This direction is based on findings from several meetings with responsible staff, as well as the project consulting team's experience with similar programs across Canada and elsewhere. The key elements are:

- Collaborate with all retail water service providers and billing software vendors to improve quality and collection efficiency of retail water use data (see note 1 below).
- Explore opportunities to pilot the use of AMI and meter data logging devices for targeted program delivery and performance assessment (see note 2 below).
- Establish common "master" water use datasets and tools for operations, engineering, finance and demand management uses (see note 3 below).
- Update the CRD Residential Water Survey, a market research study with customers that was last conducted in 2017.
- Clarify privacy and personal data requirements to ensure protection of customer information and to confirm how this information can and cannot be used to support conservation program delivery.
- Complete targeted market research and other studies to support pilot project development and program enhancements discussed under other themes in this plan.
- Continue research projects already underway, notably participation in the WRF Residential End Uses of Water Study.

Notes:

1. **Collaborate with all retail water service providers and billing software vendors to improve quality and collection efficiency of retail water use data.**

   Most or all municipal retailers use one of two software products for water billing: Tempest and Vadim, both of which were developed in BC and have been acquired by CentralSquare Technologies. CRD uses SAP for utility billing for the Juan de Fuca Water Distribution System serving West Shore communities.

As CRD updates service agreements with retailers, there is an opportunity to collaboratively develop a single data standard and annual procedure for retail water use reporting, with vendor support for implementation. Key elements include:

- standardization of how BC Assessment Actual Use Codes (and ideally also North American Industry Classification System codes) are assigned to customer accounts,
- standardized property and meter location information (including Jurisdiction/Roll number and meter UTM coordinates if available),
- a consistent report structure for meter reading and billing cycle dates, and
- consistent units of consumption, standardized on cubic metres.

These measures would help to make the data ready for use in a GIS platform, and ready for the increased frequency of consumption data collection that will be enabled by Advanced Meter Infrastructure systems.

2. **Explore opportunities to pilot the use of AMI and meter data logging devices for targeted program delivery and performance assessment.**

AMI (fixed-network radio meter reading) systems have improved in reliability and decreased in cost over the past ten years to the extent that it is likely that every retailer in the CRD will begin transitioning to this technology as aging meters are replaced over the next decade. AMI systems are generally capable of collecting and recording retail water use every hour, or even every minute.

Early implementation of AMI presents an excellent opportunity for targeting demand measures especially for leakage management, landscape watering (including measures to manage peak demands), and targeting and monitoring industrial/commercial/ institutional facility audits. Leveraging AMI data should be explored with retailers in conjunction with the approach set out above in Note 1.

Portable water meter data logging devices have also rapidly become affordable and accessible on the mass market in the past 10 years. The North American market leader, Flume, is a cloud-based data collection service based in California that has partnered with CRD for the current update to the Water Research Foundation's Residential End Uses of Water Study. Some competing products offer potential advantages over Flume, including local data collection that does not rely on local Wi-Fi or centralized US-based data collection. It is recommended that CRD continue evaluating these data logging technologies for industrial/commercial/institutional water audits and neighbourhood-scale targeting or piloting of residential demand management measures.

3. **Establish common "master" water use datasets and tools for operations, engineering, finance and demand management uses.**

The collection and use of water data related to the Regional Water Supply service is generally ad-hoc and driven by individual program or project needs. Several work groups would benefit from a single "source of truth" that reconciles total supply flows, bulk sales, and retail water use data at various time scales.

Appendix 6

Water Conservation Program Targets

Appendix 6: Water Conservation Plan Targets

This appendix provides additional information on the program targets set out in Section 7 Water Conservation Plan.

Target 1: Total Water Production

Reduce per capita water production from treatment facilities by 0.9% year-over-year to achieve a target of 300 LCD by 2035

Reducing the total amount of water produced at CRD's water treatment facilities, measured on a per capita basis, is a key goal of this Plan.

This target is simple in principle to calculate and track. However, the influence of factors outside CRD's control needs careful consideration. These factors include population growth and housing form. Therefore, at a more diagnostic level, the "business as usual" scenario should be adjusted for such factors to assess the real impact of demand management programs on total demand. Based on the current regional population projection of 1.66% annual growth through 2038, and the densification rates indicated by available housing projections, a status quo annual demand of 65 gigalitres (GL/year) is projected for 2025; however, a range of 50 to 80 GL/year is plausible, and year-to-year variation due to weather and other factors must be taken into account. A 0.9% year-over-year reduction will be difficult to measure with such a high degree of uncertainty.

A practical approach would be to monitor performance against 5-year milestone targets based on more precise forecasts, using program data as supporting evidence for measuring savings. The target reduction for each 5-year period would be 0.6% below the status quo forecast, or 1.2% by 2035. A five-year forecast can be accurately calibrated against actual data for population, land use and other factors using a robust demand model, and good program and demand data.

Target 2: Residential Consumption

Reduce residential per capita consumption by 1.2% year-over-year to achieve a target of 200 LCD by 2035

Residential per capita consumption is widely considered a standard benchmark for measurement of water efficiency program impact across North America.

This target is easy to monitor using currently available retail water use data and serves as the largest component of Target 1 (representing roughly a 3% reduction from the 2050 mid-range "business as usual" forecast). The current regional average is approximately 225 LCD with 227 serving as the benchmark (the 2023 result).

It is important to recognize that average demand fluctuates from year to year due to weather, so a weather-normalized value or a trendline is a more reliable (though lagging) indicator than single-year actual demand.

This target also supports monitoring progress on the other targets.

Target 3: Instantaneous Peak Demand

Reduce the maximum change in instantaneous flow rate at 4:00am from 46% to 20%

This is measured as the difference from 4:00am to 4:05am and is equivalent to a reduction in the maximum rate of change in instantaneous flow in the transmission system from 9% per minute to 4% per minute. Note that this does not imply that the goal is to simply shift the peak flow from 4:00am to 4:05am but rather to reduce the peak demand generally and to spread the flow increase over a longer period (for example, by encouraging those who continue to irrigate with automatic systems to set timers to different times of the morning).

Reducing instantaneous peak demand in the early hours of the morning, much of which is attributable to automatic irrigation systems, is a key goal of this plan. This target has been suggested by CRD operation staff. It is also a practical target that potentially has high value in improving reliability of the supply system, reducing failure risks, and "buying time" to plan and implement appropriate capital measures to address the supply system constraints. The primary demand management objective would be to motivate retail customers to shift automatic irrigation system start times away from 4:00am and, to a lesser extent, away from 5:00am as well.

This target has the advantage of being very specific and measurable, and achievable within the first five-year planning cycle through a combination of minor amendments to the Water Conservation Bylaw and a highly targeted outreach campaign toward irrigation system maintenance contractors and home and business owners with these systems.

Target 4: Peak Season Demand

Maintain Maximum Day Demand at 300 megalitres per day (ML/day) through 2035

Controlling peak season demand, measured by change in the Maximum Day Demand (the day in a year with the highest total daily water production) is an important goal for most communities. This is particularly important locally given the Capital Region's hot, dry summers and relatively high seasonal demand.

This target represents a 5% reduction from KWL's mid-range "business as usual" demand management forecast. Factors including climate change, population growth, and rate of densification would need to be monitored on a 5-year review and planning cycle. The target may need to be adjusted if the demand management mid-range forecast proves too optimistic over time.

There are many potential strategies to influence MDD, which has already significantly decreased since the 1980s and was routinely above 300 ML/d before 2010, though it has been consistently below this level since then. CRD's immediate plans to address this are set out in the Water Conservation Plan (see Section 5, Theme 3).

Appendix 7

Impact of Water Conservation Plan on Water Production - Quantitative Analysis

Appendix 7: Impact of Water Conservation Plan on Water Production - Quantitative Analysis

This Appendix defines estimated water savings associated with implementing several key Action described in the in the Water Conservation Strategy.

If the recommended water conservation measures are implemented as described in the main report, it is estimated that annual total water demand will be reduced relative to the status quo (continuation of the current course) by approximately 3% to 5% over 10 years (i.e. by 2035). Maximum day demand is estimated to be reduced by 4% to 9% in the same timeframe. The reductions are attributed to specific program measures as shown in Table A7-1 below. Discussion of the rationale follows the table.

Table A7-1: Estimated Water Savings Under Recommended Water Efficiency Program

#	Action	Estimated Reduction	% of Total Production	Reduction of Total Production	% of MDD	Reduction of MDD
1.1	Regional non-revenue water management community of practice	5 to 10%	10.0%	0.5 to 1%	5.6%	0.3 to 0.6%
2.1, 2.2 2.3	Review & update Water Conservation Bylaw	5 to 10%	22.2%	1 to 2%	59%	3 to 6%
3.6	Water Use Assessment Program	0.4%	21.1%	0.1%	11.8%	0.05%
3.7	Phase out once-through cooling systems	70 to 90%	0.3%	0.2 to 0.3%	0.18%	0.2%
2.4, 2.5 3.1, 3.2 3.3, 3.4	Education and outreach	1-2%	90.0%	1-2%	90.0%	1% to 2%
Total Estimated 10-Year Water Savings				**3 to 5%**		**4 to 9%**

Regional Non-Revenue Water Community of Practice (Action 1.1)

Non-Revenue Water (NRW) is approximately 10% of total water production region-wide, averaging approximately 4,600 ML between 2011 and 2023; however, it has fluctuated between 1,400 and 7,300 ML/year. NRW is forecasted to increase to 5,500 ML in 2035 under a status quo scenario.

The AWWA *M36 Water Audits and Loss Control Programs* Manual of Practice (5th ed., 2020) prescribes a water balance method for estimating the minimum amount of background leakage in a water distribution system that cannot be economically reduced. It assigns a unitless Infrastructure Condition Factor (ICF) of 1.0 to this level of real loss (system leakage). Based on the regional retail data and available information about distribution system characteristics (Water demand forecast Excel spreadsheet, KWL, 2025), the current ICF values for the local water supplier (municipal and First Nations) systems connected to the Regional Water Supply (RWS) System range from 1 (Sidney) to 7 (Victoria and Esquimalt).

Although NRW for the CRD RWS, JDF and SPW systems is not reported in the retail dataset, KWL has previously estimated real losses and ICFs for each system (GVWSS Audit, 2017). Real losses in the RWS system were estimated at 235 ML, although apparent losses due to meter inaccuracies and unmetered connections to Saanich and Victoria increased the total estimate of NRW to 2,800 ML. These bulk metering deficiencies are a likely cause of the fluctuation in

NRW reported in the retail data for Victoria/Esquimalt and Saanich. Losses in the SPW and JDF West Shore systems are difficult to separate from those in the RWS system due to bulk metering deficiencies between the three CRD systems. NRW was estimated to be between 700 and 1,600 ML annually in the JDF West Shore system, and approximately 360 ML in the Sooke system.

The high degree of uncertainty and fluctuation in NRW data indicates a clear opportunity to more effectively measure real losses in Greater Victoria water systems and to pursue cost-effective measures to reduce them. The available data indicate high potential to economically reduce real losses in most of the distribution systems connected to the RWS system. It is conservatively estimated that establishing a NRW community of practice (COP) can reduce NRW by 5-10% region-wide, representing a 0.5-1% reduction in total annual supply flow and a 0.3-0.6% reduction in MDD. The COP would include staff of CRD and municipal water services and would regularly meet to coordinate system water audits, efforts to maintain and improve bulk metering, and prioritization of economical measures to reduce real losses. The work arising from the COP would be budgeted individually by water utilities under their engineering and capital programs and is therefore not included in the estimated cost of this measure. The level of effort to convene the COP meetings is estimated to be within the existing capacity of demand management program staff and program resources. It is assumed that water savings from this measure would accumulate uniformly between 2026 and 2035. Assuming the COP remains active over time and distribution system owners continue to invest in cost-effective measures to manage water losses, the savings achieved by this action will be durable indefinitely.

Water Conservation Bylaw Review and Update (Actions 2.1, 2.2, 2.3)

Seasonal water use in recent years has ranged from 12,000 to 14,000 ML annually, representing roughly 30% of total annual water use in Greater Victoria, and approximately 60% of MDD. Agricultural use is approximately 3% of seasonal demand, and indoor seasonal uses including tourism and cooling uses are a small fraction. CRD has made only minor changes to its Water Conservation Bylaw (lawn and gardening schedule restrictions) in the past 25 years. Based on Econics and KWL experience with other jurisdictions, adjusting the allowable days and times for sprinkler irrigation of lawns and gardens can substantially reduce seasonal water demand. Through a series of revisions to its Drinking Water Conservation Plan, Metro Vancouver has held its total seasonal water demand roughly constant at 50 BL and has reduced MDD from 1,800 to 1,600 on average (11%) despite 35% regional growth in the same period. Similar results have been achieved in Region of Waterloo after it transitioned to a “one day per week” schedule. These results are also supported by recent academic research (see “Irrigation Bylaws: What is Best Practice?” under Goal 2 in the main report).

Revisions to the Water Conservation Bylaw based on review and analysis of the potential impact of changes to watering restrictions on seasonal and peak demands has high potential to reduce total annual demand and MDD. This also brings the added benefit of reducing the instantaneous increase in demand associated with automatic irrigation systems simultaneously starting on watering days. It is estimated that the impacts of bylaw review and resulting amendments, supported by subsequent changes in outreach and compliance strategies (Actions 2.2 and 2.3) would reduce annual total demand by 1-2% and MDD by 3-6% gradually over three years between 2028 and 2031. These actions might be completed with current staff and program resources, but modest increases to communications and bylaw enforcement resources would increase likelihood of success. Assuming these communication and

compliance efforts are sustained over time, the savings achieved by this action will be durable indefinitely.

Water Use Assessment Program (Action 3.6)

The Industrial, Commercial and Institutional (ICI) sectors together comprise approximately 23% of total retail water consumption and 21% of total production (11,000 ML/year). The ICI water use assessment program is estimated to have generated savings of roughly 15 ML/year between 2021 and 2024 (4 ML/year for each year of program delivery on average). It is conservatively estimated that by increasing the focus on relationships, commitments and follow-up, the water use assessment program can achieve savings of 5 ML/year every year between 2026 and 2035, totalling savings of 50 ML/year by 2035 (0.1% of total annual water production and 0.05% of MDD).

This is a relatively modest volume of water savings compared to other measures assessed in this appendix. However, it is important to note that this assumes that program continues at the current relatively modest level of effort (5 to 10 audits per year). Should CRD increase resources allocated to this program (based on the improved performance monitoring described in Appendix 4), total water savings would presumably increase correspondingly.

It is assumed that half of the savings achieved by this action will be durable indefinitely (i.e. replacement of inefficient fixtures and appliances with more efficient ones) and the other half (i.e. changes in work practices) will deteriorate between five and ten years after assessments if regular follow-up contacts with assessment recipients as part of an ongoing program are discontinued.

This action can be completed with current staff and program resources, albeit at current level of effort only, again noting that any decision to increase effort should be made based on improved performance monitoring of water savings from audits facilities.

Phase out once-through cooling (Action 3.7)

Initial results from a current research project into prevalence of remaining once through cooling systems points to a rough estimate of 100 once-through cooling (OTC) systems still operating in Greater Victoria, primarily in the restaurant and food service sector. On average these systems are estimated to use 1.5 ML/year (representing a typical 12,000 BTU/h condensing unit operating 12 hours a day) for a total water use of 300 ML/year. Assuming 70-90% of OTC water use will be eliminated through regulation and effective compliance communication and enforcement, annual total water savings are estimated to be 0.2 to 0.3% of total annual production and 0.2% of MDD. Given that communications to refrigeration contractors and system owners is ongoing in 2025, and that the prohibition will take effect in 2028, is assumed that the savings will be realized between 2026 and 2029. This action can be completed with current staff and program resources. Assuming communication and compliance strategies are sustained over time, the savings achieved by this action will be durable indefinitely.

Education and Outreach (Actions 2.4, 2.5 3.1, 3.2 3.3, 3.4)

Although difficult to measure directly, it is assumed that an ongoing program of well-designed and executed community-based social marketing campaigns will reduce water demand by 1 to 2% in addition to other program measures.

Effective education and outreach are necessary to support the other measures described in this section, and most of the savings achieved through communications is included in the estimates above. However, some water savings are unrelated to the end uses of water already described (e.g., behavioural change and increased selection of high-efficiency fixtures and appliances that reduce indoor residential water demand below the status quo). The overall impact of an effective education and outreach program is a significant shift in choices made by large groups of water users who are influenced by the program.

An example pathway for achieving a 2% region-wide reduction in demand through social marketing is a sustained campaign to promptly address leaking toilet flapper valves and water service lines. Leakage is estimated to be roughly 10% of residential indoor water use in North America (see Water Research Foundation Residential End Uses of Water Studies, 1999 and 2016). Residential base demand is just under half of total annual water use in Greater Victoria, so a 20 to 40% reduction in residential leakage resulting from a targeted and sustained social marketing campaign would achieve a 1 to 2% reduction in total water demand.

It is important to note that additional savings from education and outreach beyond the status quo are predicated on transitioning to a community-based social marketing approach, and improved monitoring of performance as described in Appendix 3. Conversely, continuation of passive, information-intensive marketing campaigns primarily delivered through mass media channels is unlikely to achieve any additional water savings. Moreover, attaining the savings described here is also predicated on increased resourcing of communications staff, as described in the main report.

It is assumed that the water savings resulting from this action would be achieved gradually between 2026 and 2035 and would deteriorate to zero over ten years if the program is discontinued.

Research and Pilot Project (Actions 1.2 1.3, 1.4, 3.5, 4.1, 4.2, 4.3, 4.4)

Research, data-collection, and monitoring actions (Actions 4.1, 4.2, 4.3, 4.4) do not directly contribute to water savings, but are essential to target, measure, and sustain reductions. Similarly, this plan identifies several pilot projects that will initially be delivered on a small scale or specifically in the Juan de Fuca system (Actions 1.2, 1.3, 1.4. 3.5). Water savings from these pilots will initially be relatively small, so are not included in modelling. However, over time these could grow to significantly reduce total water production should be prove successful and scale up to region-wide delivery

The overall impact of the recommended demand management program on forecasted water demand over the next ten years is shown in the figures on the following page.

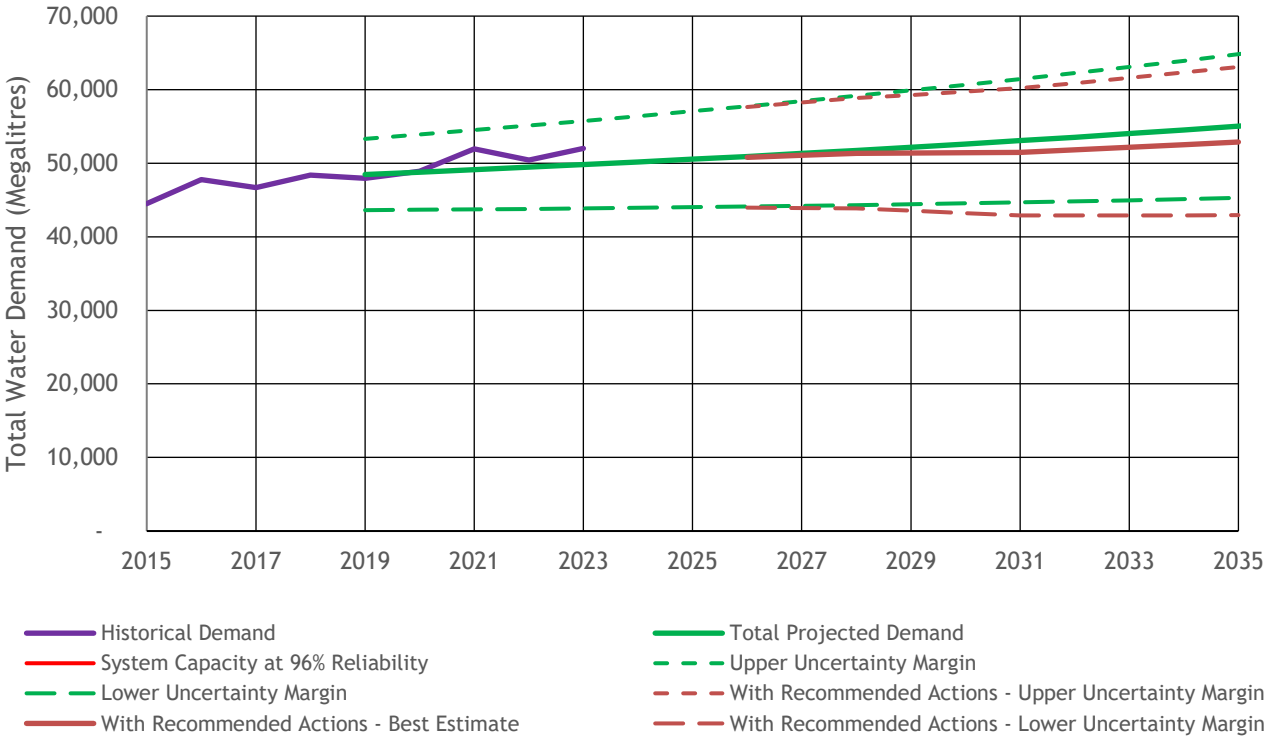

Figure A7-1: **Estimated Impact of Recommended Actions on Annual Total Demand**

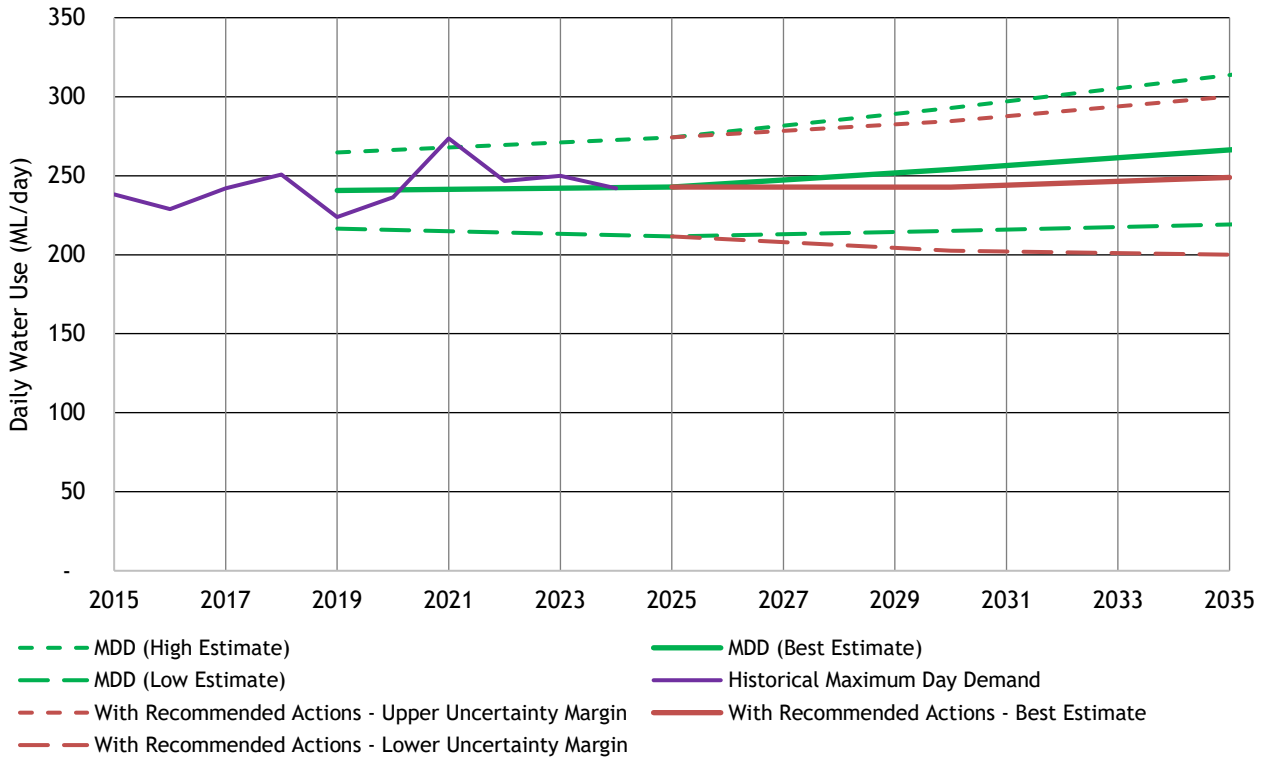

Figure A7-2: **Estimated Impact of Recommended Actions on Maximum Day Demand**

Water Conservation Plan for Greater Victoria

November 25, 2025

Danielle Buckle, Water Conservation Assistant
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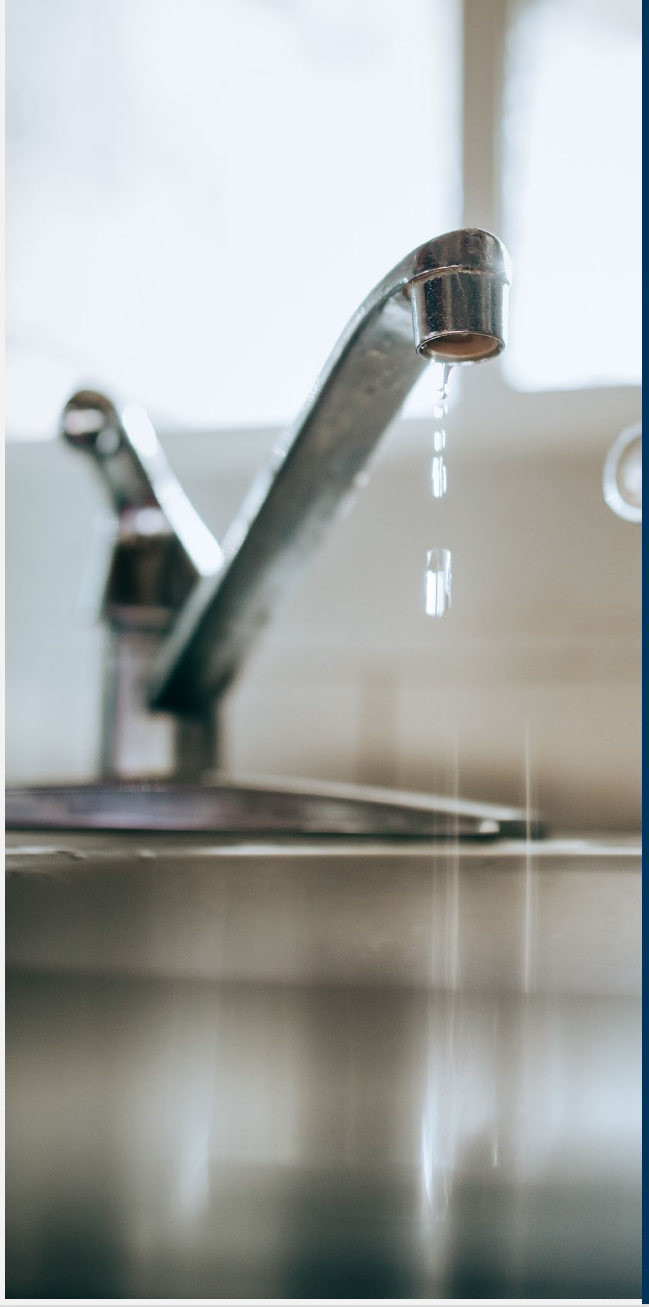
Water Conservation Plan Objectives

- reduce per capita water production and consumption
- manage seasonal peak demand
- improve water use accounting and management of non-revenue water
- program delivery is data driven, measured, and tracked
- encourage wise water use for the Capital Region
- enhance the CRD's reputation as a trusted steward of the region's water resources
- help residents and businesses understand why they should conserve water and the ways that they can do so



Water Conservation Plan Goals

1. Lead and support collaborative conservation best practices in water distribution systems
2. Reduce outdoor water use and instantaneous peak demand
3. Foster community water stewardship and encourage efficient use
4. Improve understanding of community water use through research and monitoring

Goal 1
Lead and support collaborative conservation best practices in water distribution systems

1. Establish a regional non-revenue water management community of practice
2. Investigate the potential impact of conservation-oriented water services pricing in the Juan de Fuca Water System
3. Pilot advanced metering infrastructure in the Juan de Fuca Water System
4. Collaborate with local water suppliers to promote additional water efficiency best practices

Goal 2
Reduce outdoor water use and instantaneous peak demand

1. Review the effectiveness of the Water Conservation Bylaw; based on results, implement new best practices appropriate for the Capital Region
2. Review Water Conservation Bylaw compliance and enforcement regime
3. Enhance outdoor irrigation outreach including campaigns aimed at Water Conservation Bylaw compliance and at reducing peak instantaneous demand
4. Develop “Healthy Landscapes” outreach pilot project Continue native plant gardening workshops

Goal 3
Foster community water stewardship and encourage efficient use

1. Continue print and online education campaigns and share learning resources
2. Attend community events to directly engage with residents
3. Promote the annual “Fix a Leak Week” campaign
4. Continue to deliver ‘Every Drop Counts’ school programs

Goal 3
Foster community water stewardship and encourage efficient use

4. Implement a multi-unit residential building water efficiency pilot project

5. Enhance the industrial, commercial, and institutional Water Use Assessment Program

6. Phase out once-through cooling systems; promote best practices in other cooling technology

Goal 4
Improve understanding of community water use through research and monitoring

1. Participate in the Residential End Uses of Water Study
2. Update the CRD Residential Water Survey
3. Continue annual updates to the Regional Retail Water Use Database
4. Refine plan implementation through an adaptive management approach

Targets

Target 1: Total Water Production

- Reduce per capita water production from treatment facilities by 0.9% year-over-year to achieve a target of 300 litres per capita per day (LCD) by 2035

Target 2: Residential Consumption

- Reduce residential per capita consumption by 1.2% year-over-year to achieve a target of 200 LCD by 2035

Target 3: Instantaneous Peak Demand

- Reduce the maximum change in instantaneous flow rate at 4:00am from 46% to 20%

Target 4: Peak Season Demand

- Maintain Maximum Day Demand at 300 megalitres per day (ML/day) through 2035

Benefits of the Plan

Expected to reduce:

- total annual water production in the by 3-6%
- maximum day demand by 5-9 % by 2035.

Community:

- Enhances drought and climate resilience, safeguards water supplies for emergencies, improves drinking water quality, promotes fairness in water use, and fosters a shared ethic of stewardship and conservation.

Financial:

- Optimize the use of water infrastructure for the CRD, member municipalities and individual users. Accelerates energy efficiency and helps lower utility costs

Environmental:

- Reduces energy consumption and greenhouse gas emissions, enhances stormwater absorption during heavy rains, and helps maintain natural stream flows and aquatic habitats.

Questions & Feedback

Thank You!

Research Partnerships and Projects in the Greater Victoria Water Supply Area

Water Advisory Committee
November 25, 2025

Purpose of the Presentation

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To highlight the importance and benefits of research partnerships, collaborations, and projects in risk management, climate adaptation, watershed and water supply planning, and advancing watershed protection and stewardship.

Overview of Presentation

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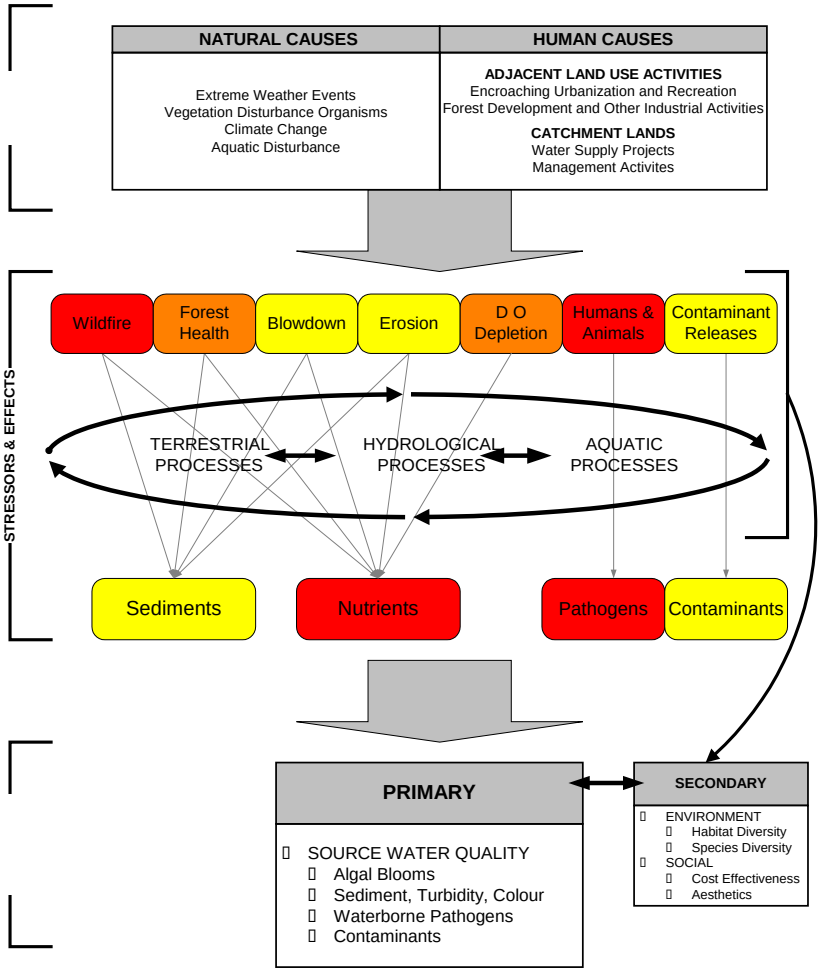
- Direction Relevant to Research from IWS Strategic Plans
- Types of Research Partnerships and Projects and the Benefits of Research
- Overviews of Key Research Undertaken with Partners
- A Listing of Other Research Projects Undertaken in the GVWSA
- How Research Results Have Informed Watershed Protection and Stewardship and Could Inform Major Infrastructure Projects

Research in the GVWSA Prior to 1999

Research areas included:

- Genetic trials of tree species
- Forest growth
- Use of hyperspectral satellite imagery and LiDAR to characterize forests

Research Direction from RWS Strategic Plans



- Direction from the 1999 Strategic Plan focused on information needed to reduce risks to water quality and supply.
- Direction from the 2012 Strategic Plan focused on assessing the potential effects of climate change on the water supply area and identified risks and the importance of collaborative partnerships in research.
- The encouragement of collaborative partnerships for research and stewardship has continued in subsequent strategic plans.

Acres International et al. 1999

Research is Part of an Integrated Approach to Risk Management

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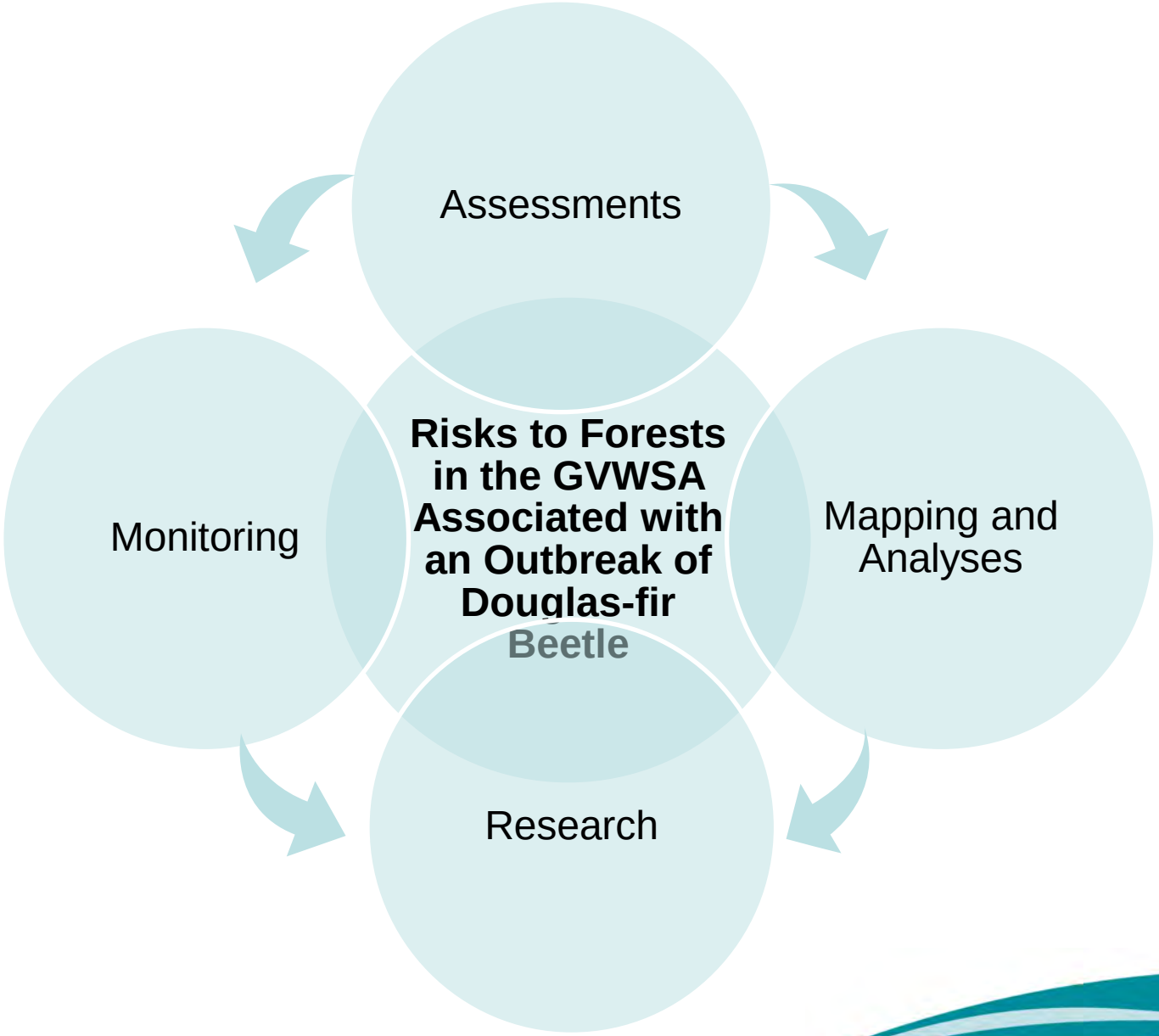

Types of Research Projects

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Projects without Direct CRD Involvement

Facilitated – Research Triggered by CRD Sharing Information with Agencies

Proposals with Funding Requests Based on Known CRD Interests

Collaborative – CRD Works with Researchers to Develop Project

CRD Participation in a National Research Network

Research Partnerships – more comprehensive research project involving multiple partners

Benefits of Research

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- Provides information needed for watershed protection and stewardship and risk management
- Contributes to the multiple lines of evidence needed to reduce uncertainty
- Often much more cost effective than consultants
- Generates products which can be used in other projects
- Beneficial syntheses of scientific literature
- Interactions with researchers often provide added information of value

Carbon Budget with Forest Disturbance and Growth 2011-2012 and with Projected Climate Change

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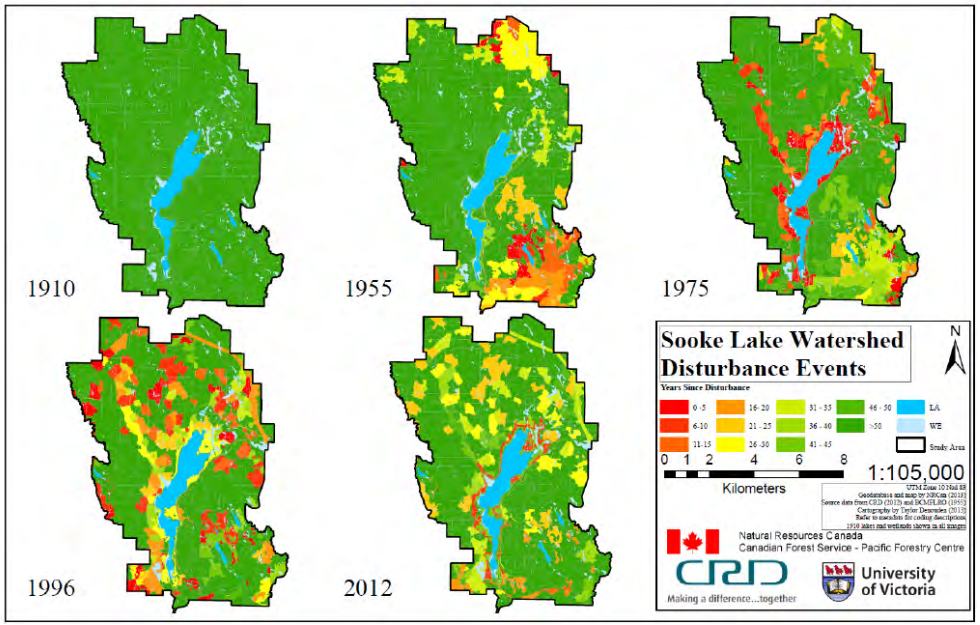
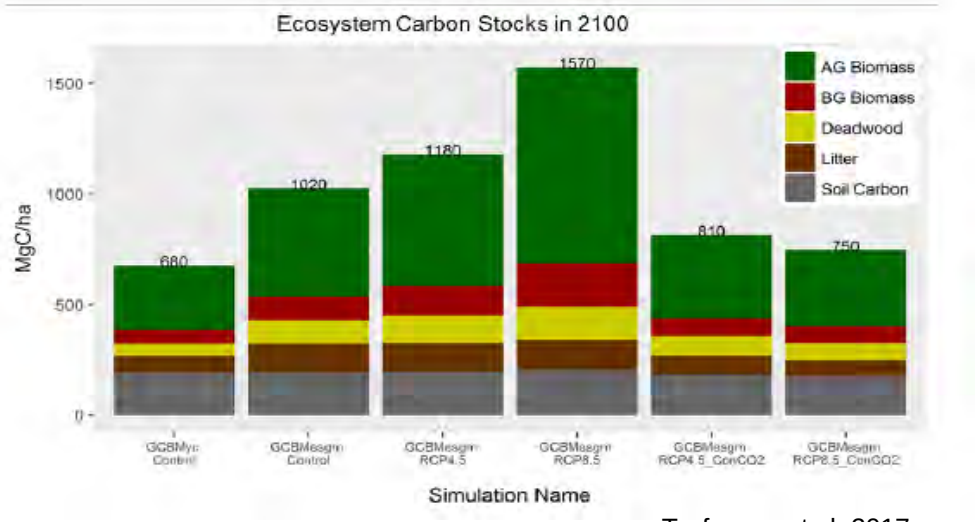


Smiley 2015



Trofymow et al. 2017

Research in two phases:

1. Using the CFS carbon model (CBM-CFS3) to develop a retrospective and current climate budget for the Sooke WSA

   Proposal and funding request from CFS based on a recommendation from the 2012 IWS Strategic Plan. Undertaken by a Master's student at UVic.

   Generated an important disturbance data set for the Sooke WSA as well as the research results.

2. Expanding the carbon budget model to 2100 under projected climate change. Modelling carried out by scientists at CFS. Study included the effect of carbon fertilization.

   Provided important insights on the effects of climate change on forest growth and mortality and the allocation of carbon

Vegetation and Wildfire History in the Sooke WSA
(Brown et al. 2019)

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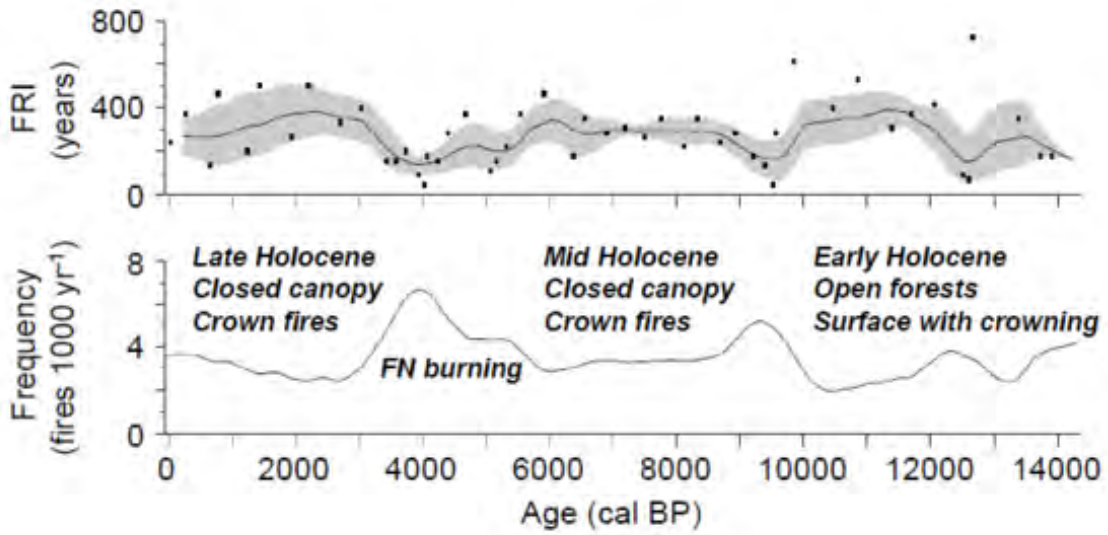
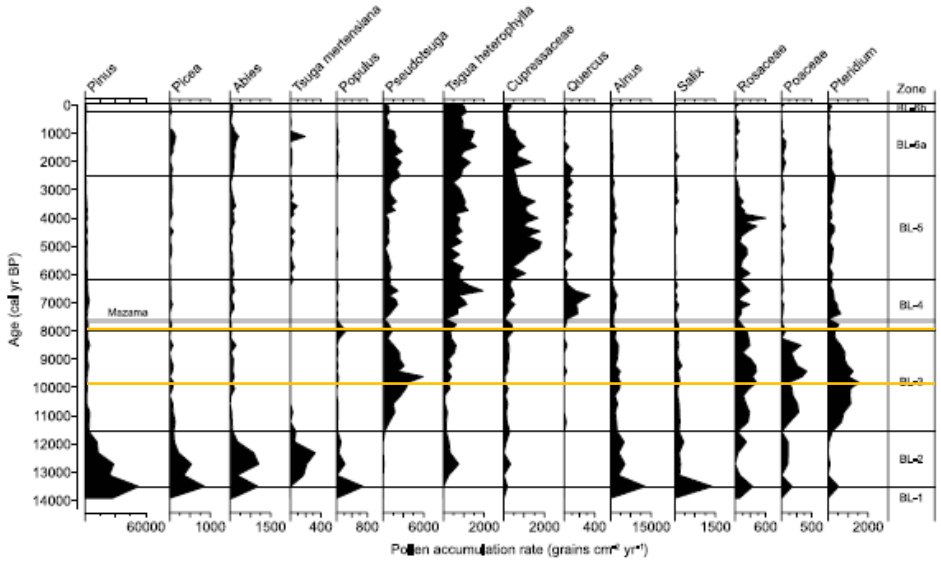


Fire Return Interval, Frequency and Type in the Sooke Water Supply Area Over the Last 14,000 Years (based on analysis of charcoal and pollen in a sediment core taken from Begbie Lake just north of Sooke Lake Reservoir). Figure taken from Brown and Trofymow 2016.



Research carried out by the Canadian Forest Service, funded by IWS

Based on the analysis of a 4.5 metre sediment core from Begbie Lake north of Sooke Lake Reservoir

Characterized vegetation change and wildfire frequency during changing climatic conditions from the end of the last ice age to present day.

Suggested that the warmer drier period between 8,000 and 10,000 years before present may provide an analogy for future climate conditions.

Comparison of Early Holocene and Modern Vegetation and Wildfire History within the GVWSA (Herralt 2024)

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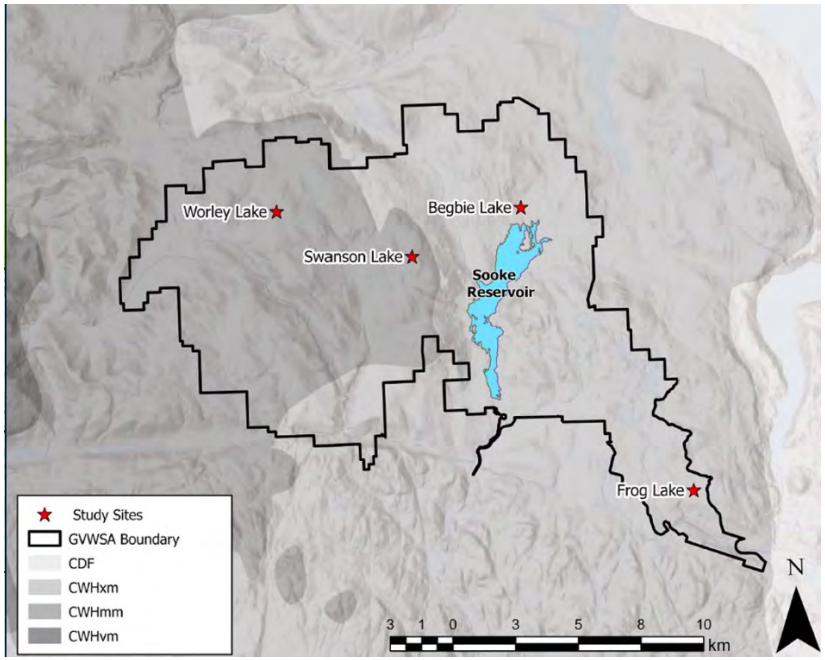

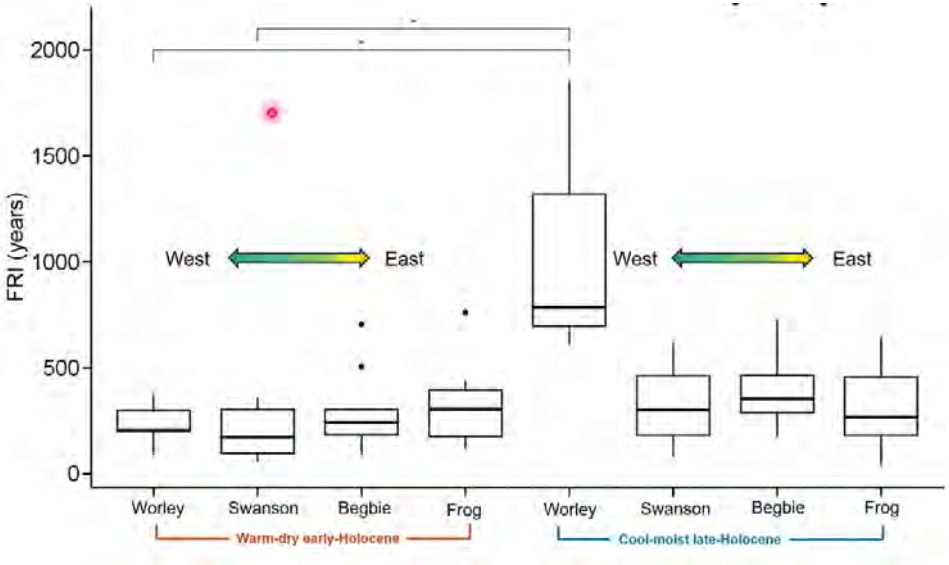

- A paleo-ecological study undertaken as part of the NSERC Alliance Research Partnership on Climate Change, Forests and Wildfire funded by the CRD and the Natural Sciences and Engineering Research Council
- Sediment cores taken from small lakes distributed throughout the GVWSA were used to compare past warm dry climate and current climate to assess potential landscape and watershed level effects of climate change
- Results suggest that climate change could result in a major shift in vegetation and wildfire frequency in the cooler and moister Leech WSA

Initial Evidence of Wildfire and Reservoir Expansion Impacts in Sooke Lake Reservoir (Brown and Trofymow 2015)

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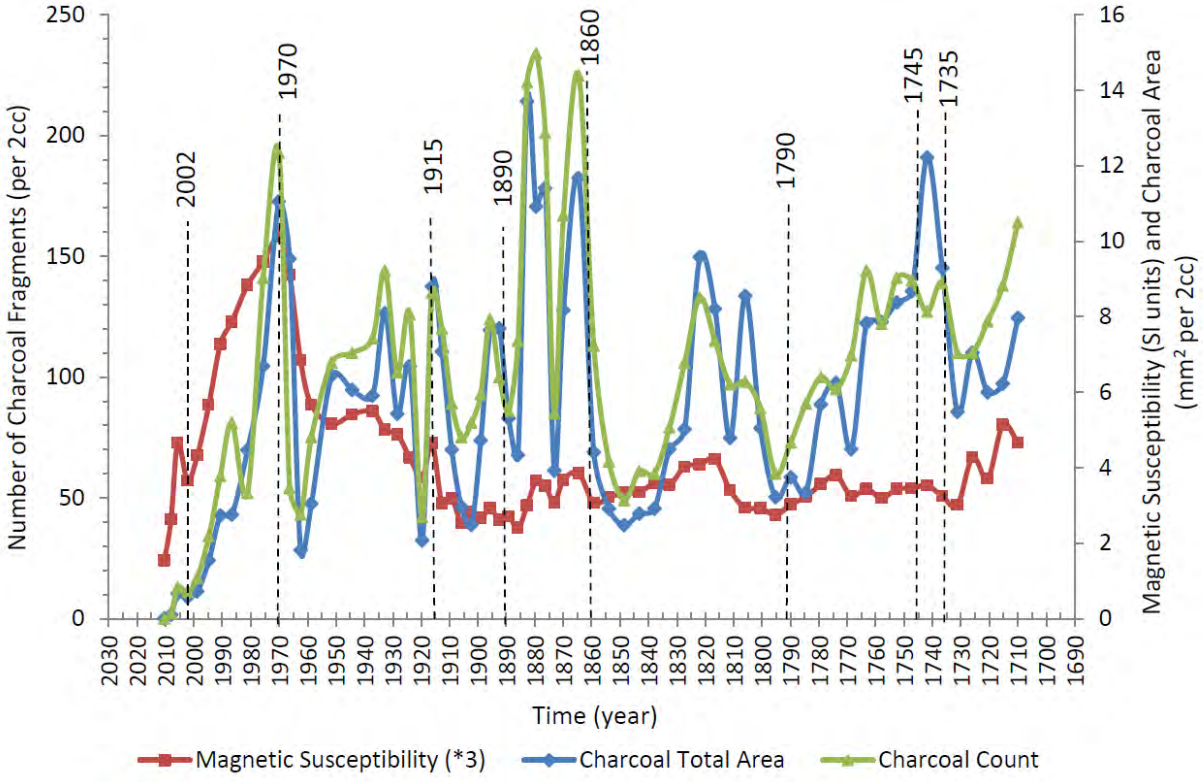

Trends in the Amount of Charcoal and Sedimentation within the North Basin Sample Site in Sooke Lake Reservoir in Relation to Years with Recorded Wildfire and Reservoir Raising Events (graph from Charpentier et al. 2015)

- An expansion of the paleo-ecological study at Begbie Lake funded by the CRD.
- A sediment core was taken from the north basin of Sooke Lake Reservoir and analyzed to identify wildfire events and associated inputs of organic and inorganic material to the reservoir.
- Results suggest that reservoir expansions contributed more inorganic sediment to the reservoir than any of the wildfires since 1690.

Analyses of Sediment Cores to Assess the Effects of Wildfire in Sooke Lake Reservoir (Hebda 2022)

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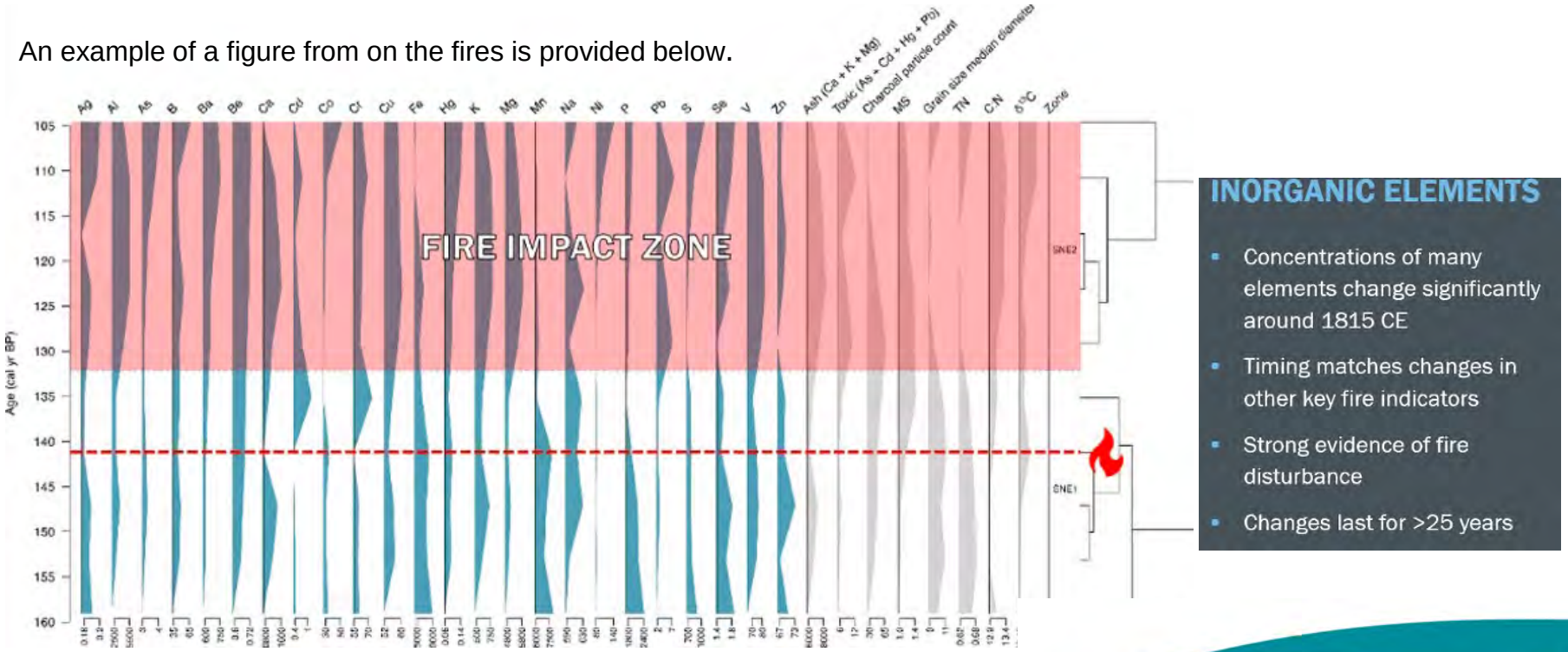
An extension of the paleo-ecological study that examined the history of vegetation and wildfire since the last ice age. A PhD candidate at the University of Victoria carried out this new study with CFS. The research was funded by the CRD.

Two sediment cores were taken from the north and south basins of the reservoir. Evidence of specific wildfire events were selected for detailed analyses of the sediment cores immediate above and below the event. Diatoms, nutrients, and organic and inorganic elements in the sediments were examined to identify changes that could indicate changes to water quality in the reservoir from the wildfire. Results suggest these effects could last for decades and challenge existing water treatment processes.

An example of a figure from on the fires is provided below.



Burn Probability in the GVWSA (Perrakis et al. 2019)

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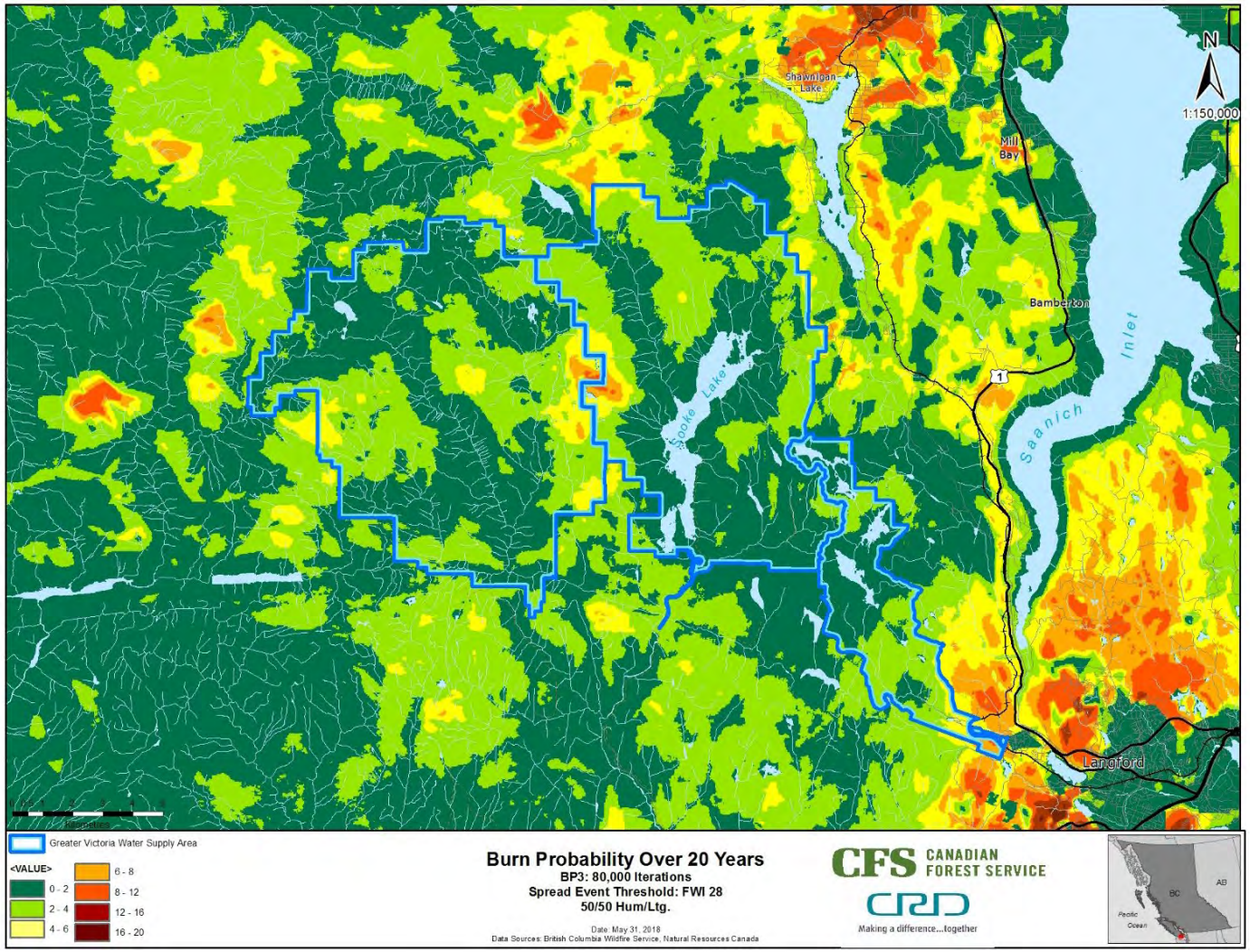

- Research carried out by wildfire scientists at the Canadian Forest Service and funded by IWS
- Modelling based on the distribution of past fire starts and current fire weather and forest fuel types
- Provided valuable insights into potential wildfire sizes and the fire weather indices where large wildfires were possible
- Validation for existing focus on landscape level fuel breaks at or near boundaries of GVWSA

Probability of Areas Within and Adjacent to the Greater Victoria Water Supply Area Burning During A Wildfire Using Existing Data on Wildfire Starts and Fire Weather Conditions (Perrakis et al. 2019) The map output is based on 80,000 iterations of modelling randomly generated human and lightning-caused wildfire starts (based on past patterns) and area burned given existing forest fuel types without suppression. Burn probability is expressed as likel burning over a 20-year period. The greatest threat of wildfire to the GVWSA in this simulation is from lightning strikes within the area and into the area from surrounding lands.

Research on Wildfire, Post-Wildfire Impacts, and Forest Fuel Management in Water Supply Catchment Areas

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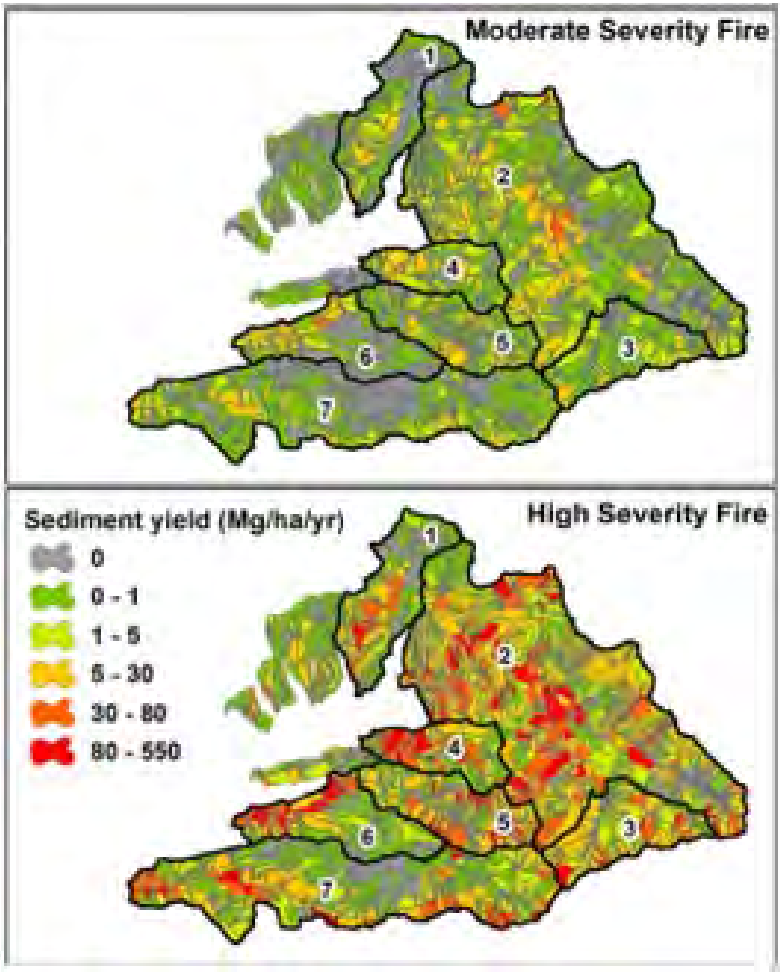

- A consortium of US Researchers, funded by NASA is developing a decision support tool to help water supply utilities make decisions on forest fuel management and post-wildfire risk mitigation.
- IWS was interviewed on its level of interest in the decision tool, and because suitable data were available for the GVWSA, was selected to participate in its testing.
- The US researchers will be using scenarios provided by IWS to model wildfire, post-wildfire impacts, and how forest fuel management and post-wildfire emergency stabilization can be used to reduce potential impacts to water supply reservoirs.
- The product of the research will be an online tool, with data for the GVWSA loaded, to test a range of model scenarios in the Sooke, Goldstream and Leech WSAs.

Modelling the Effects of Climate Change on Forests
(Bone et al. in preparation)

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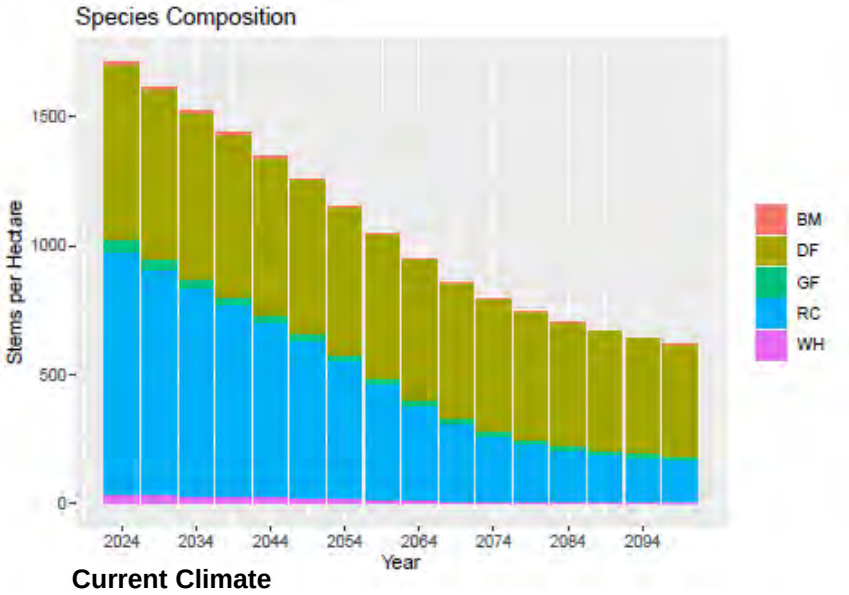
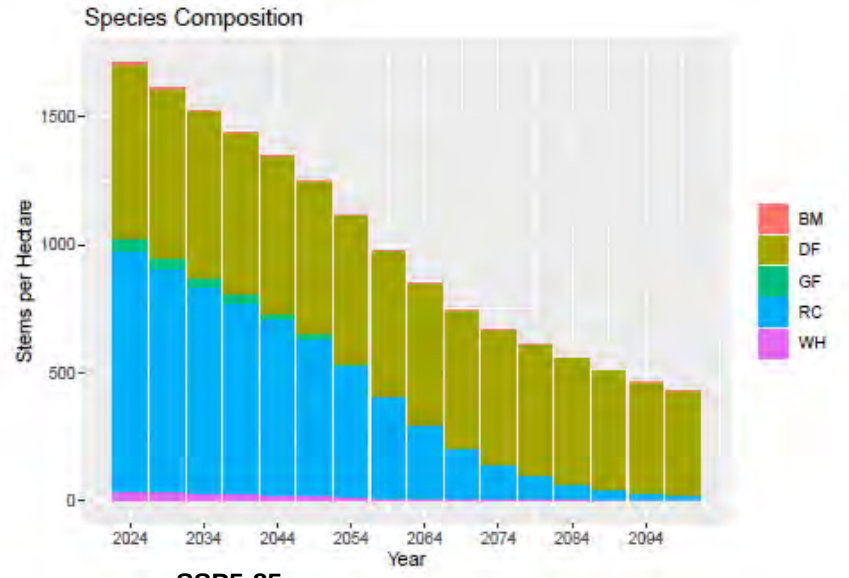


Current Climate



SSP5-85

- NSERC Alliance Project with the University of Victoria, Canadian Forest Service, ESSA Ltd., and the CRD.
- Funded by the CRD (1/3) and Natural Science and Engineering Research Council (2/3)
- Validating and applying the US Forest Vegetation Simulator to SE Vancouver Island forest
- Using actual forest plot data from the GVWSA
- Modelling forest change between 2024-2100 using nine climate models and three greenhouse gas scenarios
- Phase 1 compares forest growth and mortality under different climate change scenarios and examines how forest management (thinning) could be used to reduce tree mortality and improve forest resilience.

Modelling Wildfire Behaviour Potential and Fuel Management in a Changing Climate (Bone et al. in preparation)

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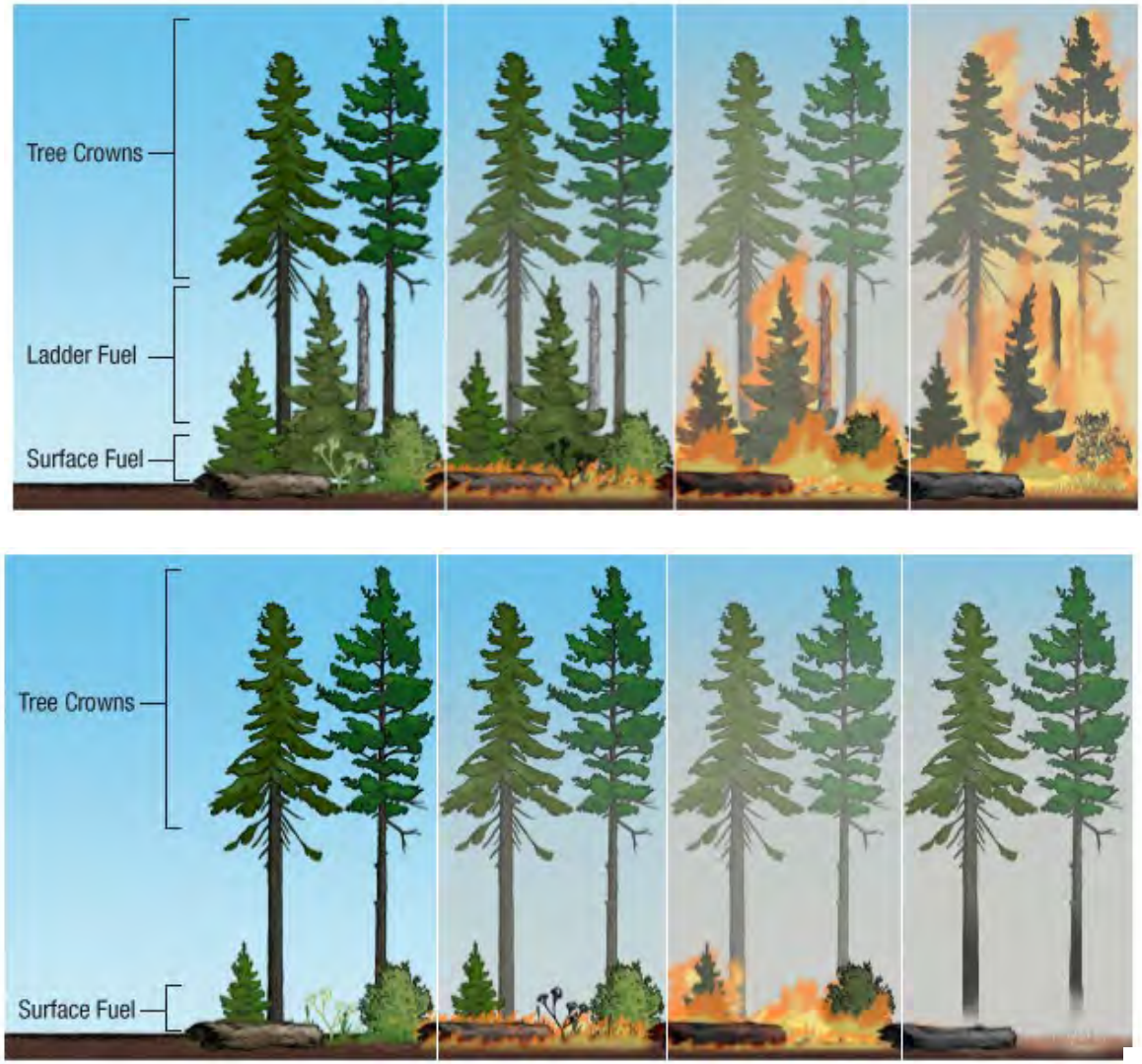

Source: U.S. Forest Service
Credit: Adam Cole, Nelson Hsu / NPR

- Phase 2 of the NSERC Alliance Study examines how climate change affects forest stands with different tree densities and structure potential in dry and moist sites.
- The Fire and Fuels Extension of FVS will be used to model how these changes relate to key indicators of wildfire behaviour.
- The modelling will then examine how forest management and forest fuel reduction treatments could reduce wildfire hazard.

Deriving Forest Metrics for Wildfire Hazard and Behaviour Modelling (Kelley et al. in preparation)

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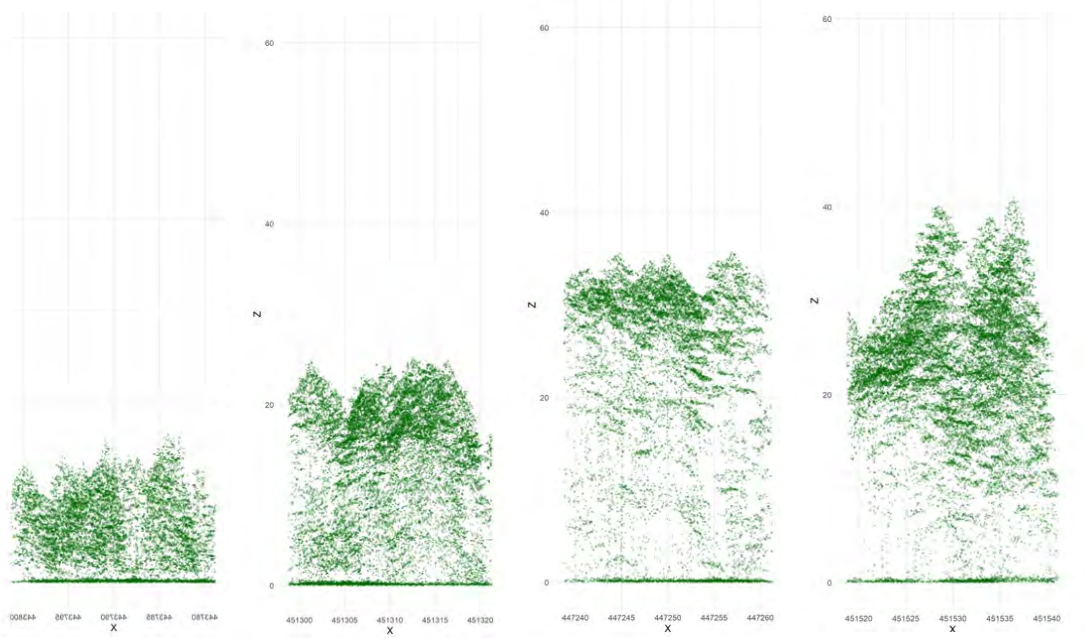

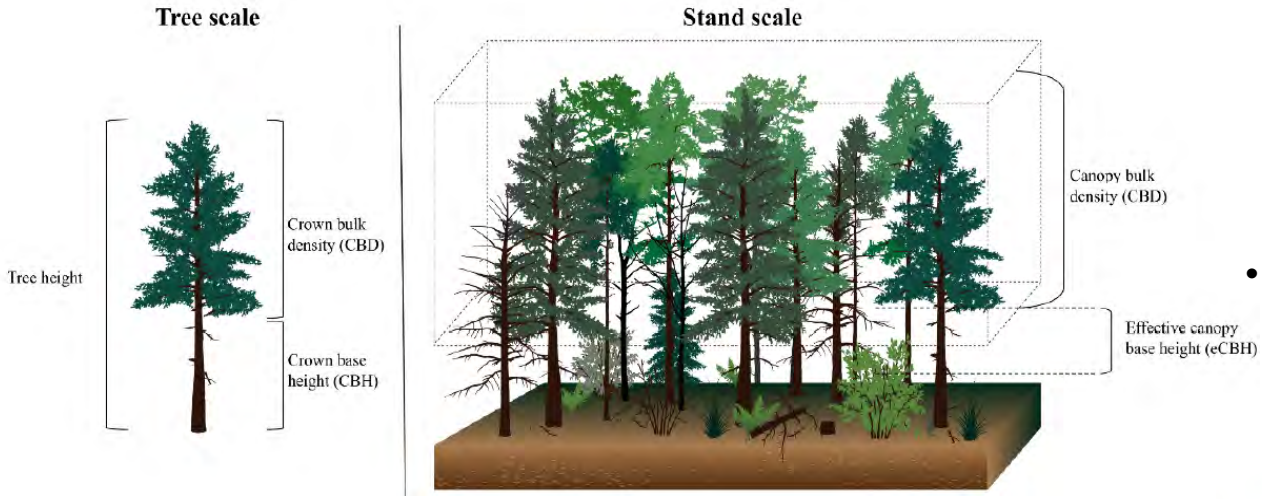

- A research Partnership with UVic with the participation of the Ministry of Forests.
- Funded by the CRD with in kind support from MOF
- LiDAR data collected for the GVWSA are being modelled to identify forest stand types with common characteristics relating to height, density, and vertical continuity.
- Those parameters, and the results of the NSERC Alliance modelling, will be used to identify forest stands in the GVWSA with specific forest fuel hazard levels of concern.
- The model outputs also generate the forest metrics that will be inputs to the next generation of the Canadian Wildfire Behaviour

Evaluating the Dynamics of Douglas-fir Beetle Populations in Forests in the GVWSA (Tobiasz 2025)

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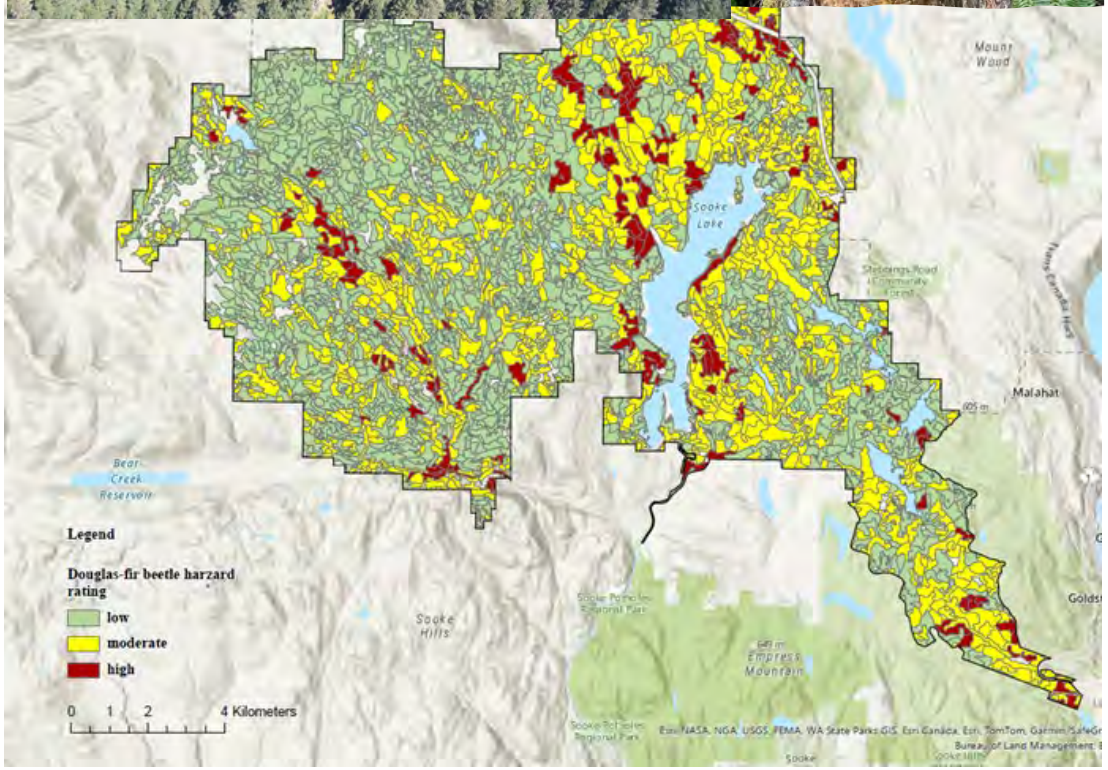

- A research partnership with the Forest Insect Disturbance Ecology Lab at the University of British Columbia.
- A Master's research project funded by the CRD.
- The research evaluated annual forest health monitoring data and the retrospective mapping of tree mortality from Douglas-fir beetle in the GVWSA between 2005 and 2023.
- The student reviewed the ecology of Douglas-fir beetle and developed models identifying the forest stands associated with the endemic population of the beetle in the GVWSA and those stands likely to be attacked if the beetle population reached outbreak

Additional Research Projects in the GVWSA

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There are a wide range of additional studies in the GVWSA that are helping to inform Watershed Protection and Stewardship. They can be grouped into several categories:

- Wildfire
- Forest Health
- Forest Ecology
- Hydrology and Water Quality
- Wildlife Domestic Animals and Pathogens
- Species at Risk
- Wildlife Movement Corridors

These studies are listed in the following slides for reference but will not be described individually.

Additional Research Projects - Wildfire

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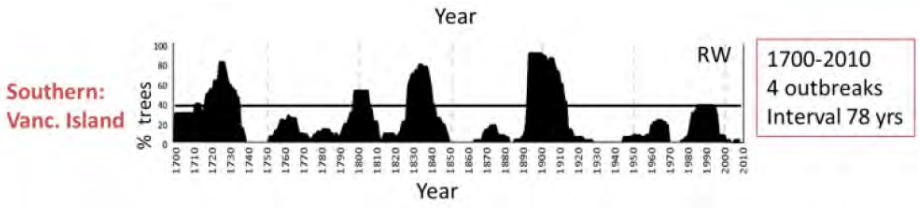
- BC Wildfire Service and Forest Innovations and the Canadian Forest Service examining the effects of forest fuel management on within stand microclimate and surface fuel moisture.
- IWS, UVic and CFS examining the effects of mechanical thinning on within stand microclimate and soil moisture.
- CFS examining how within stand forest weather and fuel moisture compares to the fire weather indices generated by weather stations in forest clearings.

Additional Research Projects – Forest Health

Alder Bark Beetle – D. Wertman photos



Spruce Budworm Outbreaks – Alfraro et al. 2017

- UBC/Mitac/CRD Research on the distribution, health and resilience of red alder in the GVWSA (Wertman in process).
- UBC research on alder bark beetle and an associated fungi on red alder mortality (Wertman
- CFS research on the endemic Vancouver Island mountain pine beetle and how its life history compares with the beetle in other parts of BC. (Bleiker in process).
- CFS research on spruce budworm outbreaks in the GVWSA since 1700 (Alfraro et al. 2017)
- CFS Research on the dynamics of spruce budworm in the GVWSA and the role of predators in keeping the population in check (Van Hezewijk et. al 2023).
- UVic Research on the use of LiDAR and spectral analysis to detect forest stands with root disease (Quinn 201

Additional Research Projects – Watershed Hydrology and Water Quality

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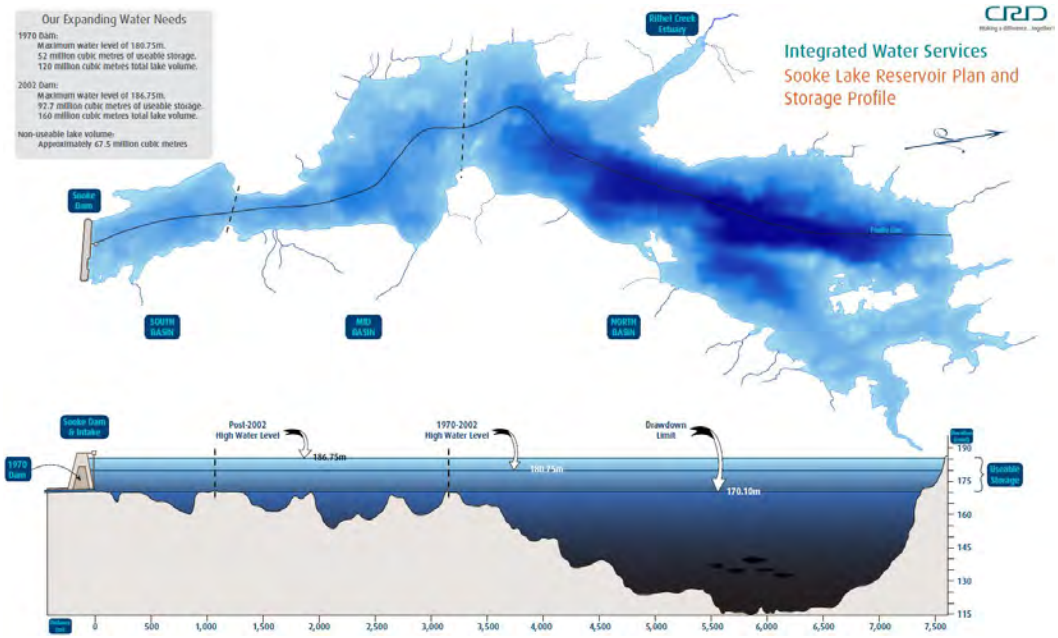

Cross section of Sooke Lake Reservoir, the primary water source for the Regional Water Supply System

- Establishing relationships amongst stream flow and water quality parameters in the Sooke WSA (Watershed Hydrology and Water Quality Operations programs in process).
- Variation in Organic Matter in the Leech River (McSorley 2020)
- Potential Effects of Climate Change on Water Quality and the Ecology of Sooke Lake Reservoir (Aquatex 2019).
- Food Web Study for Sooke Lake Reservoir (Ecofish Research Ltd. and Minnow Aquatic Environmental Services 2024 for the Water Quality Operations Program)
- Reservoir Drawdown Study to Assess Risks to Water Quality (Ecofish Research Ltd. and Minnow Aquatic Environmental Services CRD Water Quality Group in process)
- Reservoir Circulation Model for Sooke Lake Reservoir (Water Quality Operations Program in proc

Additional Research Projects – Forest Ecology

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- CFS using the GVWSA for some of their forest plots designed to characterize different forest development stages regenerating after forest harvest in relation to old forest stands (Trofymow et al. 1999)
- CFS/University of Alberta expanding the CFS plots to track the fate of all trees within one-hectare plots to better understand forest development and within stand disturbances (Schurmann 2017).
- Long-term forest monitoring plots established by IWS in old forest stands in the Sooke WSA (2015-2019).
- UVic studies using analyses of tree rings to investigate moisture variability and drought over the last several hundred years (Jarrett 2008 and Farmer 2020)
- BC Ministry of Forests studying soil moisture and climate change (Klassen and Saunders 2016)
- BC Ministry of Forests studying the diversity and relative distribution of mycorrhizal fungi in Douglas-fir forests in the GVWSA (Kranabetter et al. 2018).
- Ministry of Forests studying nutrient levels in soils and vegetation in relation to past disturbances (Kranabetter and Meeds 2017)
- CFS/University of Victoria study on the effect of tannins, nitrogen and climate on decay, nitrogen mineralization, and microbial communities in forest tree leaf litter (Shay 2016)

Additional Research Projects – Domestic Animals and Wildlife

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- Ecology of Pathogenic Protozoa in the GVWSA (Aramini et al. 1997)
- Examining the potential impacts of bullfrogs on water quality in Sooke Lake Reservoir (Centre for Coastal Health 2009)
- Assessment of the probability of waterborne pathogen contamination of Capital Regional District water supply areas by domestic dogs, horses and llamas (Centre for Coastal Health 2019)
- Assessing the distribution of marten, mink and other Wildlife within the GVWSA (Proulx 2020)
- BC Ministry of Forests studying nesting habitat characteristics of marbled murrelet (Waterhouse et al. in process)
- Wildlife camera study of wildlife and wildlife movement corridors in the Goldstream WSA (Bone et al. in process)

Conclusions and Next Steps

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The research carried out in the GVWSA has provided the CRD with a wealth of knowledge about the area, the type and effects of natural and human caused disturbances and how climate change may affect identified threats to water quality and supply and other the important ecosystem services provided by these watersheds.

The results of these research projects, and applicable inventories, assessments, and monitoring will be brought together to help inform the proposed forest management/stewardship plan for the GVWSA.

In addition to the forest management plan, the application of these results will inform other projects and initiatives in the GVWSA and provide important information for future environmental assessments in the GVWSA in support the implementation of Master Plan infrastructure projects.

Thanks to our many research partners

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Natural Resources Canada | Ressources naturelles Canada

Canada

Canadian Forest Service / Service canadien des forêts

Tony Trofymow
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Debra Wertman
Anna Tobiasz

University of Alberta

Fangliang He
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British Columbia Ministry of Environment and Climate Change Strategy

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Gordon Frazer
Geoff Quinn
Byron Smiley
Patricia Jarrett
Dan Smith
Lauren Farmer
Chris Bone
Roger Stephen
Jason Kelley
Ben Milligan

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Sari Saunders
Heather Klassen
Marty Kranabetter
Louise Waterhouse
Jenna Craig
Robbie Hember
Geoff Quinn
Scott MacKinnon

forWater

NSERC Network for Forested Drinking Water Source Protection Technologies

Hannah McSorley
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Monica Emelko
Uldis Silins
Jennifer Hall
Erin Humeny

Questions?

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