REGIONAL SERVICES COMMITTEE MEETING AGENDA

WEDNESDAY, APRIL 26, 2017
BOARD ROOM
175 INGRAM STREET, DUNCAN, BC

9:30 AM

PAGE

1. APPROVAL OF AGENDA

2. ADOPTION OF MINUTES

M1 Regular Regional Services Committee meeting of March 22, 2017 — 1

Recommendation That the minutes of the Regular Regional Services meeting of March 22, 2017 be adopted.

3. BUSINESS ARISING FROM THE MINUTES

4. DELEGATIONS

D1 Terri Dame, Cowichan Housing Association Re: Status of Homelessness and Affordable Housing in the Cowichan Valley — 3

D2 Brian Roberts, Cowichan Energy Alternatives Society Re: Update on Cowichan Carbon-Smart and Cowichan Biofuel Facility Initiatives — 11

5. CORRESPONDENCE

C1 Correspondence Re: Free Drop Off/Market Rates - CVRD Yard & Garden Waste Policy — 43

1. Hillside Stone & Garden; and
2. Vancouver Island Recycling & Waste Industry Coalition

Recommendation For Consideration

C2 Correspondence Re: Salvation Army Tipping Fees — 45

Recommendation For Consideration

6. INFORMATION

7. REPORTS

R1 Report from the Parks & Trails Planner, Parks & Trails Division Re: Tri 1 Events - Cowichan Crusher Gravel Fondo - Bike Race 47

Recommendation That it be recommended to the Board that a Parks Special Event Permit be issued to Tri Events 1 for a bike race event on June 24, 2017, subject to the conditions outlined in the staff report to the April 26, 2017, Regional Services Committee Meeting.

R2 Report from the Manager, Parks & Trails Division Re: Cowichan Valley Trail Completion Initiative - Spring 2017 Update 53

Recommendation For Information

R3 Report from the Manager, Environmental Services Division Re: Climate Issues 59

Recommendation For Information

R4 Report from the Senior Environmental Analyst, Environmental Services Division Re: Regional Airshed Protection, Reducing Emissions From Open Burning 69

Recommendation For Information

R5 Report from the Manager, Environmental Services Division Re: Climate Adaptation Program Update 121

Recommendation That it be recommended to the Board that the Phase I recommendations of the New Normal Cowichan Climate Adaptation Program as outlined in the April 12, 2017 Environmental Services Division Staff Report to the April 26, 2017 Regional Services Committee be implemented.

R6 Report from the Manager, Environmental Services Division Re: Watershed Management 207

Recommendation That it be recommended to the Board:
1. That a facilitated process to review and determine various roles and responsibilities of water governance in the region be developed.
2. That an analysis of the various options to support a watershed function for the CVRD (watershed specific, sub-regional or regional) for the committee's review and further public input be developed.

R7 Report from the Manager, Recycling & Waste Management Division Re: Tipping Fee Exemptions - Solid Waste Management Charges and Regulations Amendment Bylaw No. 4110 213

Recommendation That it be recommended to the Board:
1. That Solid Waste Management Charges and Regulations Amendment Bylaw No. 4110 be forwarded to the Board for consideration of first three readings and adoption.
2. That the Free Tipping Policy dated April 8, 1998 be rescinded effective upon the adoption of Solid Waste Management Charges and Regulations Amendment Bylaw No. 4110.

8. UNFINISHED BUSINESS

9. NEW BUSINESS

10. QUESTION PERIOD

11. CLOSED SESSION

Motion that the meeting be closed to the public in accordance with the *Community Charter* Part 4, Division 3, Section 90, subsections as noted in accordance with each agenda item.

12. ADJOURNMENT

The next Regional Services Committee Meeting will be held Wednesday, May 24, 2017 at 9:30 AM, in the Board Room, 175 Ingram Street, Duncan, BC.

Committee Members

Director A. Stone, Chairperson
Director K. Marsh, Vice-Chairperson
Director M. Clement
Director K. Davis
Director B. Day
Director M. Dorey
Director S. Furstenau
Director L. Iannidinardo
Director S. Jackson
Director K. Kuhn
Director J. Lefebure
Director M. Marcotte
Director I. Morrison
Director A. Nicholson
Director T. Walker

Minutes of the Regional Services Committee Meeting held on Wednesday, March 22, 2017 in the Board Room, 175 Ingram Street, Duncan BC at 10:40 AM.

PRESENT: Chair A. Stone
Director B. Day
Director M. Dorey
Director L. Iannidinardo <after 3:09 PM>
Director S. Jackson
Director K. Kuhn
Director J. Lefebure
Director K. Marsh
Director I. Morrison
Director A. Nicholson
Director T. Walker
Alternate Director S. Acton
Alternate Director C. Morris
Alternate Director B. Salmon
Alternate Director A. Bomford <until 12:41 PM>

ALSO PRESENT: B. Carruthers, Chief Administrative Officer
J. Barry, Corporate Secretary
M. Kueber, General Manager, Corporate Services
J. Elzinga, General Manager, Community Services
R. Blackwell, General Manager, Planning and Development
H. Hatami, General Manager, Engineering Services
C. Lockrey, Manager, Strategic Services
K. Miller, Manager, Environmental Services
C. Cowan, Manager, Public Safety
A. Melmock, Manager, Economic Development
B. Farquhar, Manager, Parks & Trails
T. Waraich, Manager, Recycling & Waste Management
B. Dennison, Manager, Water Management
P. Turney, Recording Secretary

ABSENT: Director M. Clement
Director K. Davis
Director S. Furstenau
Director M. Marcotte

APPROVAL OF AGENDA

It was moved and seconded that the agenda be amended with the addition of one New Business item:

NB1 Report from the Water Management Division Re: 2017 Budget Amendment – Function 810 Mesachie Lake Sewer System; and

that the agenda, as amended, be approved.

MOTION CARRIED

ADOPTION OF MINUTES

M1 Regular Regional Services Committee Meeting of February 22, 2017

It was moved and seconded that the minutes of the Regular Regional Services Committee Meeting of February 22, 2017 be adopted.

MOTION CARRIED

REPORTS

R1 Report from the Parks & Trails Division Re: 2017 Budget Amendment - Function 283 Kinsol Trestle

It was moved and seconded that it be recommended to the Board that the 2017 budget for Function 283 Kinsol Trestle be amended to:
1. Increase Provincial Conditional Grants revenue by $100,000;
2. Decrease Transfer to Capital Reserves by $50,000; and
3. Increase Capital Lease Improvements by $150,000.

MOTION CARRIED

R2 Report from the Recycling & Waste Management Division Re: 2017 Budget Amendment – Function 515 Curbside Collection Garbage & Recycling and Function 520 Solid Waste Management Complex

It was moved and seconded:
1. That it be recommended to the Board that the 2017 budget for Function 515 – Curbside Collection Garbage and Recycling be amended to:
   1. Decrease Multi-Material BC (MMBC) contingency amount by $841;
   2. Decrease Surplus by $841;
   3. Increase Minor Capital expense by $25,000; and
   4. Decrease Capital Equipment expense by $25,000.

2. That it be recommended to the Board that the 2017 budget for Function 520 - Solid Waste Management Complex be amended to:
   1. Increase Municipal Finance Authority long term borrowing by $628,235;
   2. Increase Federal Conditional Grant revenue by $188,800;
   3. Increase Federal Gas Tax Grant revenue by $248,065;
   4. Increase Capital Buildings expense by $475,050;
   5. Increase Capital Land Improvements expense by $475,050;
   6. Increase Long Term Debt interest expense by $4,548;
   7. Decrease Contingency expense by $4,548;
   8. Increase Provincial Conditional Grant revenue by $25,000;
   9. Increase Consultants expense by $25,000; and
   10. Increase Capital Buildings Improvement expense by $115,000.

MOTION CARRIED

R3 Report from the Environmental Services Division Re: 2017 Environmental Services Budget Amendments - Functions 131, 531, 535, and 540

It was moved and seconded:

1. That it be recommended to the Board that the 2017 Budget for Function 131 Environmental Initiatives be amended to:
   1. Increase Federal Conditional Grants revenue by $385,438;
   2. Increase Provincial Conditional Grants revenue by $306,388;
   3. Increase Partner Contributions revenue by $59,550;
   4. Increase Flood Plain Management expense by $305,876;
   5. Increase Water Study – Project Expenditures expense by $200,000;
   6. Increase Contract for Services expense by $265,000;
   7. Increase Public Education expense by $14,500; and
   8. Reduce Partnership Project expense by $34,000.

2. That it be recommended to the Board that the 2017 Budget for Function 531 South Cowichan Water Study Plan be amended to:
   1. Increase Surplus revenue by $10,000; and
   2. Increase Project Expenditures expense by $10,000.

3. That it be recommended to the Board that the 2017 Budget for Function 535 Liquid Waste Plan – Central Sector be amended to:
   1. Increase Surplus revenue by $48,644; and
   2. Increase Consultants – Engineering expense by $48,644.

4. That it be recommended to the Board that the 2017 Budget for Function 540 Liquid Waste Plan – South Sector be amended to:
   1. Decrease Transfer from Gas Tax revenue by $7,327; and
   2. Decrease Contract for Services expense by $7,327.

MOTION CARRIED

R4 Report from the General Manager, Engineering Services Department Re: 2017 Budget Amendment - Function 575 Engineering Services - Administration

(Amended from original report recommendation)

It was moved and seconded that it be recommended to the Board that the 2017 budget for Function 575 Engineering Services - Administration be amended to:

1. Increase surplus/deficit by $17,153; and
2. Decrease contingency by $17,153.

MOTION CARRIED

R5 Report from the General Manager, Community Services Department Re: Cowichan Community Policing

It was moved and seconded that a new Cowichan Community Policing Service be created and voter approval be sought to allow the CVRD to operate the service.

It was moved and seconded that the creation of a new Cowichan Community Policing Service operated by the CVRD be referred to staff for a report.

MOTION CARRIED

R6 Report from the Public Safety Division Re: Community Wildfire Protection Plan - UBCM Grant Application

It was moved and seconded that it be recommended to the Board that a grant application be submitted to the Union of British Columbia Municipalities (UBCM) for the Community Wildfire Protection Plan Update – Cowichan South project under the Strategic Wildfire Prevention Initiative, Community Wildfire Protection Plan & Cowichan Wildfire Protection Plan Update Program.

MOTION CARRIED

R7 Report from the Public Safety Division Re: Emergency Management Agreement

It was moved and seconded that it be recommended to the Board that a five year Emergency Management Agreement be approved between the Cowichan Valley Regional District, the City of Duncan, the Corporation of the District of North Cowichan, the Town of Lake Cowichan and the Town of Ladysmith, effective 2017 to 2022 once all parties have signed.

MOTION CARRIED

It was moved and seconded that staff explore including an Electoral Area Director representative, when appropriate, in the Emergency Management Agreement with the four member municipalities.

MOTION CARRIED

R8 Report from the General Manager, Community Services Department Re: Sport Tourism Launch was received for information.

The General Manager of the Community Services Department introduced Cathy Mailhot, Regional Facilitator of Sport Tourism for the Cowichan Valley Regional District, who provided a PowerPoint presentation updating the Board on the progress of the CVRD's sport tourism initiatives, and a pre-launch tour of the CVRD's new sport tourism webpage.

R9 Report from the Parks & Trails Division Re: Streams and Trails Program - Frances Kelsey Secondary School, was received for information.

R10 Report from the Manager, Strategic Services Re: Cowichan Watershed Community Engagement, was received for information.

NEW BUSINESS

NB1 Report from the Water Management Division Re: 2017 Budget Amendment – Function 810 Mesachie Lake Sewer System

It was moved and seconded that it be recommended to the Board that the 2017 budget for Function 810 Mesachie Lake Sewer System be amended to:
1. Increase Grant revenue by $1,226,567;
2. Increase Transfer from Gas Tax Phase 2 revenue by $200,000;
3. Increase MFA Long Term Funding revenue by $200,000;
4. Increase Capital Reserve revenue by $40,000;
5. Increase Transfer from Operating Reserves revenue by $10,955;
6. Increase Sundry expenses by $126;
7. Decrease Consultants expense by $1,000;
8. Decrease Sludge Disposal expense by $1,500;
9. Decrease Transfer to Reserve Expense by $5,000; and
10. Increase Capital - Engineering Structures expense by $1,684,896.

MOTION CARRIED

R11 Report from the General Manager, Corporate Services Department
Re: 2017 Regional Grant-in-Aid Applications

Arts & Culture Grant-in-Aid Applications

Chemainus Theatre Festival
It was moved and seconded that it be recommended to the Board that funding of $12,000 for a Regional Grant-in-Aid for Chemainus Theatre Festival be approved.

MOTION CARRIED

Cowichan Music Festival Society
It was moved and seconded that it be recommended to the Board that funding of $5,000 for a Regional Grant-in-Aid for Cowichan Music Festival Society be approved.

MOTION CARRIED

Cowichan Valley Performing Arts Foundation
It was moved and seconded that it be recommended to the Board that funding of $8,000 for a Regional Grant-in-Aid for Cowichan Valley Performing Arts Foundation be approved.

MOTION CARRIED

Ladysmith Little Theatre
It was moved and seconded that it be recommended to the Board that funding of $10,000 for a Regional Grant-in-Aid for Ladysmith Little Theatre be approved.

It was moved and seconded to amend to decrease the Regional Grant-in-Aid for Ladysmith Little Theatre from $10,000 to $7,000.

MOTION CARRIED

Voting resumed on the main motion as amended:

It was moved and seconded that it be recommended to the Board that funding of $7,000 for a Regional Grant-in-Aid for Ladysmith Little Theatre be approved.

MOTION CARRIED

Arts & Culture Funding from General Government

It was moved and seconded that it be recommended to the Board that $1,300 be paid out of Function 100 – General Government to cover Arts & Culture Regional Grant-in-Aid applications.

MOTION CARRIED

Regional Grant-in-Aid Applications

Big Brothers Big Sisters
It was moved and seconded that it be recommended to the Board that funding of $10,000 for a Regional Grant-in-Aid for Big Brothers Big Sisters of the Cowichan Valley be approved.

MOTION CARRIED

Byte Camp
It was moved and seconded that it be recommended to the Board that funding of $3,100 for a Regional Grant-in-Aid for Byte Camp be approved.

MOTION CARRIED

Children & Family Council of the Cowichan Region & Communities
It was moved and seconded that it be recommended to the Board that funding of $1,000 for a Regional Grant-in-Aid for Children & Family Council of the Cowichan Region & Communities be approved.

MOTION CARRIED

Cowichan Estuary Restoration and Conservation Association
It was moved and seconded that it be recommended to the Board that funding of $5,000 for a Regional Grant-in-Aid for Cowichan Estuary Restoration and Conservation Association be approved.

MOTION CARRIED

Cowichan Historical Society
It was moved and seconded that it be recommended to the Board that funding of $4,500 for a Regional Grant-in-Aid for Cowichan Historical Society be approved.

MOTION CARRIED

Cowichan Valley Intercultural Society - Multicultural Leadership Group
It was moved and seconded that it be recommended to the Board that funding of $5,000 for a Regional Grant-in-Aid for Cowichan Valley Intercultural Society - Multicultural Leadership Group be approved.

MOTION CARRIED

Cowichan Valley Intercultural Society - Syrian Refugee Fund
It was moved and seconded that it be recommended to the Board that funding of $7,000 for a Regional Grant-in-Aid for Cowichan Valley Intercultural Society - Syrian Refugee Fund be approved.

MOTION CARRIED

Cowichan Lake & River Stewardship Society (BC Conservation Foundation)
It was moved and seconded that it be recommended to the Board that funding of $5,000 for a Regional Grant-in-Aid for Cowichan Lake & River Stewardship Society (BC Conservation Foundation) be approved.

MOTION CARRIED

Cowichan Therapeutic Riding Association
It was moved and seconded that it be recommended to the Board that funding of $5,000 for a Regional Grant-in-Aid for Cowichan Therapeutic Riding Association be approved.

MOTION CARRIED

Cowichan Valley Naturalists' Society
It was moved and seconded that it be recommended to the Board that funding of $7,500 for a Regional Grant-in-Aid for Cowichan Valley Naturalists' Society be approved.

MOTION CARRIED

ADJOURN AND RECONVENE 12:41 PM

It was moved and seconded that the Regional Services Committee meeting be adjourned and reconvened immediately following the Board meeting.

MOTION CARRIED

RECONVENE 3:09 PM

The meeting reconvened at 3:09 PM, with Director Iannidinardo replacing Alternate Director Bomford.

Cowichan Wooden Boat Society
It was moved and seconded that it be recommended to the Board that funding of $50,000 for a Regional Grant-in-Aid of Cowichan Wooden Boat Society be approved.

MOTION CARRIED

Inclusive Leadership Co-operative
It was moved and seconded that it be recommended to the Board that funding of $10,000 for a Regional Grant-in-Aid for Inclusive Leadership Co-operative be approved.

MOTION CARRIED

Ladysmith Festival of Lights Society
It was moved and seconded that it be recommended to the Board that funding of $10,000 for a Regional Grant-in-Aid for Ladysmith Festival of Lights Society be approved.

It was moved and seconded that the motion be amended to increase the funding amount for a Regional Grant-in-Aid for Ladysmith Festival of Lights Society from $10,000 to $20,000.

MOTION CARRIED

Voting resumed on the main motion as amended:

It was moved and seconded that it be recommended to the Board that funding of $20,000 for a Regional Grant-in-Aid for Ladysmith Festival of Lights Society be approved.

MOTION CARRIED

3:24 PM Director Jackson declared a conflict of interest, as she has worked with the Mill Bay Marine Rescue Society, and left the meeting at 3:24 PM.

Mill Bay Marine Rescue Society
It was moved and seconded that it be recommended to the Board that funding of $10,000 for a Regional Grant-in-Aid for Mill Bay Marine Rescue Society be approved.

MOTION CARRIED

3:26 PM Director Jackson returned to the meeting at 3:26 PM.

Our Cowichan Communities Health Network
It was moved and seconded that it be recommended to the Board that funding of $3,000 for a Regional Grant-in-Aid for Our Cowichan Communities Health Network be approved.

MOTION CARRIED

OUR Ecovillage
It was moved and seconded that it be recommended to the Board that funding of $15,000 for a Regional Grant-in-Aid for OUR Ecovillage be approved.

It was moved and seconded that the motion be amended to increase the funding amount for a Regional Grant-in-Aid for OUR Ecovillage from $15,000 to $25,000.

MOTION CARRIED

It was moved and seconded that the motion be amended to increase the funding amount for a Regional Grant-in-Aid for OUR Ecovillage from $25,000 to $35,000.

MOTION DEFEATED

Voting resumed on the main motion as amended:

It was moved and seconded that it be recommended to the Board that funding of $25,000 for a Regional Grant-in-Aid for OUR Ecovillage be approved.

MOTION CARRIED

Providence Farm
It was moved and seconded that it be recommended to the Board that funding of $7,000 for a Regional Grant-in-Aid for Providence Farm be approved.

MOTION CARRIED

Volunteer Cowichan
It was moved and seconded that it be recommended to the Board that funding of $20,000 for a Regional Grant-in-Aid for Volunteer Cowichan be approved.

MOTION CARRIED

Regional Grant-in-Aid Surplus

It was moved and seconded that $50,000 of the remaining Regional Grant-in-Aid fund surplus be earmarked for potential homelessness and affordable housing initiatives in the Cowichan Valley.

It was moved and seconded that the matter of unallocated Regional Grant-in-Aid funds be referred back to staff for a report.

MOTION DEFEATED

Voting resumed on the main motion:

It was moved and seconded that $50,000 of the remaining Regional Grant-in-Aid fund surplus be earmarked for potential homelessness and affordable housing initiatives in the Cowichan Valley.

MOTION DEFEATED

4:07 PM **It was moved and seconded that the meeting be closed to the public in accordance with the *Community Charter* Part 4, Division 3, Section 90 (1)(e) Land Acquisition, and the Closed Session minutes of November 23, 2016.**

MOTION CARRIED

4:16 PM **It was moved and seconded that the Committee rise without report, and return to the Open portion of the meeting.**

MOTION CARRIED

ADJOURNMENT

4:16 PM **It was moved and seconded that the meeting be adjourned.**

MOTION CARRIED

The meeting was adjourned at 4:16 PM.

_____ _____

Chair Recording Secretary

Dated: _____

From: noreply@civicplus.com
To: Pam Turney; Shannon Carlow; Tara Daly
Subject: Online Form Submittal: Regional Services Committee
Date: Friday, March 17, 2017 3:56:41 PM

Regional Services Committee

Request to Appear as a Delegation at the Regional Services Committee

Regional Services Committee meetings are held on the fourth Wednesday of the month at 9:30 a.m.

Please Note: Contact information supplied by you and submitted with this form will become part of the public record and will be published in a meeting agenda that is posted online when this matter is before the Regional Services Committee. If you do not wish this contact information disclosed, please contact the FOI Coordinator at 250.746.2507 or 1.800.665.3955 to advise.

Meeting Date	4/26/2017
Contact Information	
Contact Name	Terri Dame
Representing	Cowichan Housing Association
Number Attending	2
Address	135 Third Street
City	Duncan
Province	BC
Postal Code	V9L 1R9
Telephone Number	*Field not completed.*
Reply Email	terri.dame@cowichanhousing.com
Presentation Topic and Nature of Request	Cowichan Housing Association will provide an overview and analysis on the status homelessness and affordable housing in the Cowichan Valley and discuss responses and solutions relevant to the broader community and local governments. The CVRD will be invited to consider its participation in planning and developing solutions for the long term.
Do you have a PowerPoint presentation?	Yes

Email not displaying correctly? View it in your browser.

Cowichan Housing Association

13

MISSION:

TO INCREASE ACCESS TO AND AVAILABILITY OF AFFORDABLE HOUSING IN THE COWICHAN REGION

CVRD Regional Services
April 26 2017

D1

Cowichan Housing Association

- 2016/2017 Focus:
  - Continuing Homeless Prevention
  - Research and data – Housing needs and best practices
  - AH Foundation – Capacity and Collaboration
  - Partnerships – OCCHN, SPC, CDFP, MHSU, UW
  - Housing First Initiative
  - Everyone Deserves a Home community meetings
  - Leveraging Resources

Affordable Housing Needs

- Increasing costs to own
- Increasing demand and cost for rental housing
- Declining rental supply plus adequacy issues
- Increasing homelessness

- *Between 2014 – 2016, the average sales price for single family homes in the Cowichan Valley increased from $315,000 to $389,947.*

- *In 2011, 1 in 4 households in the Cowichan region (over 8000) did not meet one or more standards for housing adequacy, suitability or affordability.*

Pressing Needs for Affordable Housing

BC Non-profit Housing Affordable Housing Plan

16

http://www.housingcentral.ca/SITES/HousingCentral/Affordable_Housing_Plan/HousingCentral/Affordable_Rental_Housing_Plan.aspx?hkey=433f9af0-e946-4a37-b827-94f68667dc0b

Average cost per year to address homelessness $1,490,375
(Nationally = $7+ billion)

Current rental supply backlog = 750

Rental housing demand projected to increase by 30% to 34% over the next 25 years. 1000+ units by 2021

Average annual investment needed to support current and future affordability and supply needs = $28.39 million

($20.5m Supply)

Community Voices Snapshot

- VIDEO
-

MOVING FORWARD

- **Combining Our Efforts:**
  - ✓ People and Partnerships
  - ✓ Information and Evidence
  - ✓ Resources/Funding

- March 29th community meeting key recommendation: Cowichan Coalition to Address Homelessness and Affordable Housing

From: noreply@civicplus.com
To: Pam Turney; Shannon Carlow; Tara Daly
Subject: Online Form Submittal: Regional Services Committee
Date: Wednesday, April 05, 2017 1:20:46 PM

Regional Services Committee

Request to Appear as a Delegation at the Regional Services Committee

Regional Services Committee meetings are held on the fourth Wednesday of the month at 9:30 a.m.

Please Note: Contact information supplied by you and submitted with this form will become part of the public record and will be published in a meeting agenda that is posted online when this matter is before the Regional Services Committee. If you do not wish this contact information disclosed, please contact the FOI Coordinator at 250.746.2507 or 1.800.665.3955 to advise.

Meeting Date	4/26/2017
Contact Information	
Contact Name	Brian Roberts
Representing	Cowichan Energy Alternatives Society
Number Attending	1
Address	#1 - 55 Station Street
City	Duncan
Province	British Columbia
Postal Code	V9L 1M2
Telephone Number	2507100017
Reply Email	brian@cowichanenergy.org
Presentation Topic and Nature of Request	Update on Cowichan Carbon-Smart and the Cowichan Biofuel Facility initiatives.
Do you have a PowerPoint presentation?	Yes

COWICHAN BIOFUEL INITIATIVE

21

Cowichan energy alternatives

Update and Next Steps in 2017

CVRD

D2

INTRODUCTION

Brian Roberts, M.Sc., P.Ag., P.Geo.

BC Government – Research
Environmental Consulting Practice
VIU Instructor - Environmental Science
Green Community Initiatives

D2

OUR GROWING TEAM AT CEA

OBJECTIVES

- To keep the CVRD Board and Staff informed on our progress and plans for the future
- To continue to assess if we are achieving our shared vision and goals for the CBF

WHY BIODIESEL?

Biodegradable

Carbon-neutral

Renewable

Locally Sourced

Clean-Burning

Non-Toxic

"the use of vegetable oils for engine fuels may seem insignificant today, but such oils may become, in the course of time, as important as the petroleum and coal tar products of the present time."

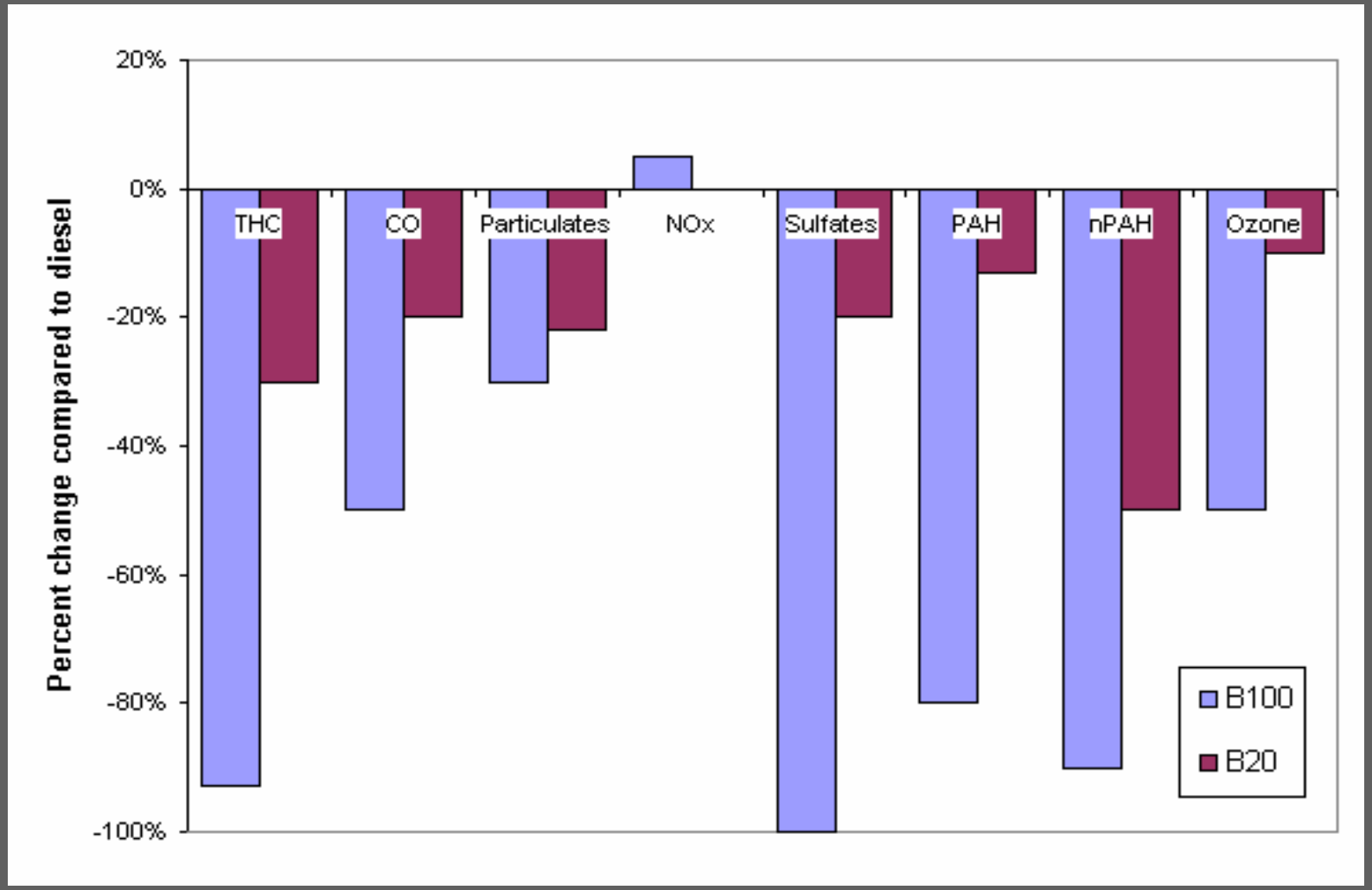
Rudolf Diesel, 1912

Can be used NOW with any diesel engin

BENEFITS

- Environmental
- Social
- Mechanical & Operational
- Economic

ENVIRONMENTAL

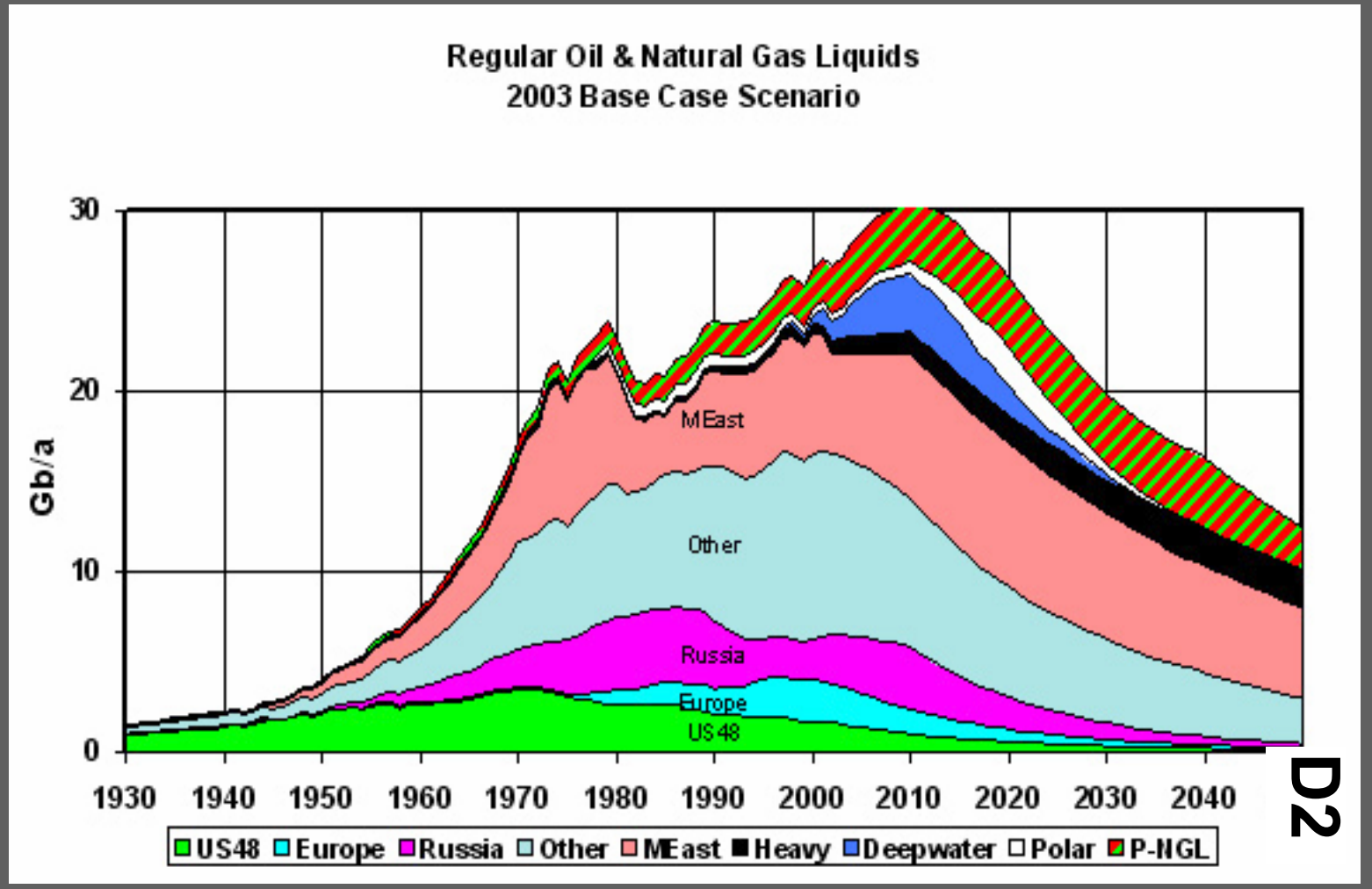


D2

ENVIRONMENTAL

SOCIAL

- Energy Security
- Green Jobs
- Education
- Positive local example
- Community Resilience



D2

SOCIAL


We turn used cooking
bcbiofuel
NETWORK
www.bcbiofuel.org


SUSTAINABLE ENERGY
BIO-DIESEL
Step 1
Step 2
Step 3
Step 4
Step 5
BENEFITS
GO!
SAFETY!

30

D2

MECHANICAL & OPERATIONAL

- Cetane ~5-10 points higher than petro diesel
- Higher lubricity reduces wear and tear and increases engine life
- Smoother/quiet running
- Cleaner fuel system & combustion chamber

LESSONS LEARNED FROM PAST PILOTS: VANCOUVER

Darcy Vaillant, manager of maintenance at Terminal Systems Inc. (TSI) in Vancouver, BC:

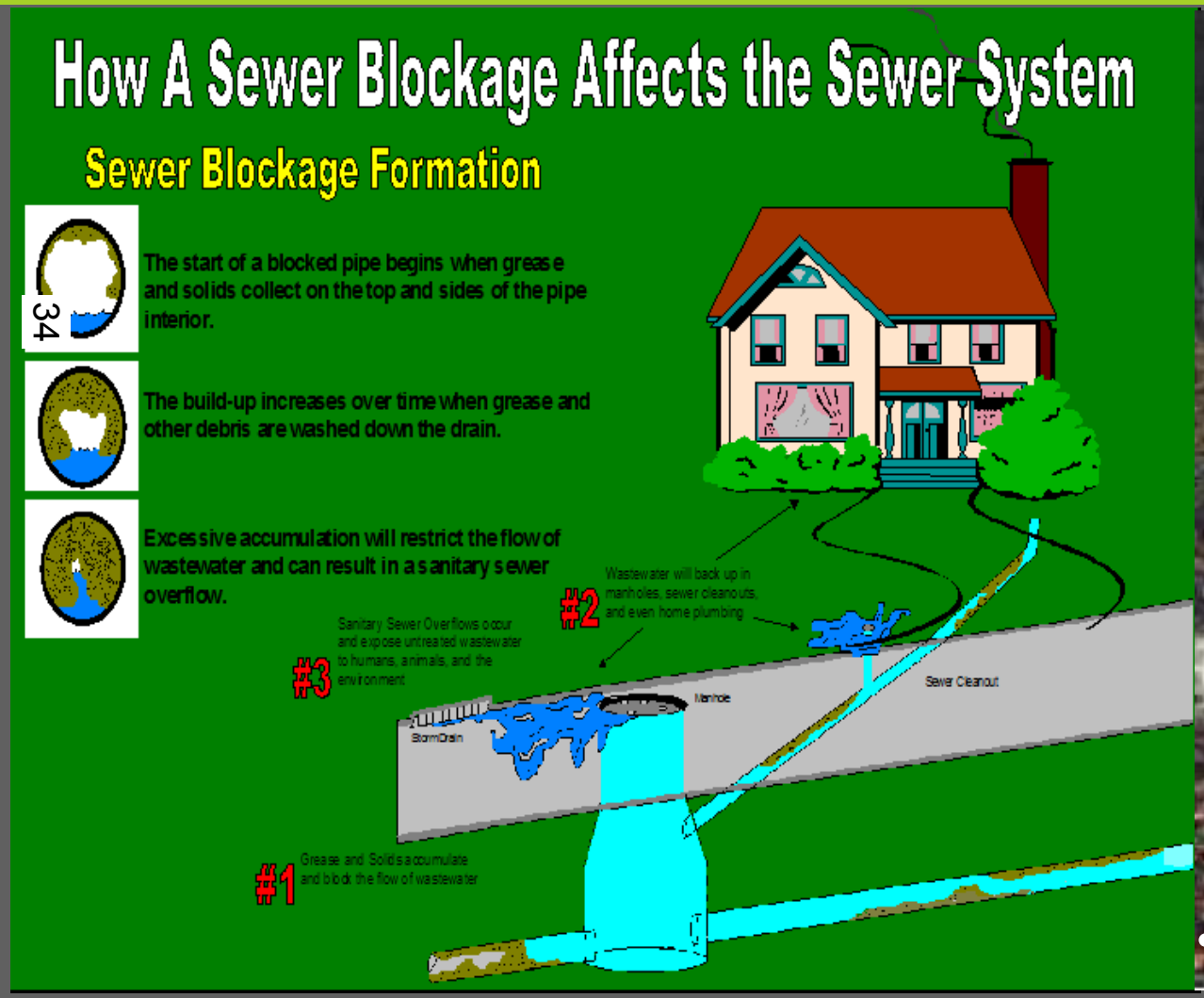
- TSI implemented the use of B20 in all of the 227 diesel engines at its two terminals—Vanterm and Deltaport.
- "Once I went up to B20 in testing, the reduction in emissions was impressive," says Vaillant

LESSONS LEARNED FROM PAST PILOTS: CVS CRUISE VICTORIA COACH SERVICES

Gary Gale, Managing Director, CVS Cruise Victoria:

- No significant problems running a bus fleet on B100 supplied by Cowichan Bio-Diesel Co-op.
- Usual issues with any rubber fuel lines needing replaced were all easily managed
- Experienced significant decrease in tailpipe emissions
- Reduced risk of contaminating spills

ECONOMIC



- FOGs collected at source prevents blockages

D2

FINANCIAL CONSIDERATIONS - CVRD

Cost of Green&Go Biodiesel Blending and Dispensing Station				
System Component	**CVRD**	**CEA**	**Total**	**Retail System**
Tank 5000 gal	$5,600.00		$5,600.00	$27,500.00
Tank 2000 gal	$5,500.00		$5,500.00	$9,500.00
Pump	$7,500.00		$7,500.00	$30,000.00
Installation	$41,008.63		$41,008.63	$86,171.00
Repairs 2014-15	$3,200.00	$1,500.00	$4,700.00	
Repairs 2016	$4,500.00	$1,500.00	$6,000.00	
Instal. Proj. Mgnt		$23,050.00	$23,050.00	$46,100.00
POS R&D, Inst & Pilot		$55,000.00	$55,000.00	$60,000.00
	$67,308.63	$81,050.00	$148,358.63	$259,271.00

Savings to CVRD over retail	**$191,962.37**
% Savings	**74.0%**

- Total costs to CVRD for biodiesel pump construction = $67,309
- Total cost to CEA for biodiesel pump construction = $81,050 on agreement that CEA and CB-DC would have assured access to pump for community benefit and GHG reductions.
- Total combined costs of pump = $148,359 (a saving of over $100,000 over a conventional/retail sys

FINANCIAL CONSIDERATIONS - CVRD

CVRD Costs to Fuel Offsite (BAU)	
# Trucks	4
Fills/Mo	16.8
Mo/Yr	12
Hrs/Fill	0.5
$/Hr	$20.00
$ Time Saved/Yr	**$8,046.52**
Total fills/Yr	804.7
Av Vol./Fill	124.3
Total Vol./Yr	100,048.1
$/L Savings	$0.07
$ Fuel Saved/Yr	**$7,003.37**
Total $ Saved/Yr	**$15,049.89**
Total $ Saved/Litre	**$0.15**

Now that the fuel pump is in place at the Bings Recycling Centre, the CVRD saves money every year in two ways:

1. **Time saved: drivers no longer need to drive offsite to purchase fuel.**
These savings can be quantified using CVRD records and statistics from the new Point of Sale database. According to a March 14, 2016 CVRD staff report , drivers spend an extra 0.5 hrs per fill-up whenever fuel is purchased offsite. Since drivers fill the trucks 16.8 times per month, this equals over $8,000 per year in staff time.

2. **Fuel cost savings from bulk diesel purchases.**
At present, the CVRD saves nearly $0.30/litre by purchasing and taking delivery of bulk diesel at Bings versus buying at a retail station offsite. Assuming only an $0.07/litre savings, this conservatively saves the CVRD $7,000 per year on fuel purchases. (*Note CVRD bulk diesel purchasing currently saves $0.30/litre over retail prices.)

Total Annual Cost Savings = $15,000 or $0.15/litre

D2

FINANCIAL CONSIDERATIONS - CVRD

Return on Investment (Years) - CVRD			
	CVRD Cost	**Combined Cost**	**Est. Retail Cost**
Total Pump Cost to CVRD	$67,808.63	$148,358.63	$259,271.00
Payback (Yrs)	**4.5**	9.9	17.2
*Yrs in operation to date	2.7	2.7	3.5
Yrs remaining until payback	**1.8**	7.2	13.7

*Pump opened for CVRD June 2013. Offline 10 months due to water & electrical damage.

As of todays date, the CVRD is on track to recover its share of the biodiesel pump construction costs within 2 years. Using bulk fuel cost savings of $0.15/litre over retail prices, the CVRD will have recovered its share of costs within 2 months (before the end of November, 2016). (*Note CVRD bulk diesel purchasing currently saves $0.30/litre over retail prices.)

FINANCIAL CONSIDERATIONS - CEA

Return on Investment (Years) - CEA			
	CEA Cost	**Total Investment**	**Incl. Opp. Costs**
Total Pump Cost to CEA	$81,050.00	$128,690.00	$228,690.00
*Return on all biofuel blend sales	$10,000.00	$10,000.00	$10,000.00
Payback (Yrs)	**8.1**	**12.9**	**22.9**
Yrs in operation to date	0.0	0.0	0.0
Yrs remaining until payback	**8.1**	12.9	22.9

*Assuming annual sales of 100,000L with gross margin of $0.10/L

Going forward, CEA is looking to the CVRD for a stable relationship and to honour its commitment to use biodiesel so that we too can recover our substantial investment in the biodiesel blending pump at Bings Creek. This will largely be accomplished through a new marketing effort to increase community awareness, access and purchases of biodiesel from the soon to be rebranded "Green & Go" biodiesel station.

ENVIRONMENTAL CONSIDERATIONS - CEA

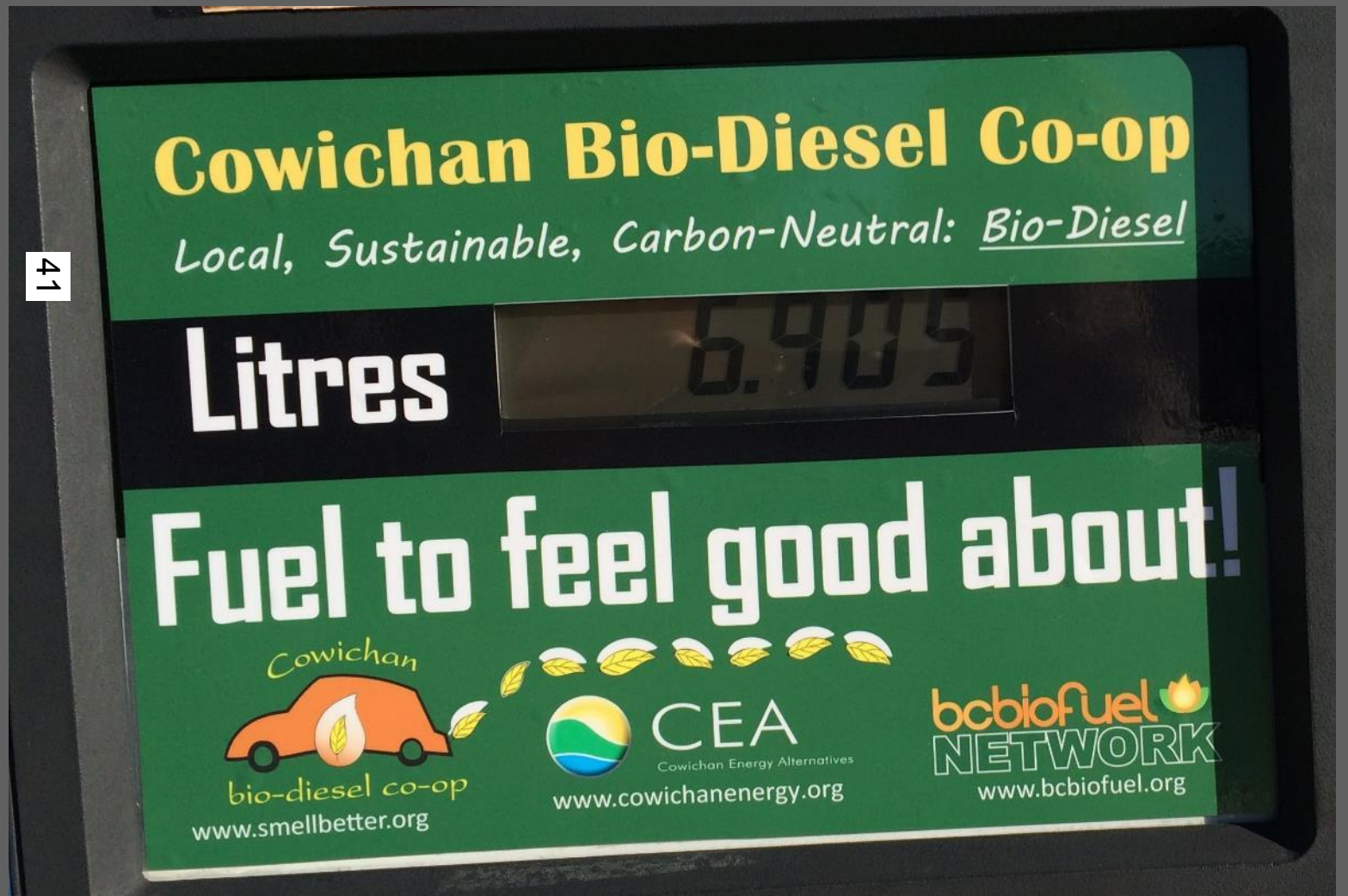
- Tonnes CO_2e reduced by CVRD in Q1, 2017:

12 tonnes

D2

2015 POSITIVE STEPS FORWARD

2016 – RESET & BREAKTHROUGH!



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- ✓ WSM License in place
- ✓ Facilities inspected by CVRD
- ✓ All requested reports, assessments and written agreements in place
- ✓ **Next: updated marketing plan to promote the new Green & Go™ biofuel station!**

D2

GREEN & GO BIODIESEL STATION

Green & Go™

A smart, inexpensive biofuel blending pump!

D2

RESULTS: ARE WE ACHIEVING OUR GOALS & MATERIALISING OUR VISION?

- 1. Access to pure (B100) and high bio-diesel blends not available anywhere else.
- 2. Convenient onsite fueling for CVRD fleet vehicles
- 3. Lower fuel costs due to bulk discounts on fuel purchasing. The greater the access and use of the pump, the greater the volume, the cheaper the bulk price.
- 4. Blending options allow CVRD to maximizing GHG reductions and associated benefits while also providing lower biodiesel blends that meet warranty limitations
- 5. GHG reductions from bio-diesel use will help CVRD meet UBCM carbon neutral commitments and result in cost savings of thousands of dollars annually.
- 6. Fuel tracking and management by fleet and vehicle with breakdown of diesel and biodiesel volumes used and GHG reductions achieved with each fill and annual summary reports available.
- 7. Accessible location for other local government waste management fleets to benefit
- 8. Larger Community GHG reductions and local economic benefits
- 9. Education and research opportunities
- 10. Positive media stories and PR benefits as Bings Creek is a public, high traffic location
- 11. Maintenance fund can be created at a few cents/L to reduce costs and ensure pump longevity.

THE FUTURE: WHAT NEXT?

- CEA & CB-DC will examine investment in increasing efficiency of biodiesel production & distribution, and more value-added sustainable products
- Promote the new Green & Go™ biofuel station to increase community biodiesel use and emissions reductions!
- Ongoing research and education
- Continue to work towards the vision and shared goals of project and an overarching vision and plan for futu

D2

COWICHAN BIODIESEL FOCUS OF INTERNATIONAL RESEARCH COLLABORATION

A research collaboration between VIU in Nanaimo and Iberoamericana University of Mexico was formed last year to study our biodiesel initiative in the Cowichan Valley and the values people and organizations like the CVRD place on using biodiesel. An initial survey was started last summer by visiting professor Odette Labatto from Ibero.

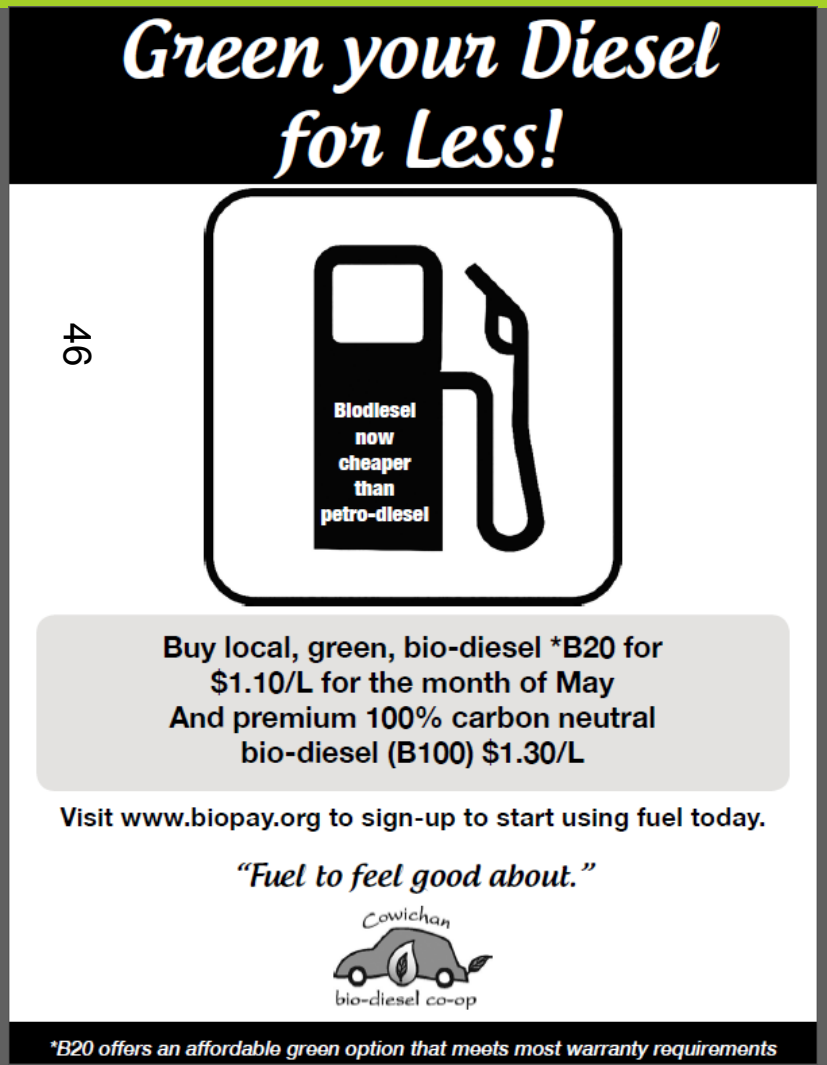
This May we will host Odette and 4 Ibero students as part of an exchange to learn about our biofuel operation and to expand the research survey. Ibero has already hosted me and two VIU professors in Mexico City last November as part of the exchange and to learn more about the Cowichan biodiesel initiative.

Ibero and VIU would like to request to include CVRD staff involved with using biodiesel in the expanded survey. The survey would take place through the second and third weeks of May and would include a follow-up survey next year.

We're very excited about the great opportunity to be part of this international research project and exchange, and would welcome the CVRD's participation.

D2

NEW OUTREACH AND OPEN HOUSE TO INCREASE AWARENESS AND UPTAKE



Find out more about the benefits of bio-diesel at our Open House on May 12 and 13, at the Cowichan Bio-Diesel Facility. See first-hand how bio-diesel is produced from waste cooking oil and try it in your diesel car with our new Green & Go Pump - no conversion necessary, just fill and go!

Local governments and business fleets seeking information on local, sustainable fuel options are invited to join us Friday May 12, 2017 at 2p.m. - 4:30 p.m.

The public is welcome to tour the CBF on Saturday May 13, 2017 at 10am – 3pm.

Where: Cowichan Bio-Diesel Facility at Bings Creek Recycling Centre

3900 Drinkwater Road, Duncan, BC

Join us for this free info session to learn more on the mechanical, environmental and social benefits of bio-diesel for you and your community.

The Cowichan Bio-Diesel Co-op has been supplying 100% bio-diesel made from recycled waste cooking oil to all its members since 2005.

D2

SBBC Top 5 in BC for **Community Impact**

CEA Triple Bottom Line Impact since 2009

Cowichan Energy Alternatives	TOTAL
Gross Revenues 2016 ($)	$412,627
Jobs created & maintained 2016 (#)	9
Cumulative Gross Revenues since 2009 ($)	$4,644,107
Benefit to local economy (2.5x Rev$)	$11,610,268
Equivalent Jobs since 2009 (#/yr)	48
GHGs reduced since 2009 (tonnes CO2e)	24,532

Resilient Communities, Healthy Planet.

UBCM COMMUNITY EXCELLENCE AWARD 2017?

The Community Excellence Awards program is an opportunity to showcase municipalities and regional districts who "lead the pack", take risks to innovate, establish new partnerships, question established ways of doing business and pioneer new customer service practices.

Deadline: JUNE 17, 2016

http://www.ubcm.ca/EN/main/convention/Awards/community-excellence-awards.html

THANK YOU CVRD FOR YOUR COMMITMENT TO LOCAL, SUSTAINABLE ENERGY!

Our world will change… When we focus on solutions to inspire, not problems to fear.
When we make sustainable solutions accessible, to everyone.
And when we lead by demonstrating the change we seek, before seeking change from others.

D2

HILLSIDE
Stone & Garden

2381 Staghorn Road,
Duncan, BC V9L 6L7
Phone: (250) 146-5548
Email: www.hillsidestone.org

February 21, 2017

Tauseef Waraich, M.Sc., P.Ag
Manager
Recycling & Waste Management Division
Cowichan Valley Regional District
175 Ingram Street, Duncan, BC V9L 1N8
Email: twaraich@cvrd.bc.ca
Tel: 250.746.2530 Toll Free: 1.800.665.3955 Fax: 250.746.2513

RE: Cowichan Valley Regional District Free Yard & Garden Drop Off Facilities

This letter has been prepared by Hillside Stone & Garden with regards to the designated free yard & garden drop off facilities within the Cowichan Valley Regional District (CVRD).

It is to Hillside's understanding that currently there are only 3 CVRD facilities and 1 private venture facility that are currently allowed to accept free residential yard & garden material within their place of business. As a local CVRD landscape supply business holding a Waste Stream Management License, Hillside knows that being able to supply a free yard & garden drop off option to our customers would only help bring more people in though our doors. As a business and resident perspective, why would someone looking to dispose of yard & garden go to a place where they have to pay, when they can go down the road to another facility and dump for free. Hillside, a local business paying taxes are having to personally subsidize its disposal of yard & garden waste and allow it's customers to dump for free to compete with these other local facilities stated above where local tax payers are futting the bill for residence to drop off and dispose of there yard & garden? How does this make any sense? The CVRD should immediately stop subsidizing yard and garden disposal, it is not "free" and should implement a tipping fee to reflect the true cost of handling this material.

Please consider allowing all places of business holding a current CVRD Waste Stream Management License to be able to supply local residents the option of dropping off their yard & garden for free. Thanks for your time and hearing Hillside's concerns.

Best Regards,

Corey Pace
President
Hillside Stone & Garden

Vancouver Island Recycling & Waste Industry Coalition

March 9th, 2017

To: CVRD Board Chair and Members

RE: CVRD's Decision to Not Charge Market Rates for Yard and Garden Waste

The Vancouver Island Recycling and Waste Industry Coalition (VIRWIC) has been formed with a key purpose to work with local governments, and other stakeholders to develop fair and effective recycling and waste management policies throughout Vancouver Island. We want local governments to meet their recycling and solid waste objectives, the public to receive high quality service at a reasonable cost, and the industry to have a stable investment environment.

Our key policy messages are:

1. Local governments should not be in competition with the private sector - the role of Local governments should be to adopt a target setting, education and enforcement role

2. Open and fair competition in the sector will create value for residents while keeping costs low - industry investments in infrastructure can only happen when government sends a clear signal that it will not build competing infrastructure or restrict free trade

More information about VIRWIC can be found at www.virwic.ca

The Cowichan Valley Regional District's Solid Waste Management Plan, approved by the Province, includes a few key commitments that support the private recycling and waste management industry. The plan states that the CVRD will set market rates, support local recycling businesses, and avoid cross-subsidization. The recycling businesses in the region have made investments based on these CVRD commitments that were approved by the Province.

The CVRD's recent decision not to charge market rates for yard and garden waste is in conflict with the approved Solid Waste Management Plan. The decision does not support local industry, instead it puts the CVRD in the position of using taxpayer dollars to compete with private industry who pay taxes in the CVRD. Subsidizing yard and garden waste to offer "free drop off" is enticing the public to use CVRD facilities over private facilities in the area. The private industry cannot utilize taxpayer dollars like the CVRD to subsidize disposal costs, therefore this recent decision is creating an unequal playing field and stifling competition.

As an industry, we ask that you reconsider the decision to not charge market rates on yard and garden waste, or provide equal subsidies to private facilities accepting yard and garden waste in the region so they may offer the public the same "free drop off" as any CVRD operated facilities. We support the CVRD's initiative to increase recycling objectives for yard and garden waste as well as other recyclables. However, if the CVRD chooses to continue to misleadingly advertise that "yard and garden costs zero dollars to accept at CVRD operated facilities", or exclude industry from equal subsidies, you will continue to harm industry.

Sincerely,

Stew Young Jr
VIRWIC Co-chair

The Salvation Army
Cowichan Valley Ministries
280 Trans Canada Hwy
Duncan, BC, V9L 3P9

Family Services/Office: 250-746-8669
Thrift Store: 250-746-7032
Fax: 250-746-5890

April 12, 2017

CVRD Recycling & Waste Management Division
Attn: Tauseef Waraich
175 Ingram St.
Duncan, BC
V9L 1N8

Dear Mr. Waraich,

Re: Non-Profit Bings Creek Tipping Fees

This past fall, we were notified that we could no longer receive free tipping at the Bings Creek facility. This came as a complete surprise to us and resulted in some ongoing financial challenges that we would not like to incur.

I would like to request that The Salvation Army be exempted from paying the tipping fees at the Bings Creek facility. I would further like to request this exemption be extended to other non-profit organizations that operate thrift stores in our community as well.

As you may be aware, we have a long history of serving the less fortunate and marginalized members of our community to help bring compassion, dignity and hope into the lives of many of our fellow citizens. This service to others comes at a financial cost that is paid for by community fundraising, limiting expenses and from the profits of our thrift store operations.

Your allowing for a tipping fee exemption would go a long ways to limiting some of our expenses that can then be directly applied to serving and enhancing our community.

In addition to the service we provide to individuals, our thrift store also provides a service to the community ... and to the municipalities as a place to divert items from the landfill. We sort out items for sale to raise funds that directly goes to the outreach support given to the needy. It also means that we are a partner to the municipalities in that we incur the expense of sorting items that would otherwise be sent to the landfill.

In addition to this, we provide jobs for staff to separate out recyclable materials. These jobs enable staff and volunteers to become community ambassadors and promoters for recycling amongst their social connections ... which further contributes to the diversion from landfills.

Unfortunately, we do receive items that are not suitable for recycling or sale that necessitates disposal to the land fill. Some of these "donations" are a direct result of the tipping fees charged by the CVRD ... which people do not want to pay. We know from anecdotal comments that many people think thrift stores are a good place to drop off their items so that they can help the organizations as well as avoiding paying for their disposal at Bings Creek. I believe that the CVRD needs to acknowledge some partial responsibility for such items that are dropped off to thrift stores.

We have ongoing issues with people dropping off items after hours that are vandalized and destroyed. These items end up in the landfill. We have incurred the cost of signage, lighting, security cameras and now static security guards in our attempts to prevent these after-hours drop offs.

Some unscrupulous landlords even come by in the late darkness of night with license plates obscured and hats covering faces to dispose of garbage left by tenants ... which we have to bring to the landfill. Yet, even in these cases, we spend time and effort to recycle whatever we can.

I believe it is reasonable to expect that a for profit thrift store or business should incur tipping fee costs as a part of their operational costs. I do not think that not-for-profit thrift stores should have these costs placed upon us given the community service provided by our organization and others.

I hope that you will be able to pass this along to the CVRD Board responsible for this decision so that they can consider my request.

I am also willing to appear before the board as a delegate to speak to this issue not only for The Salvation Army, but for all community service agencies operating Thrift Stores here in the Cowichan Valley.

Should you have any questions or need further information to approve this request, please contact me at your convenience. I look forward to hearing back from you on this issue.

Yours truly,

Dave Maandag
Community Ministry Director

STAFF REPORT TO COMMITTEE

DATE OF REPORT	March 28, 2017
MEETING TYPE & DATE	Regional Services Committee Meeting of April 26, 2017
FROM:	Parks & Trails Division Planning & Development Department
SUBJECT:	Tri 1 Events – Cowichan Crusher Gravel Fondo – Bike Race
FILE:	

PURPOSE/INTRODUCTION

The purpose of this report is to provide information associated with a 2017 Parks Special Event Application for the use of the Cowichan Valley Trail (CVT).

RECOMMENDED RESOLUTION

That it be recommended to the Board that a Parks Special Event Permit be issued to Tri Events 1 for a bike race event on June 24, 2017, subject to the conditions outlined in the staff report to the April 26, 2017, Regional Services Committee Meeting.

BACKGROUND

The Cowichan Crusher Gravel Fondo is an on/off road bike race with two different routes and lengths. An estimated 150 participants will be attending the event from all over BC. Both races start and finish on private property adjacent to the CVT.

The short 30 km route leads racers from the start point on private property in Glenora onto the CVT north to Waters Road where they do not cross the road, but turn around to head south down the CVT. Racers continue south on the CVT across the Kinsol Trestle to Renfrew Road where they turn around and turn North to once again cross the Trestle and return to the start point. The short race ends at this point and the estimated time for this race will be 1½ hours occurring between 9 a.m. and 11 a.m.

The longer route leads racers from the start point on private property in Glenora onto the CVT north past Waters Road past Glenora Trails Head Park into Cowichan River Provincial Park to Mayo Lake Road where they turn around to head back south along the CVT. Again the racers pass Glenora Trails Head Park, cross Waters Road to Mountain Road where they leave the CVT to ride along Ministry of Transportation (BC MoT) managed road until they once again access the CVT at Riverside Road. The racers continue south across the Kinsol Trestle to Renfrew Road where they turn around and head north across the Kinsol Trestle cross Mountain Road and return to the start point in Glenora. The estimated time for this race is 3 hours and will occur between 9 a.m. and 12 noon.

The event applicant has applied to BC MoT for a special event permit application for use of the section of the CVT which the Ministry manages through Cowichan River Provincial Park and all road portions included in the race. The applicant has received approval from BC Parks for the race through the Provincial Park. The race occurs on the CVRD managed CVT between Renfrew Road and Holt Creek Trestle at Glenora Trails Head Park.

ANALYSIS

Staff support the application and proposed routes. The applicant must confirm approval for the event from BC MoT. All conditions must be met in addition to the general conditions and requirements applicable to all parks special events prior to final approval and provision of the CVRD Special Event Permit. If these conditions are not met the CVRD will retain the right to remove the permit which would halt the event from occurring on CVRD managed property. The conditions to the permit are as follows:

1. The Applicant will develop laminated copies of a notice that will be posted along the Cowichan Valley Trail at a minimum two weeks prior to the event. The notice will advise the community of the times the trail will be utilized for the event. A draft of the notice will be provided to the CVRD for review and approval. Notices will be posted in methods and locations approved by the CVRD and will not be posted to trees. Staples are not to be used while posting notices.

2. The applicant will provide to CVRD staff a minimum of two weeks prior to the event a safety plan detailing what directions and guidelines will be given to the race participants, first aid station locations, as well as the locations and types of traffic control that will be placed along the race routes.

3. Traffic control personnel will be placed at access points to the CVT, Waters Road, Mountain Road, Hume Road, Shelby Road, Renfrew Road and at both ends of the Kinsol Trestle for the duration of the event.

4. The event will provide trail marshals to review the course before and after the race.

5. The applicant will provide a copy of insurance with the required coverage to the CVRD for this event.

FINANCIAL CONSIDERATIONS

No cost implications are expected for permitting this event to occur beyond regular scheduled park maintenance.

COMMUNICATION CONSIDERATIONS

The applicant will be posting notices in the park and throughout the community at least two weeks prior to the event. The notices will be reviewed and approved by parks staff prior to posting. Appropriate posting methods and locations will be communicated with the applicant. The applicant has been and will continue to communicate with Economic Development to investigate possible opportunities for supporting this event in the CVRD this year and hopefully in the subsequent years.

STRATEGIC/BUSINESS PLAN CONSIDERATIONS

This event aligns and supports the following objectives as outlined in the CVRD Corporate Strategy:

- Individual and community wellness
- Exceptional recreation, culture and park services
- A strong volunteer base
- Active community partnerships, collaboration and development
- Create a unique sense of place

Referred to (upon completion):

- ☐ Community Services *(Island Savings Centre, Cowichan Lake Recreation, South Cowichan Recreation, Arts & Culture, Public Safety, Facilities & Transit)*
- ☐ Corporate Services *(Finance, Human Resources, Legislative Services, Information Technology)*
- ☐ Engineering Services *(Environmental Services, Recycling & Waste Management, Water Management)*
- ☐ Planning & Development Services *(Community & Regional Planning, Development Services, Inspection & Enforcement, Economic Development, Parks & Trails)*
- ☐ Strategic Services

Prepared by:

Graham Gidden, MLA, BCSLA Intern
Parks & Trails Planner

Reviewed by:

Brian Farquhar
Manager

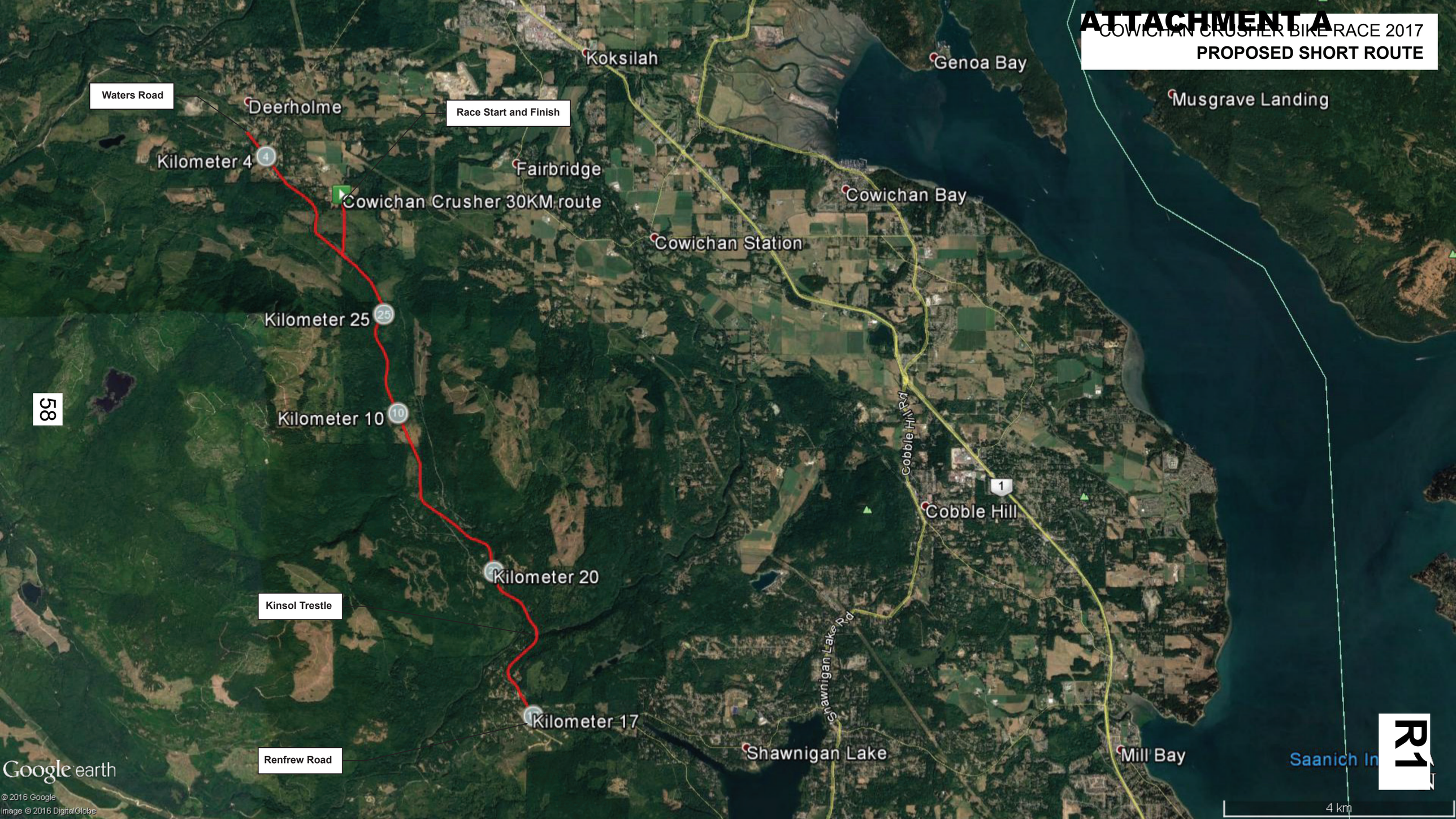
Ross Blackwell, MCIP, RPP, A.Ag.
General Manager

ATTACHMENTS:
Attachment A – Cowichan Crusher Bike Race – Proposed Short Route
Attachment B – Cowichan Crusher Bike Race – Proposed Long Route

ATTACHMENT A

COWICHAN CRUSHER BIKE RACE 2017

PROPOSED SHORT ROUTE



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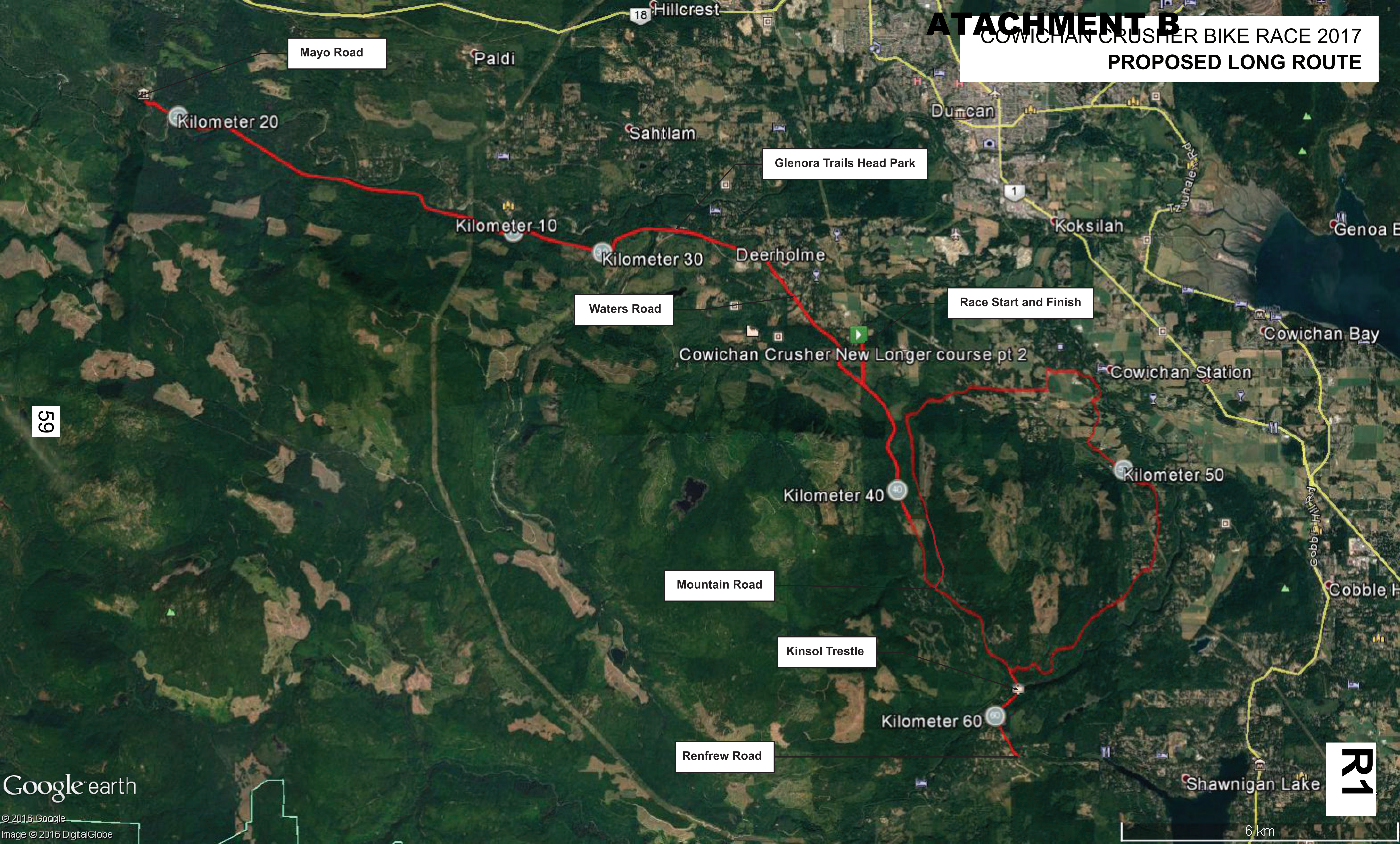
R1


ATACHMENT B
COWICHAN CRUSHER BIKE RACE 2017
PROPOSED LONG ROUTE
R1
Mayo Road
Paldi
Hillcrest
18
Kilometer 20
Sahtlam
Duncan
Glenora Trails Head Park
1
Kilometer 10
Kilometer 30
Deerholme
Koksilah
Genoa B
Waters Road
Race Start and Finish
Cowichan Crusher New Longer course pt 2
Cowichan Bay
Cowichan Station
59
Kilometer 50
Kilometer 40
Mountain Road
Cobble H
Kinsol Trestle
Kilometer 60
Renfrew Road
Shawnigan Lake
Google earth
© 2016 Google
Image © 2016 DigitalGlobe
6 km

STAFF REPORT TO COMMITTEE

DATE OF REPORT	April 18, 2017
MEETING TYPE & DATE	Regional Services Committee Meeting of April 26, 2017
FROM:	Parks & Trails Division Land Use Services Department
SUBJECT:	Cowichan Valley Trail Completion Initiative - Spring 2017 Update
FILE:	

PURPOSE/INTRODUCTION

The purpose of this report is to provide an update on the Cowichan Valley Trail completion initiative.

RECOMMENDED RESOLUTION

For information.

BACKGROUND

The Cowichan Valley Trail is a 120 km multi-use trail route that is part of the Trans Canada Trail on southern Vancouver Island. Since 1998 the Cowichan Valley Regional District, through direction of the Board, has been actively securing and developing major sections of the Cowichan Valley Trail route, exclusive of the 22 km developed and managed as a "rail to trail" by the Province of BC between Glenora and the Town of Lake Cowichan (this section of trail passes through/beside Cowichan River Provincial Park). The provincial section of the trail includes several former railway trestles (i.e. Holt Creek Trestle, Marie Canyon Trestle) that were converted to trail use between 1998 and 2001.

Funding for development of the Cowichan Valley Trail over the years has been derived from a number of grant funding programs (provincial, federal and non-profit) and through capital funding under the Regional Parks function. Of the 120 km route, just over 94 km is in place as managed trail that is predominantly "rail to trail", providing an accessible gentle-grade gravel pathway for cyclists, hikers, strollers and equestrians. Installed trail counters documented over 400,000 visits to the Cowichan Valley Trail in 2016 (excluding the provincial section); however the actual number of visits is higher as not all access points to the trail are currently monitored and recording devices cannot separately count those travelling in groups.

The route's 26 km remaining for trail development currently requires the use of roadway shoulders. These trail segments to be completed are as follows:

- Malahat Connector (Shawnigan Lake to Capital Regional District) – 9.3 km
- Somenos to South Chemainus – 12 km
- Chemainus to Saltair/Ladysmith – 4.5 km

ANALYSIS

<u>Malahat Connector (Shawnigan Lake to Capital Regional District) – 9.3 km</u>

As previously reported to the Committee, this section of trail is under construction and completion is scheduled later this spring. The trail alignment includes lands owned by the Regional District, trail agreements with Ministry of Forests and private land owners, and a trail SRW across lands held by Malahat Nation. Planning and construction of the trail has involved collaboration with

Malahat Nation under a joint MoU approved in 2013 to guide key aspects of this project.

Funding for trail construction includes secured grants from BikeBC, Trans Canada Trail Foundation, Federal Gas Tax Funding, Trans Canada Trail Relocation Fund and approved capital funding through the Regional Parks function. The total estimated cost of the project is $2.2 million, inclusive of a major trail bridge over Shawnigan Creek, several smaller creek crossings, a small parking staging area on Stebbings Road and trail features inclusive of a major work under development through Malahat Nation involving artists and youth from the community. The finished trail will be gravel surfaced 2.0 to 3.0 metres in width to provide an all-weather accessible trail for non-motorized recreation use (cycling, equestrian, walking/hiking). Local contractors working on the trail project include Cutting Edge Enterprises (Cowichan Valley-based), MacDonald and Lawrence Timber Framing (Mill Bay) and GT Excavating (Cobble Hill).

The Capital Regional District is concurrently working a trail connection from the existing Galloping Goose Trail/E&N Rail Trail in Langford to connect with this new section of the Cowichan Valley Trail. The planned completion and linking of the two trails is expected by early summer, so tentative dates for an official trail opening are currently being reviewed. In addition to Canada 150 Celebration Events taking place throughout the year, the Trans Canada Foundation is also celebrating 25 years of the Trans Canada Trail and is encouraging community-based events across Canada along the trail. The Foundation has expressed strong support for the trail's Malahat Connection as a featured Trans Canada Trail accomplishment in 2018.

The collaborative partnership with Malahat Nation on developing this trail connection also provides under the MoU for recognition and celebration of Malahat's culture and economic opportunities. This includes a trail feature being developed by Malahat's artists and youth, with funding of $55,000 for this work included in the $2.2 million project budget, providing for the artwork fabrication, Malahat youth participation and skills development, transportation costs, installation and unveiling ceremony (date still to be determined). The works will be located within the trail corridor on Malahat Nation's lands near the trail bridge over Shawnigan Creek, providing, in part, acknowledgement of Malahat Nation's involvement with the trail project and featuring aspects of the Nation's culture and history.

Chemainus to Saltair/Ladysmith – 4.5 km "Rail with Trail"

The Cowichan Valley Trail initiative has developed key sections of "rail with trail" through Chemainus and northern portion of Saltair (Electoral Area G); however a gap of 4.5 km remains to be completed from Stocking Creek Park in Saltair to Cook Street in Chemainus. The estimated cost to complete this trail "gap" is $1,450,000 based on contracted survey and trail design plans done in 2013. This estimate includes a significant crossing over Stocking Creek and building of the "rail with trail" following the adopted design standards of the "E&N Rail with Trail Guidelines" document jointly developed by Island Corridor Foundation and regional districts located along the E&N railway corridor.

Grant applications to fund the project were made to the Provincial Rural Dividend Fund and BikeBC. The Board was previously advised of the successful grant award of $500,000 from the Rural Dividend Fund. However, the Regional District was recently notified the BikeBC grant application is also approved for $511,274. Conditions of award for these funds are still forthcoming, so staff will be working the Provincial Ministries on how the two grants can be applied to the project. Additional funds allocated to the Chemainus to Saltair/Ladysmith "Rail with Trail" include $225,000 in Community Works Gas Tax Funds and $100,000 from the 2017 Regional Parks budget. A further report to the Committee/Board will be brought forward once grant funding conditions are known, along with a summary of total funding requirements to complete the project and proposed project timeline. The objective would be to commence with this "rail with trail" project upon completion of the Malahat Connector, working towards a completion date in fall 2018.

Somenos to South Chemainus – 12 km (Combined trail with Rail with Trail)

The final remaining section of the Cowichan Valley Trail to complete is recognized as one of the more challenging portions due to the distance, crossing requirements of the Trans-Canada Highway and terrain conditions. The route follows a portion of the Catalyst waterline route from Highway 18 to the Cowichan Exhibition grounds. Crossing at Mays Road, the route follows the Trans-Canada Highway to the E&N Railway right of way, whereupon a rail with trail is planned for the majority of the route to the existing section of the Cowichan Valley Trail in Chemainus. The 12 km distance is estimated at $6.0 million based on trail engineering design work completed. There is the opportunity to separate the 12 km trail route into shorter sections (i.e. Highway 18 to Cowichan Exhibition grounds) as a means of continued targeting of potential grant funds and partnership opportunities to complete the trail. There may also be opportunities with Halalt First Nation and/or Stz'uminus Nation with this trail project, as was jointly developed with Malahat Nation on the Malahat Trail Connection.

FINANCIAL CONSIDERATIONS

The 2017 budget for the Cowichan Valley Trail includes $137,144 for the annual operation and maintenance of the Cowichan Valley Trail (excluding the section administered by the Province of BC from Glenora to Lake Cowichan). The terms of the MoU Agreement with Malahat Nation for the new trail across their lands include Malahat Nation assuming maintenance of the trail under contract with the Regional District, funded through the Regional Parks budget. Contract details are still being developed and will be based on maintenance requirements for existing sections of the Cowichan Valley Trail.

COMMUNICATION CONSIDERATIONS

Coordination of an official trail opening ceremony for the Malahat Trail Connection will be done with the Capital Regional District (CRD), inclusive of linking this event as part of Trans Canada Trail celebrations across Canada. Provincial Ministries which have provided funds for this project will also need to be engaged, as well as the Trans Canada Trail Foundation.

STRATEGIC/BUSINESS PLAN CONSIDERATIONS

Regional SF Area #5.1 Formalize First Nations Relationships.

Referred to (upon completion):

- ☐ Community Services *(Island Savings Centre, Cowichan Lake Recreation, South Cowichan Recreation, Arts & Culture, Public Safety, Facilities & Transit)*
- ☐ Corporate Services *(Finance, Human Resources, Legislative Services, Information Technology)*
- ☐ Engineering Services *(Environmental Services, Recycling & Waste Management, Water Management)*
- ☐ Planning & Development Services *(Community & Regional Planning, Development Services, Inspection & Enforcement, Economic Development, Parks & Trails)*
- ☒ Strategic Services

Prepared by:

Brian Farquhar
Manager

Reviewed by:

Not Applicable
Not Applicable

Ross Blackwell, MCIP, RPP, A.Ag.
General Manager

ATTACHMENTS:
Attachment A – Cowichan Valley Trail Completion Initiative – Remaining Trail Gaps

ATTACHMENT R2

Cowichan Valley Trail Completion Initiative

Remaining Trail Gaps

TO NANAIMO

Regional District of Nanaimo

Yellowpoint

Gabriola Island

LADYSMITH

Thetis Island

Kuper Island

Chemainus to Saltair/Ladysmith 4.5 km

Saltair

Cowichan Valley Regional District

CHEMAINUS

Crofton

Somenos to South Chemainus 12 km

Chemainus River

LAKE COWICHAN

District of North Cowichan

Maple Bay

Highway 18

Quamichan Lake

DUNCAN

Cowichan River

Cowichan Bay

Cobble Hill

Koksilah River

Mill Bay

Shawnigan Lake

Malahat Connector 9.3 km

Capital Regional District

Sooke Lake

TO VICTORIA

Completed Trail

Proposed Trail Route

CVRD

Trans Canada Trail
Sentier Transcanadien

0 5 10 15 km

STAFF REPORT TO COMMITTEE

DATE OF REPORT	March 14, 2017
MEETING TYPE & DATE	Regional Services Committee Meeting of April 26, 2017
FROM:	Environmental Services Division Engineering Services Department
SUBJECT:	Climate Issues
FILE:	0540-20-RS/05

PURPOSE/INTRODUCTION

The purpose of this report is to provide an omnibus update on a number of provincial climate initiatives and reports and their implications to the Cowichan Valley Regional District's (CVRD) climate mitigation and adaptation programs.

1. Community Energy and Emissions Inventory - updated reports now available;
2. BC Climate Leadership Plan and updating the Climate Action Charter; and
3. *Building Act* - Step code and implications for CVRD land use and building.

RECOMMENDED RESOLUTION

For information.

BACKGROUND

1. Community Energy and Emissions Inventory (CEEI) Reports

The Province's 2008 "*Green Communities Legislation*" amended the *Local Government Act* and *Community Charter* to require that all local governments institute greenhouse gas emission reduction targets in the Regional Growth Strategy (if applicable) and in the Official Community Plans, as well as identify actions and policies for achieving those targets.

As part of these actions, local governments need to inventory both their own and community emissions and establish ambitious, yet realistic, reduction targets which they will then report out on an annual basis. In order to provide a standardized process and comparable numbers, the Province provides semi-regular inventory reports.

With the 2012 data now released (Attachments A and B), the CVRD and its communities are in a position to establish the effectiveness, if any, of changes and strategies in land use and energy planning towards achieving their current targets. The data for the region no longer tracks transportation or land use conversion metrics – two of the areas of greatest interest and impact to our region. The recent release of the census data provides a backdrop upon which further analysis of the data and growth of our communities may help to fill the current data gap.

Regardless of any opportunities for climate mitigation via carbon reduction, climatic changes are certain and already occurring in our region. Knowing the range of projected changes is crucial in ensuring that investments in planning are as targeted as possible; to that end, detailed projections for the region have been developed and are currently being utilized for a range of strategic planning programs, including water supply, hazard, and risk analysis. A summary presentation will be provided to the Committee in April.

2. Provincial Climate Leadership Plan and Climate Action Charter

With the updated BC Climate Leadership Plan released at the end of 2016, there are a number of

additional provincial policies and targets to drive carbon reduction and adaptation.

1. Transportation infrastructure and support for e-vehicles;
2. Renewed focus on waste to energy strategies;
3. Promoting low carbon and renewable material in infrastructure;
4. Reducing emission and planning for adaptation in the public sector; and
5. Target of net-zero buildings by 2032.

The CVRD is also a signatory of the Climate Action Charter that provides annual funding via the Climate Action Revenue Incentive Program (CARIP) to support investments and programs that reduce carbon emissions as well as the reporting and monitoring process. Carbon reduction is a complex process and the CVRD has focused on two streams to meet those regulatory needs: CVRD corporate operations and the Regional Sustainability Strategy program. At the community level this has focused on the trilogy of the built environment, energy analysis, and land use planning.

Climate Action Charter Update

In 2007, the Province of British Columbia and the Union of British Columbia Municipalities (UBCM) established a Joint Provincial-UBCM Green Communities Committee (GCC) pursuant to the British Columbia Climate Action Charter. The purpose of the GCC is to support local government in taking action on climate change.

To assist in carrying out this mandate, and in support of the updated Climate Leadership Plan, three working groups (Green Infrastructure and Services, Low Carbon Land Use, and Climate Adaption) have been struck with a mandate to provide enhanced recommendations by the end of March 2017. The CVRD is active on the Adaption Working Group.

3. *Building Act* and Step Code

With the new *Building Act*, all local adjustments related to energy conservation and other enhancements will be voided when the act comes into force. This means that any building or land use issues, such as density bonusing or land use contracts, that used the amended section 919.1 and 920(10.1) of the *Local Government Act* to conserve water, conserve energy, or reduce greenhouse gas emissions will no longer be in force unless there is another Board-approved mechanism in place to which to transition prior to the end of the two year transition period in December 2017.

The Province's updated Climate Leadership Plan has identified that by 2032, the BC Building Code will require all new homes to be constructed 'Net Zero Ready.' It is expected that over the next decade, the building code will be updated incrementally to require improved energy performance. The new Provincially-proposed 'Step Code' supports the *Building Act* by providing a consistent provincial standard for energy efficiency to replace the wide range of existing policies and programs developed by local governments. The 'Step Code' will be available to communities to adopt and to begin requiring energy performance above building code as a transition opt-in opportunity at this time to bridge the policy gap incurred by the new *Building Act*.

ANALYSIS

With the new and revitalized policy development at both the federal and provincial level, there is an opportunity to consider how new programs and language adjustments in funding programs will affect the CVRD. Funding, particularly infrastructure, will increasingly be focused on ensuring that climate resilience is incorporated, as evidenced in the two new federal grant programs recently announced to address climate change in communities and to strengthen infrastructure planning and decision making.

With the changes to the *Building Act*, there are some implications for the CVRD and member

municipalities who have existing land use requirements tied to building performance or to other environmental objectives.

Funding for outreach and education is now being provided by BC Hydro to bridge the education and outreach gap both within local government and with the construction community. Both the Capital Regional District and Regional District of Nanaimo have put forward grant applications and are willing to incorporate education programs in the CVRD should funding be available. Unfortunately, the call for proposals, which required local contributions, came after the CVRD's budget process.

FINANCIAL CONSIDERATIONS

N/A

COMMUNICATION CONSIDERATIONS

N/A

STRATEGIC/BUSINESS PLAN CONSIDERATIONS

Supports the Regional Strategic Focus Areas of Response to Climate Change and Excellence in Regional Land Use Planning.

Referred to (upon completion):

- ☐ Community Services *(Island Savings Centre, Cowichan Lake Recreation, South Cowichan Recreation, Arts & Culture, Public Safety, Facilities & Transit)*
- ☒ Corporate Services *(Finance, Human Resources, Legislative Services, Information Technology)*
- ☒ Engineering Services *(Environmental Services, Recycling & Waste Management, Water Management)*
- ☒ Planning & Development Services *(Community & Regional Planning, Development Services, Inspection & Enforcement, Economic Development, Parks & Trails)*
- ☒ Strategic Services

Prepared by:

Kate Miller, MCIP, RPP, LEED AP
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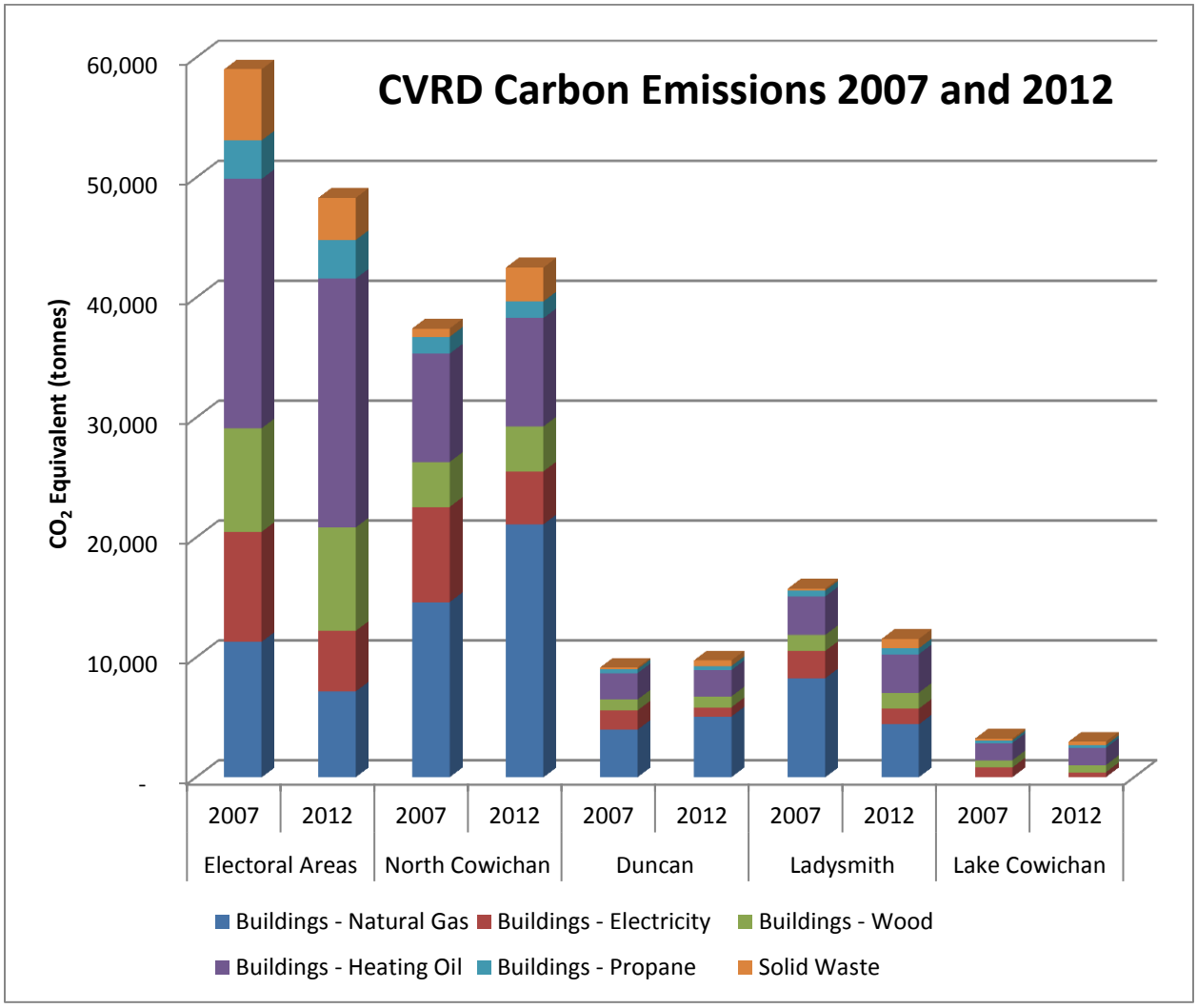
Reviewed by:

Not Applicable
Not Applicable

Hamid Hatami, P. Eng.
General Manager

ATTACHMENTS:
Attachment A – CVRD Building and Solid Waste Carbon Emissions
Attachment B – CEEI Summary Tables

CVRD Building and Solid Waste Carbon Emissions



Note. Graph includes only emissions from the Buildings and from Solid Waste Sectors as these were the only categories reported consistently in 2007 and 2012. As such, they do not represent total carbon emissions for each jurisdiction.

Source: BC Ministry of Environment. *Community Energy & Emissions Inventory 2007-2012 Reports*. January, 2017. http://www2.gov.bc.ca/gov/content/environment/climate-change/reports-data/community-energy-emissions-inventory

CVRD Carbon Emissions 2007 – 2012

CVRD

Sector	SubSector Description	Measurement Description	Units	2007				2010				2012			
				Connections	Consumption	Energy (GJ)	$CO_2E(t)$	Connections	Consumption	Energy (GJ)	$CO_2E(t)$	Connections	Consumption	Energy (GJ)	$CO_2E(t)$
Buildings	Residential	Heating Oil	GJ	1	541,385	541,385	36,640	1	524,081	524,081	35,468	1	540,840	540,840	36,603
Buildings	Residential	Propane	GJ	1	93,345	93,345	5,679	1	90,362	90,362	5,498	1	93,251	93,251	5,673
Buildings	Residential	Wood	GJ	1	648,804	648,804	15,235	1	628,066	628,066	14,748	1	648,151	648,151	15,220
Buildings	Commercial/Small-Medium Industrial	Natural Gas	GJ	936	459,762	459,762	22,874	667	605,869	605,869	30,143	695	433,810	433,810	21,582
Buildings	Commercial/Small-Medium Industrial	Electricity	kWh	4,600	316,899,000	1,140,835	8,240	4,489	337,450,000	1,214,819	8,549	4,425	331,742,000	1,194,270	4,534
Buildings	Residential	Natural Gas	GJ	5,823	307,207	307,207	15,284	6,789	310,135	310,135	15,430	7,269	324,929	324,929	16,166
Buildings	Residential	Electricity	kWh	33,225	522,503,000	1,881,009	13,585	35,194	527,796,000	1,900,064	13,371	36,099	545,032,000	1,962,114	7,449
Agriculture	Enteric Fermentation	Methane	T	15,297	878		21,959					14,118	863		21,569
Land-use Change - Deforestation	Municipal	Deforestation	Ha	29			26,128								
Land-use Change - Deforestation	Agriculture	Deforestation	Ha	14			9,337								
Solid Waste	Community Solid Waste	Solid Waste	T		27,948		7,051		27,139		9,516		22,729		7,875
ALL SECTORS						**5,072,347**	**182,012**			**5,273,396**	**132,723**			**5,197,365**	**136,671**

Electoral Areas

Sector	SubSector Description	Measurement Description	Units	2007				2010				2012			
				Connections	Consumption	Energy (GJ)	$CO_2E(t)$	Connections	Consumption	Energy (GJ)	$CO_2E(t)$	Connections	Consumption	Energy (GJ)	$CO_2E(t)$
Buildings	Residential	Heating Oil	GJ	1	306,836	306,836	20,766	1	297,029	297,029	20,102	1	306,527	306,527	20,745
Buildings	Residential	Propane	GJ	1	52,874	52,874	3,217	1	51,184	51,184	3,114	1	52,821	52,821	3,214
Buildings	Residential	Wood	GJ	1	367,963	367,963	8,641	1	356,201	356,201	8,364	1	367,592	367,592	8,632
Buildings	Commercial/Small-Medium Industrial	Natural Gas	GJ	401	133,691	133,691	6,651	221	105,537	105,537	5,251	174	73,533	73,533	3,658
Buildings	Commercial/Small-Medium Industrial	Electricity	kWh	2,025	107,932,000	388,555	2,806	2,028	112,285,000	404,226	2,845	2,025	108,974,000	392,306	1,489
Buildings	Residential	Natural Gas	GJ	1,894	93,668	93,668	4,660	1,686	70,751	70,751	3,520	1,741	70,230	70,230	3,494
Buildings	Residential	Electricity	kWh	13,823	245,107,000	882,384	6,373	14,761	251,830,000	906,587	6,380	15,213	261,133,000	940,078	3,569
Solid Waste	Community Solid Waste	Solid Waste	T		23,474		5,922		22,702		7,960		10,138		3,512
ALL SECTORS						**2,225,971**	**59,036**			**2,191,515**	**57,536**			**2,203,087**	**48,313**

R3

North Cowichan

Sector	SubSector Description	Measurement Description	Units	2007 Connections	2007 Consumption	2007 Energy (GJ)	2007 $CO_2E(t)$	2010 Connections	2010 Consumption	2010 Energy (GJ)	2010 $CO_2E(t)$	2012 Connections	2012 Consumption	2012 Energy (GJ)	2012 $CO_2E(t)$
Buildings	Residential	Heating Oil	GJ	1	133,444	133,444	9,031	1	129,179	129,179	8,743	1	133,310	133,310	9,022
Buildings	Residential	Propane	GJ	1	23,020	23,020	1,401	1	22,284	22,284	1,356	1	22,997	22,997	1,399
Buildings	Residential	Wood	GJ	1	159,829	159,829	3,753	1	154,720	154,720	3,633	1	159,668	159,668	3,749
Buildings	Commercial/Small-Medium Industrial	Natural Gas	GJ	241	182,954	182,954	9,102	248	303,487	303,487	15,099	293	283,135	283,135	14,086
Buildings	Commercial/Small-Medium Industrial	Electricity	kWh	1,249	121,888,000	438,796	3,169	1,221	135,789,000	488,840	3,440	1,179	135,831,000	488,991	1,856
Buildings	Residential	Natural Gas	GJ	2,110	110,758	110,758	5,510	3,013	136,140	136,140	6,773	3,171	141,238	141,238	7,027
Buildings	Residential	Electricity	kWh	11,929	183,580,000	660,887	4,773	12,565	180,137,000	648,493	4,564	12,876	187,703,000	675,730	2,565
Land-use Change - Deforestation	Mining	Deforestation	Ha									2			1,101
Land-use Change - Deforestation	Municipal	Deforestation	Ha									7			4,905
Land-use Change - Deforestation	Agriculture	Deforestation	Ha									2			1,463
Solid Waste	Community Solid Waste	Solid Waste	T		2,738		691		2,783		976		8,142		2,821
ALL SECTORS						**1,709,688**	**37,430**			**1,883,143**	**44,584**			**1,905,069**	**49,994**

City of Duncan

Sector	SubSector Description	Measurement Description	Units	2007 Connections	2007 Consumption	2007 Energy (GJ)	2007 $CO_2E(t)$	2010 Connections	2010 Consumption	2010 Energy (GJ)	2010 $CO_2E(t)$	2012 Connections	2012 Consumption	2012 Energy (GJ)	2012 $CO_2E(t)$
Buildings	Residential	Heating Oil	GJ	1	32,396	32,396	2,192	1	31,360	31,360	2,122	1	32,363	32,363	2,190
Buildings	Residential	Propane	GJ	1	5,602	5,602	341	1	5,423	5,423	330	1	5,597	5,597	341
Buildings	Residential	Wood	GJ	1	38,686	38,686	908	1	37,450	37,450	879	1	38,647	38,647	908
Buildings	Commercial/Small-Medium Industrial	Natural Gas	GJ	154	60,411	60,411	3,006	198	85,065	85,065	4,232	228	77,141	77,141	3,838
Buildings	Commercial/Small-Medium Industrial	Electricity	kWh	677	34,080,000	122,688	886	644	34,518,000	124,265	874	636	29,159,000	104,972	399
Buildings	Residential	Natural Gas	GJ	367	19,326	19,326	961	504	24,474	24,474	1,218	516	24,680	24,680	1,228
Buildings	Residential	Electricity	kWh	2,514	27,782,000	100,015	722	2,633	28,187,000	101,473	714	2,646	27,380,000	98,568	374
Solid Waste	Community Solid Waste	Solid Waste	T		539		136		512		180		1,362		472
ALL SECTORS						**379,124**	**9,152**			**409,510**	**10,549**			**381,968**	**9,750**

Town of Ladysmith

Sector	SubSector Description	Measurement Description	Units	2007 Connections	2007 Consumption	2007 Energy (GJ)	2007 $CO_2E(t)$	2010 Connections	2010 Consumption	2010 Energy (GJ)	2010 $CO_2E(t)$	2012 Connections	2012 Consumption	2012 Energy (GJ)	2012 $CO_2E(t)$
Buildings	Residential	Heating Oil	GJ	1	47,439	47,439	3,211	1	45,922	45,922	3,108	1	47,391	47,391	3,207
Buildings	Residential	Propane	GJ	1	8,181	8,181	498	1	7,919	7,919	482	1	8,173	8,173	497
Buildings	Residential	Wood	GJ	1	56,838	56,838	1,335	1	55,021	55,021	1,292	1	56,781	56,781	1,333
Buildings	Commercial/Small-Medium Industrial	Natural Gas	GJ	140	82,706	82,706	4,115	92	111,781	111,781	5,561				
Buildings	Commercial/Small-Medium Industrial	Electricity	kWh	394	42,746,000	153,885	1,111	373	45,190,000	162,684	1,145	374	48,988,000	176,357	670
Buildings	Residential	Natural Gas	GJ	1,452	83,455	83,455	4,152	1,586	78,770	78,770	3,919	1,841	88,780	88,780	4,417
Buildings	Residential	Electricity	kWh	3,544	44,870,000	161,532	1,167	3,748	46,172,000	166,219	1,170	3,848	47,007,000	169,225	642
Land-use Change - Deforestation	Municipal	Deforestation	Ha									4			2,504
Land-use Change - Deforestation	Recreation	Deforestation	Ha									1			411
Solid Waste	Community Solid Waste	Solid Waste	T		625		158		590		207		2,237		775
ALL SECTORS						**594,036**	**15,747**			**628,316**	**16,884**			**546,707**	**14,456**

Town of Lake Cowichan

Sector	SubSector Description	Measurement Description	Units	2007 Connections	2007 Consumption	2007 Energy (GJ)	2007 $CO_2E(t)$	2010 Connections	2010 Consumption	2010 Energy (GJ)	2010 $CO_2E(t)$	2012 Connections	2012 Consumption	2012 Energy (GJ)	2012 $CO_2E(t)$
Buildings	Residential	Heating Oil	GJ	1	21,271	21,271	1,440	1	20,591	20,591	1,394	1	21,249	21,249	1,438
Buildings	Residential	Propane	GJ	1	3,668	3,668	223	1	3,551	3,551	216	1	3,664	3,664	223
Buildings	Residential	Wood	GJ	1	25,488	25,488	599	1	24,673	24,673	579	1	25,462	25,462	598
Buildings	Commercial/Small-Medium Industrial	Natural Gas	GJ												
Buildings	Commercial/Small-Medium Industrial	Electricity	kWh	255	10,253,000	36,911	267	223	9,668,000	34,805	245	211	8,790,000	31,644	120
Buildings	Residential	Natural Gas	GJ												
Buildings	Residential	Electricity	kWh	1,415	21,166,000	76,198	550	1,487	21,470,000	77,292	544	1,516	21,808,000	78,509	298
Land-use Change - Deforestation	Municipal	Deforestation	Ha									1			1,012
Solid Waste	Community Solid Waste	Solid Waste	T		573		144		552		194		850		294
ALL SECTORS						**163,536**	**3,223**			**160,912**	**3,172**			**160,528**	**3,983**

Source: BC Ministry of Environment. *Community Energy & Emissions Inventory 2007-2012 Reports*. January, 2017. http://www2.gov.bc.ca/gov/content/environment/climate-change/reports-data/community-energy-emissions-inventory

R3

Information received Re: Climate Issues

Greetings

Good news today – the Province announced the sign off of the Energy Step Code regulation (see below). A few thoughts on this ….

1. Wow! Great work by everyone who contributed to this amazing process! The Energy Step Code is a ground-breaking tool for local governments to participate in the transition to Net Zero buildings - simplifying and strengthening local governments' climate and energy toolkit. Industry support and partnerships have been invaluable.

2. A massive congrats to all local government staff who worked on this incredibly complex work. Your efforts were way beyond the call of duty, and have brought us to this point. Work included
   - reviewing reams of technical and policy docs,
   - thrashing through ideas and concepts at the Energy Efficiency Working Group (now Energy Step Code Council) over the past 2 years,
   - testing ideas with your local developers and building officials,
   - drafting up solutions that would work for all parties
   - speaking about the draft Energy Step Code at webinars and other events
   - hosting builder training to share lessons.

   And thanks to those who will continue to work on this through the Energy Step Code Council - the multi-stakeholder body tasked with tracking and overseeing the Energy Step Code implementation and maintains its integrity. Your ongoing input and ideas are critical for successful and orderly roll-out of the Energy Step Code.

3. The Energy Step Code Council is working to provide lots of support for local governments around Energy Step Code roll-out. As many of you know, we have numerous studies and guides underway. Before the summer, we should be able to provide you with costing information, a Best Practices Guide for implementation, survey results around local government readiness, template ppts and worksheets for working within your local government, etc. Please be patient in the meantime, but know that we are working to get you this information as soon as possible.

4. The Community Energy Manager network will continue to support a peer network for local governments thinking of using the Step Code. We will send out information on future events and webinars.

5. We are working with Professional Associations and Industry Associations to integrate training on the Energy Step Code into professional development offerings, journal articles, conferences, webinars etc. Look out for this info going forward, and please share with your colleagues.

Enjoy the sunshine!

Cheers … Robyn

Robyn Wark, MRM MCIP | Team Lead, Senior Relationship Manager, Sustainable Communities

BC Hydro
333 Dunsmuir St, 5th floor
Vancouver, BC V6B 5R3

Greetings:

I am pleased to announce the introduction of the BC Energy Step Code, as an amendment to the BC Building Code, effective immediately. The BC Energy Step Code is the result of a substantial consensus building process with a broad range of stakeholders over the past two years. Their contributions to this ongoing project have been invaluable.

As a technical regulation, the BC Energy Step Code is a voluntary compliance path within the BC Building Code (Subsections 9.36.6. and 10.2.3. of Division B). It establishes progressive performance targets (or steps) that support market transformation from the current energy-efficiency requirements in the BC Building Code to net zero energy ready buildings by 2032. The transition to net zero ready buildings by 2032 is a key commitment of the Province's Climate Leadership Plan.

The BC Energy Step Code only applies to new construction of the following building types:

- Residential (Part 9) – Province-wide.
- Multi-unit residential and commercial (business and personal services and mercantile) – only in climate zone 4 (i.e., Lower Mainland, southern Vancouver Island, southern Okanagan).

Building owners may voluntarily build to the requirements in the BC Energy Step Code. Incentives are available for achieving higher standards.

In addition to being a voluntary standard for builders, the BC Energy Step Code may also be referenced in local government bylaws and policies, enabling province-wide consistency of energy efficiency requirements across jurisdictions and replacing a patchwork of varying requirements. On December 15, 2017, section 5 of the *Building Act* will render local government bylaws with technical building requirements of no legal force, unless the bylaws concern what the *Building Act* calls 'unrestricted matters.' Local governments wishing to require higher energy-efficiency standards than those in the BC Building Code may now do so in a consistent and predictable way using the BC Energy Step Code.

Two matters have been added to the Building Act General Regulation's unrestricted matters list to support local government use of the BC Energy Step Code: the conservation of energy, and the reduction of greenhouse gas emissions. These two matters are unrestricted with two conditions:

- Local governments may not require buildings to be constructed except in conformance to a step in sections 9.36.6.3. or 10.2.3.3. of Division B of the British Columbia Building Code, and

- Local governments may not modify the requirements or impose requirements in addition to those in sections 9.36.6. or 10.2.3. of Division B of the British Columbia Building Code.

The Province has prepared a guide to explain the provincial policy supporting the BC Energy Step Code and its use and application by local governments and other local authorities. Additional educational materials and training opportunities will be available from the Energy Step Code Council in the coming months.

Please visit our website for more information:
http://www2.gov.bc.ca/gov/content/industry/construction-industry/building-codes-standards/energy-efficiency/energy-step-code.

Questions about the BC Energy Step Code can be directed to the Building and Safety Standards Branch at Building.Safety@gov.bc.ca.

Please share this information as appropriate with others in your organization.

Sincerely,

Andrew Pape-Salmon, P.Eng., MRM, FCAE
Executive Director
Building and Safety Standards Branch

STAFF REPORT TO COMMITTEE

DATE OF REPORT	March 20, 2017
MEETING TYPE & DATE	Regional Services Committee Meeting of April 26, 2017
FROM:	Environmental Services Division Engineering Services Department
SUBJECT:	Regional Airshed Protection, Reducing Emissions From Open Burning
FILE:	5280-02-APS

PURPOSE/INTRODUCTION

The purpose of this report is to respond to the Regional Services Committee's referral to staff.

RECOMMENDED RESOLUTION

For information.

BACKGROUND

In 2015, the Cowichan Valley Regional District's (CVRD) Board endorsed Cowichan's Regional Airshed Protection Strategy (attached). The Strategy recognizes that local air quality is influenced by many activities and sources, including industry, transportation, wood smoke, road dust, natural circumstances, and commercial and residential development. Since no single jurisdiction controls all these sources, a collective approach to air quality protection is needed. The CVRD took a lead role in the development of the Strategy in coordination with the Ministry of Environment and with participation from several other local and provincial government agencies, First Nations, industry, and non-government agencies.

As part of the strategy development, the CVRD and the Ministry of Environment (MOE) conducted an Air Quality Study in 2014, which showed that air quality can be poor during the fall and winter because of fine particulate matter ($PM_{2.5}$) primarily from open burning and woodstove use. The Study, along with an Emissions Inventory, undertaken by the CVRD showed that the sources of these emissions are distributed across multiple organizations and jurisdictions, including municipalities and CVRD electoral areas. The Strategy identifies the necessary steps to be undertaken in order to have an effective response to air quality concerns across the region. In particular, to reduce emissions from open burning, the Strategy identifies actions including:

- Develop consistent regulatory approach for open burning; and
- Explore complete bans on backyard burning for additional high density (urbanized) areas in the region. *Note:* backyard burning is already banned in the Town of Ladysmith, the Town of Lake Cowichan and the City of Duncan.

The Municipality of North Cowichan is currently pursuing amendments to its Fire Protection Bylaw to improve air quality in its communities and the region. On March 22, 2017 the CVRD Regional Services Committee received a letter from the Municipality of North Cowichan requesting that the CVRD review potential sources of $PM_{2.5}$ originating West of the Cairnsmore monitoring station, including unregulated electoral areas, and work with any relevant organizations to implement mitigation measures. The Committee referred the letter to CVRD staff.

ANALYSIS

The Municipality of North Cowichan's concerns for $PM_{2.5}$ are well supported by the 2014 Air

Quality study. The Study shows a trend of $PM_{2.5}$ coming from west and southwest of the station in the fall, winter and spring.

The CVRD staff is currently working collaboratively with a number of organizations on three key projects supporting the identification of, and additional opportunities for reduction of emissions from open burning. Because the movement of air contaminants do not follow jurisdictional boundaries, these projects will protect air quality not only in North Cowichan, but also across the region.

1. *Open Burning Emissions Reduction Study*

   The Recycling & Waste Management and Environmental Services divisions have started an Open Burning Emissions Reduction Study for CVRD electoral areas. Funding of $20,000 for the Study has been granted by the Province as part of a program to support emissions reductions in BC communities that have elevated levels of $PM_{2.5}$. The Study objectives include:

   - Determine the potential for generation of land clearing debris within CVRD Electoral Areas and current and potential hotspots for backyard burning
   - Identify best practices for managing land clearing debris and residential yard and garden materials

2. *Citizen Air Quality Awareness*

   The Study also includes a public outreach component that includes the installation of 10 Purple Air Quality sensors (www.purpleair.org) to understand wood smoke patterns in various neighbourhoods throughout the Cowichan Valley and the development of communication tools to present facts on local air quality conditions, impacts and tools for improving air quality. The project is a collaboration between the CVRD, the MoE, Cowichan Tribes, the Cowichan Fresh Air Team, the School District and volunteers. Funding of $5,000 for the project has been granted by the Province as part of a program to support emissions reductions in BC communities that have elevated levels of $PM_{2.5}$. Volunteers have also donated funds to Fresh Air Team Cowichan for the purchase of 6 additional sensors.

3. *Review CVRD regulations for open burning*

   CVRD staff are working with partners to review CVRD regulations for open burning to identify potential gaps or inconsistencies with other applicable bylaws and regulations in the region including municipal and provincial. Work is expected to be ongoing into 2018. In 2017, staff have started the process of forming a collaborative group to review the bylaw through the Cowichan's Regional Airshed Protection Roundtable.

   The Bylaw Enforcement division's work plan for 2017 includes a collaborative review of the CVRD's Smoke Control Bylaw 3716 to identify possible opportunities to improve enforcement of the bylaw

The Airshed Protection Roundtable includes three working groups: an open burning group, a communications & awareness group and a monitoring & evaluations group. Each of these working groups is working to identify and implement additional actions that may lead to reduction in emissions from open burning across the region. North Cowichan is an active member of the Airshed Roundtable and discussions over the next year may inform the development of additional works proposed in 2018 and beyond where funding and resources are available. In particular, the communications and awareness group is exploring the development of a website to share information with the public.

FINANCIAL CONSIDERATIONS

Funding of $25,000 to conduct the Open Burning Emissions Reduction study in CVRD electoral

areas and the Citizen Air Quality Awareness project has been granted by the Province as part of a program to support BC communities that have elevated levels of $PM_{2.5}$.

COMMUNICATION CONSIDERATIONS

Because the impacts of poor air quality affect such a broad spectrum of the community and originate from a variety of sources, the implementation of actions will require broad and coordinated communications among many organizations including provincial government, local government, First Nations, industry, agriculture, and local stewards.

STRATEGIC/BUSINESS PLAN CONSIDERATIONS

The protection of air quality in our region supports the focus areas in the Corporate Strategic Plan to respond to climate change and to engage our communities.

Referred to (upon completion):

- ☐ Community Services *(Island Savings Centre, Cowichan Lake Recreation, South Cowichan Recreation, Arts & Culture, Public Safety, Facilities & Transit)*
- ☒ Corporate Services *(Finance, Human Resources, Legislative Services, Information Technology)*
- ☒ Engineering Services *(Environmental Services, Recycling & Waste Management, Water Management)*
- ☒ Planning & Development Services *(Community & Regional Planning, Development Services, Inspection & Enforcement, Economic Development, Parks & Trails)*
- ☐ Strategic Services

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General Manager

ATTACHMENTS:
Attachment A – Regional Airshed Protection Strategy

Attachment A

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Cowichan’s Regional Airshed Protection Strategy

R4

A partnership of: Cowichan Valley Regional District, Cowichan Tribes, Ministry of Environment, Island Health, Our Cowichan - Communities Health Network, School District 79, Catalyst Paper, University of Victoria, City of Duncan, Town of Ladysmith, Town of Lake Cowichan, Municipality of North Cowichan and Cowichan Fresh Air Team - as of November 2015.

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This strategy has been referred for comment to the following organizations and will be included in future programing for action as per the identified roles and responsibilities laid out. Each of these organizations will be invited to participate in meetings of the Cowichan Airshed Protection Round Table.

Ministry of Environment
Ministry of Forests, Lands & Natural Resource Operations
Ministry of Transportation and Infrastructure (Victoria)
Ministry of Agriculture
BC Transit
Island Health
Managed Forest Council
Cowichan Tribes
Ditidaht First Nation
Halalt First Nation
Lake Cowichan First Nation
Lyackson First Nation
Malahat First Nation
Pauquachin First Nation
Pacheedaht First Nation
Penelakut First Nation
Stz'uminus First Nation
First Nations Health Authority
Our Cowichan Communities Health Network
Cowichan Fresh Air Team
South Island Fire Management Organization (SIFMO)
Caycuse Volunteer Fire Department Society
Cowichan Bay Fire Protection
Mill Bay Fire Protection
Shawnigan Lake Fire Protection
Thetis Island Fire Protection
Pacific Pilotage Authority
School District 68
School District 79
Municipality of North Cowichan
Town of Lake Cowichan
Town of Ladysmith
City of Duncan
Catalyst
TimberWest
Island Timberlands
Hancock Forest Management
CVRD Engineering Services Department
CVRD Planning & Development Department
CVRD Inspections and Enforcement Division
CVRD Waste and Recycling Management Division
CVRD Public Safety Division

Additional organizations that are interested in participating in the proposed Regional Airshed Protection Round Table will be added to this list and invited to the meetings.

This report outlines a Regional Airshed Strategy for the Cowichan Valley Regional District (CVRD). It identifies the necessary steps to be undertaken in order to develop an effective response to growing air quality concerns in the region. This work is consistent with and taken based on direction in the CVRD Corporate Strategic Plan which specifically directs that an airshed protection strategy be developed. Given this is an area in which many players are involved the CVRD has taken the lead role in the development of the strategy in coordination with MOE, however the implementation will require a broad and coordinated response from many.

Jon Lefebure – Chair Cowichan Valley Regional District

What is the air quality problem in our Region?

In the Cowichan, the air contaminant of greatest concern is $PM_{2.5}$, which refers to particulate matter that is less than 2.5 microns in diameter. This is the particulate matter of greatest concern because it can travel deep into the lungs and become lodged there, causing heart and lung disease, and premature death. Fine particles that comprise $PM_{2.5}$ are also efficient at scattering light, resulting in degradation of visibility.

A 2014 Air Quality Study for the Cowichan region indicated that there are occasional exceedances of the provincial $PM_{2.5}$ objectives from 2009 to 2013. The Study also indicated that the exceedances were primarily due to local open burning and wood burning appliances (winter), and forest fires located in other regions (summer). An emission inventory completed in 2014 estimated that 77% of the total $PM_{2.5}$ in the Region is coming from area sources. Open burning accounted for 53% of the total $PM_{2.5}$ and wood burning appliances accounted for 23% of the total $PM_{2.5}$.

Our History

Air quality concerns in our Region are rooted in local history. The primary sources for $PM_{2.5}$ include open burning and wood burning appliances. However, the burning of wood debris for clearing land and the use of wood stoves for residential heating has been happening for generations.

There is something about the smell of wood smoke and the warmth of heat from a fire that is comforting for people. In our region, it is part of our history of living off the land. People will say: "My parents burned wood and my grandparents burned wood, why wouldn't I?" Today, we know about the health effects of wood smoke. And today, the technology and practices exist to do it better.

TW Paterson – local historian and author of over 26 books on BC History

Wild fires have also been contributing to air quality concerns throughout our history. In 1938, a cloud of smoke one mile high covered two-thirds of Vancouver Island and was reported as far south – 640 km – as Portland Oregon. Its fly-ash was so thick that two ships collided off Port Angeles. This was the product of Vancouver Island's worst forest fire ever, the Great Fire (so-called) of 77 years ago which burned an area of approximately 350 square kilometers.

Image mcr020399-7 courtesy of the Museum at Campbell River

Image mcr020399-16 courtesy of the Museum at Campbell River

Why are we concerned about air quality?

There is solid scientific evidence at a national level of a strong link between air pollution levels and impacts on human health. Locally, data from Island Health indicates that **in the Cowichan Local Health Area, admissions rates for children with respiratory diseases averaged 70% higher than provincial rates** for the period 1998 to 2012. In 2012 the **proportion of persons aged 5-54 diagnosed with asthma was 14% higher** and the **prevalence of chronic respiratory illness for all persons aged 45 and over was 50% higher in Cowichan Valley Regional District than the province**.

In our region, air emissions originate from a wide range of sources including mobile vehicle emissions, stationary industrial point sources, residential or commercial area sources and natural sources. There is also a wide range of types of contaminants being emitted. For common air contaminants such as particulate matter (PM) and ground-level ozone, health impacts have been found even at low concentrations, indicating that there may be no safe level. The elderly, the young, those with lowered immunity, and/or existing heart and lung ailments are especially vulnerable.

Air pollution also affects the integrity of natural ecosystems and agricultural crops, increases greenhouse gas emissions and degrades the visibility of scenic vistas. Together with the health costs, these impacts and their consequences for tourism and other industries have implications for economic activity throughout the region.

What is an airshed?

The term “airshed” is used to describe an area where the movement of air tends to be hindered by the local geography and by weather conditions. The most obvious examples of an airshed would be the Cowichan, the Shawnigan, Chemainus Basins or even the larger Georgia Basin. Airsheds are not confined to political boundaries and they can be at multiple scales depending on a variety of variables such as geography, dominant wind patterns or weather.

During temperature inversions, a common event in our region, the cooler air near the ground is trapped by warmer air aloft. The effects and duration can be much different depending on the season. The types of emissions that accumulate in the surface layer will vary according to seasonally related activities such as summer traffic, winter home heating with woodstoves or open burning in the fall.

In contrast, when the air is well mixed and winds are moderate, pollutants are quickly dispersed. In some cases, the pollutants and their by-products may be transported long distances beyond the airshed. This is a reminder that everyone and their activities are globally interconnected and that our local conditions are to some extent affected by issues elsewhere. The region experiences impacts to air quality from a wide variety of events including fires in Europe, central BC and other areas, dust storms in Asia and the combustion of fossil fuels by mobile sources and large facilities in neighboring regions.

For the above reasons, many of our communities are prone to periods of poor air quality. As global and regional emissions increase and local ground temperatures increase as a result of global climate change, air quality is expected to continue to worsen over time.


Lizard Lake Fire - August 2015

This can have numerous impacts on the community, including adversely affecting human health, the environment and visibility. It can also limit a community's ability to attract or accommodate desirable and potential growth. Fortunately, action at the local level can be taken to reduce local consequences.

Addressing Air Quality Concerns by Airshed Planning

Local, regional and provincial governments have developed and applied various approaches to combat and control air pollution. Among these, airshed planning has emerged as an important tool for dealing with multiple pollution sources that involve numerous stakeholders and, in some cases, cross political boundaries. Airshed planning is a stakeholder-driven process to coordinate the abatement of activities affecting air quality in a defined area or airshed. It recognizes that local air quality is influenced by a myriad of activities and sources, including industry, transportation, commercial and residential development, wood smoke, road dust, and natural circumstances. Since no one jurisdiction controls all these sources, a collective approach to air quality protection is needed that engages a variety of organizations

and individuals and, where necessary, encourages partnerships with neighbouring communities in developing and implementing local solutions.

To date, all such efforts in BC have been voluntary in nature, in keeping with a shared stewardship approach. Currently, there are 14 airshed plans that have been completed for various airsheds in the province, with some variation in key areas, objectives, and mechanisms. The issues and ability of key players in the region will affect the level and speed of implementation of a regional strategy. As such it is important that the development of such a strategy include the participation of a broad range of participants working in a coordinated fashion.

Why pursue a Community Based Approach?

Because the impacts of poor air quality affect such a broad spectrum of the community and originate from a variety of sources a multi stakeholder process is necessary in order to address sources effectively. This will require that all affected organizations and entities are aligned and coordinated so that policies, actions and ongoing monitoring is effective and strategic in nature. No one entity is charged with the issue nor can any individual action address its effects in a meaningful way.

Existing programs and policies in the region are already contributing towards air quality management objectives (e.g., energy and climate action planning, transportation planning, open burning bylaws, wood burning appliance programs). As such, the emphasis of the proposed strategic process will be on supporting and expanding these existing initiatives.

The value of partnerships for airshed protection is illustrated by successes already achieved in the Region including:

- backyard burning regulations in 5 electoral areas and 4 municipalities,
- a woodstove exchange program that has supported the upgrades of 635 woodstoves
- the *clear the air cowichan* communications materials
- a series of 5 articles on wood smoke in the local newspaper
- partnership with UVIC researchers to undertake initial nephelometer study
- partnership with MOE that allowed for the technical background required to backstop this (emissions inventory, air quality study for the CVRD)
- current partnership for installation of additional regional monitoring stations across region (total now 4)

These programs were all delivered through a collaboration of several provincial government, local government, academic and stewardship organizations. If it is possible to achieve a coordinated alignment it will be possible to ensure that future planning and programing builds effectively on the overall goals and identified actions. And enforcing the philosophy of collective impact, shared interests and shared responsibility which will be a keystone for long term and stable policy development and community health objectives.

Participants

Contributions from the various organizations involved in local air quality management are key to the successful design and implementation of an Airshed protection strategy. To date a number of ongoing discussions have occurred in the region and most recently planning discussions were hosted by the MOE and the CVRD in 2014 and 2015 to bring together a focused Round Table group to develop a collaborative Airshed Protection Strategy for the region and its affected populations. Each organization has interest in moving forward on the development of a Regional Airshed Strategy as a sub component of the Regional Sustainability and Health Strategies. This strong message provided the impetus to MOE and the CVRD to partner on the development of the necessary background studies (attached as appendices A and B).

The Round Table gathered over a number of meetings in 2014 and 2015 and discussed the overall issues affecting air quality in the region. Based on the insights gathered through these discussions, the CVRD and the MOE partnered to develop additional background material and identification of specific contaminants, appropriate indicators and draft targets for the groups discussion (see appendices C and D).

Based on a structured process the group then identified specific goals, actions and the identification of key leaders and supporting organizations. The following Action Plan is the result of that work and will form the combined efforts of the collaborative in achieving *our vision***.**

Our Vision

Working together for clean air to support our health, our environment and our communities

Our goals, targets and objectives

Airshed planning and implementation will be an ongoing effort of many. While a number of high priority goals have been identified, it is recognized that this will be an ongoing process of refinement over time. Short term and long term actions are summarized below then in more detailed tabular format. Key targets have also been included. The complete set of indicators and targets is provided in Appendix C.

1. *GOAL – Protecting Human Health*

We will protect and improve regional air quality so our communities are as healthy as possible.

Key Targets

- Zero exceedance of 24 hour BC AAQO for $PM_{2.5}$ (25 ug/m^3)
- Zero exceedance of annual BC AAQO for $PM_{2.5}$ (8 ug/m^3)

Objectives

- Reduce $PM_{2.5}$ emissions from local open burning including land clearing burning and backyard burning
- Reduce $PM_{2.5}$ emissions from wood burning appliances
- Support programs that reduce emissions from mobile and point sources[1] of all targeted pollutants (PM_{10}, $PM_{2.5}$, SO2, Nox, CO and VOC)

Key Actions – High Priority

- Raise public awareness on the health impacts of wood smoke, the alternatives, the best practices and the rules.
- Develop consistent airshed wide regulatory approach for open burning
- Contribute to provincial efforts to control wood smoke through participation in wood smoke strategy discussions
- Explore options for a curbside pickup of yard and garden materials to overcome barriers to open burning alternatives.
- Develop airshed wide regulatory approach for wood burning appliances
- Develop incentives for wood burning appliance upgrades to overcome financial barriers for upgrading and replacing appliances
- Promote use of alternative energy sources and systems

Supporting Actions – Medium Priority

- Reduce vehicle idling through policies and education
- Support alternative modes of transportation
- Reduce stop and go traffic on the Trans-Canada Highway
- Reduce dust emissions in communities adjacent to dirt roads
- Compliance with federal and provincial regulatory requirements by point source emitters[1].

Participants

- Lead roles for the Ministry of Environment, Island Health, First Nations, Our Cowichan - Communities Health Network, Municipalities, the CVRD and other local governments.
- Support from all Airshed Protection Round Table participants

[1]A point source emitter is a single, stationary source of pollution, such as an industrial facility, that typically operates under some kind of government authorization.

2. *GOAL – Building Strong and Collaborative Partnerships:*

We recognize that many players are critical to true partnerships and we will work towards coordinating our efforts to achieve the objectives and benefits clean air provides our community.

Key Targets

- Formation of an Airshed Protection Round Table with Terms of Reference and Annual Reporting

Objectives

- Develop Terms of Reference for the Airshed Protection Round Table
- Implement the actions in this strategy
- Annual monitoring and reporting of progress towards the goals, targets and objectives of the strategy

Key Actions – High Priority

- Develop Terms of Reference for the Airshed Protection Round Table
- Collaborative development of work plans for the actions identified in this strategy.

- Periodic reporting by the Round Table on progress towards meeting the objectives in the Strategy
- Determine compliance with provincial and federal objectives and standards by working with partners to implement additional short-term monitoring projects in communities throughout the CVRD.
- Periodic assessment of whether the strategy should focus on other pollutants of interest
- Develop existing and new linkages to climate change, wildfire (bc *FireSmart*), transportation and solid waste planning processes.

Participants

- All Round Table participants and other organizations that can improve air quality in the Region.

Key Actions

Goal #1: *Protecting human health*

We will protect and improve regional air quality so our communities are as healthy as possible.

The following actions related to goal #1 are considered **high priority** as they could lead to a relatively large reduction in $PM_{2.5}$. The tables provide details of the initiatives and tasks that will help us achieve our goals.

Emission Sources: Open Burning and Wood Burning Appliances, the 1st and 2nd largest sources of $PM_{2.5}$.

Objectives:

- Reduce emissions from local open burning including land clearing burning and backyard burning
- Reduce emissions from wood burning appliances

#	Action	Initiative	Who?	Status	Proposed Future Tasks
1	Raise public awareness on the health impacts of wood smoke, the best practices, the alternatives and the rules.	Deliver a regionally coordinated public awareness campaign to educate the public on the health impacts of wood smoke, the best practices, the alternatives and the rules. Tools to include: • Website • Printed media (newspaper and newsletters) • Social Media • Community Outreach • Agriculture focused media and content • Community Air Quality Forums	Our Cowichan - Communities Health Network, Island Health, MoE, UVic, the CVRD, municipalities, School District.	**Initiative is in progress.** *Tasks Completed:* • Clear the Air Cowichan website includes information on the rules and best practices (burn it smart). • Released 5 newspaper articles in the Fall of 2014 on the impacts of wood smoke. • Air quality advisories for the region are released by the MoE.	• 2016 late summer/fall - Run article series again. **Lead:** CVRD, MoE and Our Cowichan Communities Health Network. • 2016 - Turn articles into series of digital info documents. **Lead:** CVRD, MoE and Our Cowichan • 2016 – Explore community air quality forums. **Lead:** Our Cowichan, CVRD, MoE • 2016 - Develop a public interface for air quality issues and alerts that can be delivered effectively using a variety of media routes. **Lead:** MoE and CVRD and Our Cowichan**.**

Emission Sources: <u>Open Burning</u> *Open Burning is the largest source of $PM_{2.5}$*					
Objective: Reduce emissions from local open burning including land clearing burning and backyard burning					
#	**Action**	**Initiative**	**Who?**	**Status**	**Proposed Future Tasks**
2	Develop consistent airshed wide regulatory approach for open burning	2a. Develop, implement and review backyard burning bylaws across the region.	CVRD, Municipalities, Fire Improvement Districts,	**Initiative is in progress.** *Tasks Complete:* • Open burning bylaws Implemented in the Municipality of North Cowichan, City of Duncan, Town of Ladysmith, Town of Lake Cowichan and some CVRD electoral areas	• Spring 2016 - Review bylaws on a rolling 3 year basis. **Lead:** <u>CVRD, Municipalities and Fire Improvement Districts.</u> • Spring 2016 - Identify issues and barriers for adoption and enforcement of bylaws across whole of region, including improvement districts areas and additional electoral areas. **Lead:** <u>CVRD, Municipalities and Fire Improvement Districts.</u> • Spring 2016 - Explore expansion of burning timelines to take advantage of better venting in some areas and reduce the number of days with people burning. **Lead:** <u>CVRD, Municipalities and Fire Improvement Districts.</u> • Spring 2016 - Develop metrics to track: the # of burns that follow best practices and those that don't & the # of agricultural, forest and backyard burns. **Lead:** <u>CVRD and MoE.</u>
		2b. Explore an update to open	Ministry of	**Initiative is pending**	• Spring 2016 - Preliminary discussion

		burning bylaw(s) in the Region to include prohibition of any open burning on zoned agricultural land and ALR land as long as it is not 'a normal farm practice'.	Agriculture, CVRD, Agricultural Community, Municipalities		with CVRD and MNC agriculture commissions. **Lead:** MAL, CVRD, Municipalities and MoE. • Spring 2016 - Focused stakeholder meeting with local agricultural producers. **Lead:** MAL, CVRD, Municipalities. • Spring 2016 - Develop and clarify the role of burning on agricultural properties in an educational way. **Lead:** MAL CVRD and Agricultural Commissions.
		2c. Explore complete ban on backyard burning for additional high density (urbanized) areas in the Region while maintaining alternate disposal options of yard and garden debris.	All Airshed Round Table participants	**Initiative is Pending.** *Background:* Backyard burning is banned in the City of Duncan, Town of Ladysmith and the Town of Lake Cowichan.	• Fall 2015 - Review of Official Community Plan (OCP) issues, explore area E as a starting point given the current OCP cycle and public consultation. **Lead:** CVRD, MoE and Muncipalities.
3	Contribute to provincial efforts to control wood smoke	Monitor or participate in Open Burning Smoke Control Regulation (OBSCR) planning discussions and other wood smoke strategy discussions	Forest Industry, MFC, Min of Ag, Agricultural Community, Island Health, CVRD, MoE, Municipalities, Private Forest Sector	**Initiative is in Progress** Provincial OBSCR discussions are ongoing.	• Ongoing for 3 to 5 years – Participation by MoE and Island Health in OBSCR discussions**.** **Lead:** MoE • Spring 2016 - Report progress to Airshed Round Table on periodic basis. **Lead:** MoE,
4	Explore options for a curbside pickup of	Study the potential benefits and costs for curbside pickup of	CVRD, Municipalities,	**Initiative is in Progress.** CVRD has already gathered	• 2016 - Explore costs and benefits for a yard and garden pickup including:

	yard and garden materials to overcome financial barriers to the alternative.	yard and garden materials and options for the receiving facility (District Energy System or compost facility)	Agricultural Community,	information on costs and benefits.	○ options for commercial or multi-family residential organics ○ Consider breaking up the two waste streams for more specific management objectives. **Lead:** CVRD. Seek direction from the Board and Report back to task force by 2016. **Lead:** CVRD • 2017 - explore the pilot use of a fee for service air curtain burner and wood chipper. **Lead:** CVRD

Emission Sources: Wood Burning Appliances

Wood burning appliances is the 2nd largest source of $PM_{2.5}$

Objective: Reduce emissions from local open burning including land clearing burning and backyard burning

#	Action	Initiative	Who?	Status	Proposed Future Tasks
5	Develop airshed wide regulatory approach for wood burning appliances	Develop and implement a model wood burning appliance bylaw to be available for the region. Explore expansion of options that have already adopted by a part of the Region to other high density (urbanized) parts of the Region that want them. These options include: • During air quality advisory,	CVRD, Municipalities, Ministry of Environment	**Initiative is in Progress.** *Tasks Complete:* • Wood burning appliance bylaw already implemented in the City of Duncan	• Develop and implement a model wood burning appliance bylaw ○ 2016 - Estimate the number of woodstoves there are in the region by spatial locations and age. ○ 2016- Further develop an understanding of the use of woodstoves in economically challenged households. ○ 2016 – Study the neighborhood *$PM_{2.5}$ levels* in more densely

		no woodstoves may be used, except to heat homes with no other form of heating • Upon sale of house, non-certified woodstoves must be upgraded or removed. Additional financial incentives to support these upgrades/removals would be explored. • Only certified woodstoves may be installed in new homes being constructed.			populated areas (e.g. mobile home parks) ○ 2016 - Request an update from the province regarding the changes to legislation required for real estate transactions ○ 2017 - Expand and support the burn it right program ○ 2017 - Explore and make recommendations on the expansion of wood burning bylaws in other high density areas ○ 2017 - Legal review of woodstove ban in new homes. **Lead:** CVRD and municipalities
6	Develop incentive programs for wood burning appliance upgrades.	Develop and implement a wood burning appliance rebate program for the region	Ministry of Environment, CVRD, Municipalities,	**Initiative is in Progress.** *Tasks Complete:* • Regional woodstove rebate program implemented. Rebates are for upgrades for woodstoves to certified appliances. 718 stoves exchanged between 2009 and 2015 (reduction of 44.5 tonnes of $PM_{2.5}$).	• Ongoing - Continue wood burning appliance upgrades at a pace established in action 5 above. **Lead:** CVRD • 2016 – Explore additional incentives to overcome financial barrier of upgrades. • 2017 - Expand woodstove switch out program to include incentives for transition to alternative modes of heating. **Lead:** CVRD
7	Promote use of alternative energy	Promote alternative energy pilot programs and grant programs.	School District, Local Solar Energy	**Initiative is in Progress.** *Tasks Complete:*	2016 – Include information on alternative energy source and

	sources and systems		Stewardship Community, CVRD, Municipalities,	• Solar panel demonstration project being explored for the Region • Events in the community to promote clean energy forms have been coordinated by local stewards and co-ops. • Potential for exploring District Energy Systems	systems in public awareness campaign. **Lead:** CVRD and Our Cowichan Communities Health Network. • 2016 – Contribute air quality information to solar energy stewardship community as they engage the community. • **Lead:** CVRD and Our Cowichan Communities Health Network

Goal #2: *Building strong and collaborative partnerships*

We recognize that many players are critical to true partnerships and we will work towards coordinating our efforts to achieve the objectives and benefits clean air provides our community.

The following actions are considered to be **high priority** as they support the reduction of $PM_{2.5}$ and other targeted contaminants.

Emission Sources: All					
Objectives: • Develop Terms of Reference for the Airshed Protection Round Table • Implement the actions in this strategy • Annual monitoring and reporting of progress towards the goals, targets and objectives of the strategy					
#	**Action**	**Initiative**	**Who?**	**Status**	**Proposed Future Tasks**
1	Formation of an Airshed Protection	Develop Terms of Reference Formation for an Airshed	All Round Table participants and	**Initiative is in progress.** *Tasks complete:*	• Strategy to be reviewed and approved in principle by partnering

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	Round Table	Protection Round Table that will implement the actions in this Strategy.	other organizations that can improve air quality in the Region.	The Airshed Round Table has begun the process of building partnerships through 3 workshops from 2013 to 2015 to develop this strategy.	organizations in the Fall of 2015. **Lead:** CVRD • TOR to be drafted by Dec 2015. **Lead:** CVRD
2	Develop Work Plans	Develop work plans for the high priority actions identified in this strategy. Identify supporting processes for the medium priority actions identified in this strategy	All Round Table participants	**Initiative is in progress**	• January 2016 and ongoing - Task force to meet annually to report out and develop 2 year work plans **Lead:** Our Cowichan Communities Health Network • January 2016 - Invitation to participate to be extended to additional participants (e.g. fire departments: **Lead:** Our Cowichan
3	Periodic Reporting and Monitoring	Annual reporting by the Round Table on progress towards meeting the objectives in the Strategy.	All Round Table participants	**Initiative is pending**	• December 2015 - Decision and recommendations on monitoring and reporting framework to be developed **Lead:** CVRD and Our Cowichan • December 2015 - Annual reporting and task force meeting and communications schedule to be discussed for recommendations **Lead:** Our Cowichan
		Periodic assessment of whether the strategy should focus on other pollutants of	All Round Table participants	**Initiative is pending**	• Fall 2016 **–** Review whether strategy should focus on other pollutants of interest.

		interest.			**Lead:** MoE • Establish review cycle and process. **Lead:** MoE
		Regional Air Quality Monitoring and Information Gathering	MoE and CVRD	**Initiative is in progress**	• Spring 2016 - MOE will provide air monitoring stations and technical support via a MOU with the CVRD **Lead:** MoE and CVRD • Spring 2016 – Work with partners to implement additional short term $PM_{2.5}$ monitoring projects throughout the region. **Lead:** MoE
4	Develop existing and new linkages to climate change, transportation, wildfire and solid waste planning processes.	Participate in climate change strategy, transportation planning, wildfire (bc firesmart) and solid waste planning discussions.	All Round Table participants	**Initiative is pending**	• Spring 2016 - Preliminary presentations to task force with proposed issues and linkages by invited representatives **Lead:** Various participants • 2016 and 2017 - Become a FireSmart community. **Lead:** CVRD

Supporting Actions

The following actions are considered to be **medium priority** for the following reasons:

- they could lead to a relatively large reduction in targeted contaminants including Nitrogen Oxides (NOx), Carbon Monoxide (CO) and Volatile Organic Compounds (VOCs); and/or
- they could lead to a relatively small reduction in $PM_{2.5}$; and/or
- the actions are beyond the direct control of representatives of the Airshed Protection Round Table

Emission Sources: <u>On-Road Vehicles</u> *On-road vehicles are the second largest source of Nitrogen Oxides (NOx) and Carbon Monoxide (CO) emissions in our region.*					
Objective: Support programs that reduce emissions from mobile and point sources of all targeted pollutants (PM_{10}, $PM_{2.5}$, SO_2, NOx, CO and VOC)					
#	**Action**	**Initiative**	**Who?**	**Timing**	**Proposed Future Tasks**
1	Reduce vehicle Idling through policies and education	• Identify organizations and companies with/without policies. Extend invitations to support anti-idling policies for companies that do not have one • Provide anti-idling resources to organizations (e.g. free anti-idling signs for store parking lots)	Stewardship Community, CVRD, Municipalities, Island Health	**Initiative is in progress.** *Tasks complete* • Anti-idling policy under exploration for the CVRD vehicle fleet • Municipal anti-idling bylaws have been implemented	• Report to task force spring 2016 **Lead:** *<u>To be determined</u>*
2	Support alternative modes of transportation	Support programs that overcome barriers to bicycling as a commuting option	CVRD, Municipalities, Ministry of Transportation and Highways,	**Initiative is in progress.**	• Local governments to report out issues and recommendations regarding active transportation in Summer 2016. **Lead:** <u>CVRD and Municipalities</u>

			Stewardship Community, Island Health		
		Support programs that overcome barriers to electric vehicle use as a commuting option	Electric vehicle community, CVRD, Municipalities	**Initiative is in progress.** *Tasks Complete* 10 publicly accessible Electric Vehicle charge stations installed across 4 municipalities (Ladysmith, North Cowichan, Lake Cowichan and Duncan) and 2 electoral area (Mill Bay, and Shawnigan Lake)	• By 2017 - Round Table participants to provide support letters to electric vehicle associations. **Lead:** *To be determined* • By 2017 - local partners (where possible) to explore installing EVI stations in their facilities **Lead:** *To be determined*
		Raise awareness for public transit and promote ridership	BC Transit Municipalities All Round Table participants	**Initiative is in progress.** *Tasks Complete* The Cowichan Valley Future Transit Plan is complete and ridership targets are included in the plan. The plan envisions what the network should look like 25 years from now. Implementation is underway.	• By 2017 - Task force partners to review how their organizations can support internally and externally the use of public transportation in their programs and public messaging **Lead:** *To be determined* • By 2017 - Report to be brought back to the task force **Lead:** *To be determined*
		Road Improvements to improve walkability	Municipalities, Ministry of Transportation and Highways, CVRD	**Initiative is in progress.** *Tasks Complete* CVRD Parks and Trails Master Plans include active transportation and have	• By 2017 - Task force members to consider how to support the collection of this information from their user groups **Lead:** Municipalities and CVRD

				been developed for some electoral areas of the region. Transportation planning as part of the CVRD's Regional Integrated Strategy is underway. City of Duncan's active transportation plan is being developed.	• By 2017 - Local governments to review OCP's and provide recommendations on improvements. **Lead:** CVRD and Municipalities
3	Reduce Stop and go traffic on the Trans Canada Highway and other major road systems in the region	Implement the TransCanada Highway (TCH) Corridor Management Plan	Ministry of Transportation and Highways, CVRD, Municipalities and Cowichan Tribes.	**Initiative is in progress.** *Tasks Complete* The Boys Rd to Beverley Rd section of the TCH corridor management plan is being implemented.	• By Dec 2016 - MOTI be invited to become a partner on the task force or strategy by December 2015. **Lead:** Our Cowichan
4	Reduce dust emissions in communities adjacent to dirt roads	Reduce Mud track out onto main roads to through truck wash stations	TimberWest, CVRD, Town of Lake Cowichan, Island Health,	**Initiative is in progress.** *Tasks Complete* The Youbou truck wash station has been built and is expected to be in use in the Fall of 2015.	• By Dec 2016 - MOTI be invited to become a partner on the task force or strategy by December 2015. **Lead:** Our Cowichan • A representative of the Managed Forest Council to be invited to sit on as an industrial representative by December 2015. **Lead:** Our Cowichan

Emission Sources: <u>Point Sources</u> *Point Sources are the largest contributor of Sulphur Dioxide and Total Reduced Sulfur. And the second largest contributor of VOCs.*					
Objective: Support programs that reduce emissions from mobile and point sources of all targeted pollutants (PM_{10}, $PM_{2.5}$ SO2, NOx, CO and VOC)					
#	**Action**	**Initiative**	**Who?**	**Timing**	**Proposed Future Tasks**
1	Compliance with provincial and federal regulatory requirements for reporting of PM_{10}, $PM_{2.5}$, SO2, CO, NOx, VOCs and TRS.	Annual air quality monitoring and reporting	Large point source facilities. Ministry of Environment	**Initiative is in progress.** *Ongoing tasks underway* Many of the large facilities in our region are reporting for compliance with provincial and federal permitting requirements for facilities.	• Spring 2016 - Catalyst to provide annual data and issues identification **Lead:** <u>Catalyst</u>

Appendix A - Emissions Inventory for the Cowichan Region

Background

Levelton Consultants Ltd. (Levelton) was retained by BC Ministry of Environment (MoE) and for the Cowichan Valley Regional District (CVRD) to compile an emissions inventory for the region. The main purpose of the 2014 analysis was to provide background information regarding which pollutants/emmission sources may be of greatest concerns and identify and individual sectors/subsectors will be key to future management actions. The regional inventory was compiled for 2011 as the base year and forecasted at five-year intervals for 2016, 2021, 2026 and 2031.

Scope

The emissions inventory was compiled for the following key pollutants of interest:

- Particulate Matter (PM), including the following size fractions:
    - Particulate matter less than 2.5 microns in equivalent diameter ($PM_{2.5}$);
    - Particulate matter less than 10 microns in equivalent diameter (PM_{10});
    - Total particulate matter (TPM);
- Carbon Monoxide (CO);
- Sulphur Dixide (SO_2);
- Nitrogen Oxides (NOx);
- Ammonia (NH_3); and
- Volatile Organic Compounds (VOCs)

No specific analysis of carbon dioxide or other Greenhouse Gasses (GHG's) was undertaken as it was outside to the parameters of this study and have been calculated as a component of the Community Energy and Emmissions Inventory (CEEI) by the Province.

The emmissions inventory identified a number of source categories including: point sources (large industrial facilities), area sources (light industrial,residential, commercial and institutional sources, agricultural activities, miscellaneous sources), mobile sources (on-road motor vehicles and non-road sources including aircraft, marine vessels, and others such as construction and lawn and garden equipment), and road dust. A summary of the emission inventory is provided below.

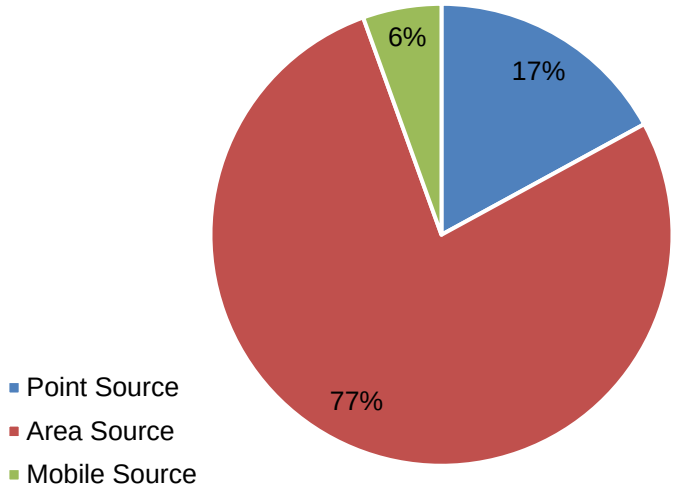
Results – where are the emmissions coming from?

The majority of TPM, PM_{10}, $PM_{2.5}$, VOC and NH3 emissions were from area sources. Mobile sources, excluding road dust, were the largest contributor of CO and NOx. The largest emitters for SO_2 were point sources.

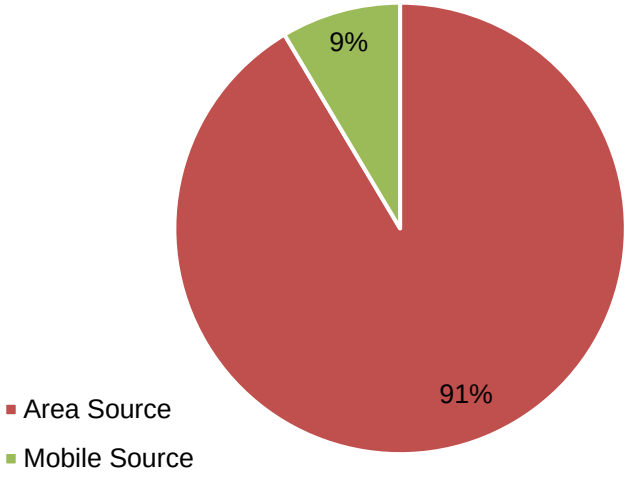
Area Sources

Overall, the majority of TPM, PM_{10}, $PM_{2.5}$, VOC and NH_3 emissions were from area sources. Open burning was the largest contributor of CO, NOx, TPM, PM_{10} and $PM_{2.5}$. VOC emissions from gasoline marketing including the distribution and sales of petroleum products at service stations and solvent evaporation accounted for approximately half of the total VOC emissions from area sources. Agricultural activities were the largest source for the regional NH_3 emissions. Space heating was the largest contributor of SO_2 emissions and second largest contributor of CO, NOx, TPM, PM_{10} and $PM_{2.5}$ emissions.

Distribution of $PM_{2.5}$ Emissions



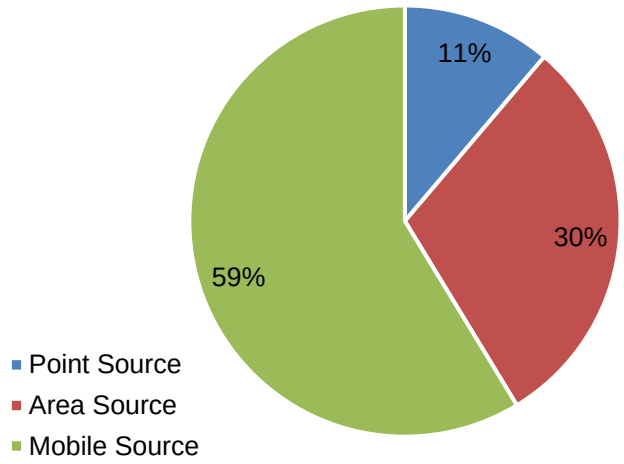
Distribution of NH_3 Emissions



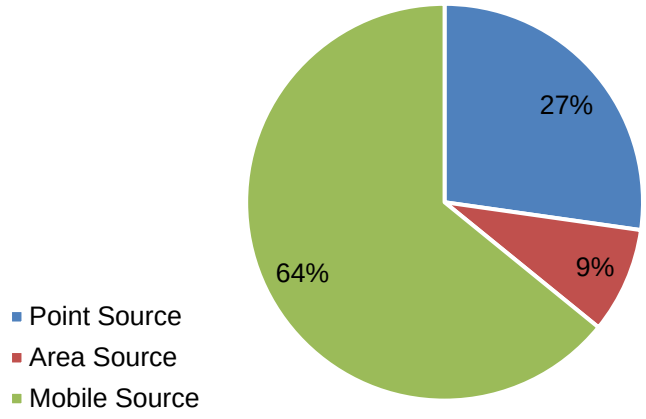
Mobile Sources

Overall, mobile sources, excluding road dust, were the largest contributor of CO and NOx. Data analyses indicated that emissions from on-road vehicles were the largest contributor of all CACs from mobile sources with the exception of NOx. Marine vessels were the largest contributor of NOx emissions from mobile sources. The second largest emission contributor to CO, TPM, PM_{10}, $PM_{2.5}$ and VOC emissions from mobile sources was non-road equipment/vehicles. CAC emissions due to aircraft activity were insignificant.

Distribution of CO Emissions

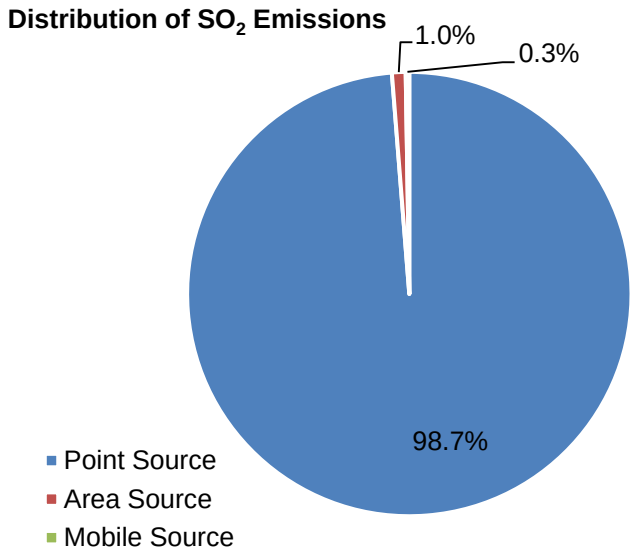


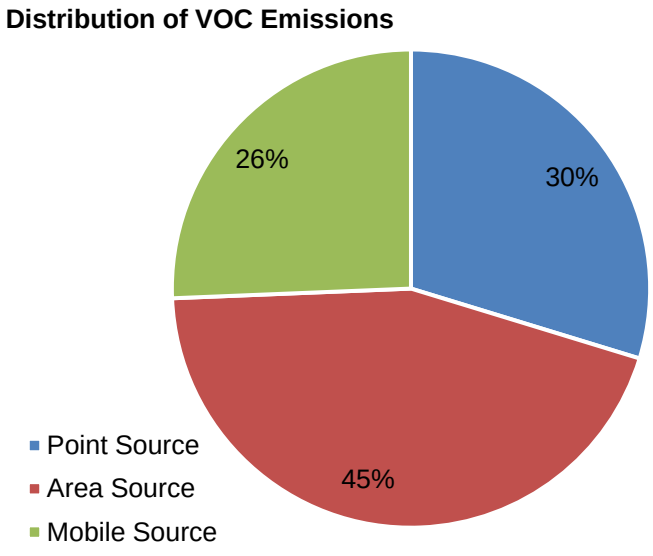
Distribution of NOx Emissions



Point Sources

Overall, the largest emitters for SO_2 were point sources. The majority of point source industry emissions were from the pulp and paper sector, which accounted for 87% of CO, 95% of NOx, 62% of TPM, 77% of PM_{10}, 86% of $PM_{2.5}$, 67% of VOC, and 99.7% of SO_2 emissions from point sources. The petroleum product storage sector was the second largest contributor at 29% in terms of total VOC emissions.





For additional details on the Emissions Inventory please visit: http://www.cvrd.bc.ca/DocumentCenter/View/65427

Appendix B - Air Quality Study for the Cowichan Region

Background

The BC Ministry of Environment and the Cowichan Valley Regional District engaged Stantec Consulting Inc. in 2014 to analyze the meteorological and air quality datasets for the region to develop a more comprehensive analyis of the impact of emissions on air quality. The study considered the 11- year period 2003 through 2013 to consolidate the most recent air quality information in support of future airshed management efforts. Statistical summaries, graphics, and case studies were used to characterize patterns in the observed air quality conditions.

Scope

Air quality datasets from four monitoring stations in the CVRD were analyzed. These include Crofton Substation, Crofton Escarpment Way, Duncan Deykin Avenue, and Duncan Cairnsmore. The Crofton Substation and Duncan Deykin Avenue stations were operational prior to 2003. Observations at Crofton Escarpment Way and Duncan Cairnsmore stations began in October 2008 and July 2009, respectively.

The five substances that were measured and analyzed are: sulphur dioxide (SO_2), nitrogen dioxide (NO_2), particulate matter (PM), total reduced sulphur (TRS), and ozone (O_3). Particulate matter is further categorized by diameter into inhalable (PM_{10}) and respirable ($PM_{2.5}$) fractions. These substances are known collectively as criteria air contaminants (CACs). Air quality is determined by a comparison of the measured CAC concentrations with the national and provincial ambient air quality objectives (AAQO).


Lake Cowichan (EC)
Crofton Substation
Crofton Met
North Cowichan Met (EC)
Crofton Escarpment Way
Duncan Cairnsmore
Duncan Deykin Avenue
Cowichan Lake Forestry (EC)
Duncan Kelvin Creek (EC)
Shawnigan Lake (EC)
UTM mN
5440000
5430000
5420000
5410000
5400000
5390000
5380000
370000
380000
390000
400000
410000
420000
430000
440000
450000
460000
470000
UTM mE
Elevation (m)
Stantec
CVRD
Legend
CVRD Boundary
Major Road
Water Body
Water Course
Meteorological Stations
Air Quality Stations
Cowichan Valley Regional District
Meteorological and Air Quality
Stations
PROJECTION UTM
DRAWN BY KW
DATUM NAD 83 - ZONE 10
CHECKED BY JS
DATE 2014-Nov-17
FIGURE NO. 2-1

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Results of baseline analysis

Respirable Particulate Matter - $PM_{2.5}$ (particulate size is small enough to be absorbed and distributed into organs of body)

There were sporadic exceedances of the $PM_{2.5}$ objectives (Figures 1 and 2). The study revealed that the exceedances were episodic and not systemic in nature. The Crofton Substation, Crofton Escarpment Way, and Duncan Deykin Avenue stations had very few exceedances of the 24-hour AAQO for $PM_{2.5}$ while Duncan Cairnsmore had a greater frequency of exceedances. The diurnal (hourly) analysis showed increased $PM_{2.5}$ concentrations in the late afternoons and evenings (Figure 3). **$PM_{2.5}$ and meteorological data analysis revealed that most of the sporadic exceedances may be due to local burning and space heating (winter),** The analysis also revealed that there were a few exceedances due to long range transport from forest fires located in other regions (summer).

Impact of pollutant

$PM_{2.5}$ refers to particulate matter that is less than 2.5 microns in diameter. This is the particulate size of greatest concern because it can travel deep into the lungs, causing heart and lung disease, and even premature death. Fine particles that comprise $PM_{2.5}$ are also efficient at scattering light, resulting in degradation in visibility.

The following figures illustrate the exceedance of $PM_{2.5}$ objectives and the daily pattern observed at the Duncan Cairnsmore location.

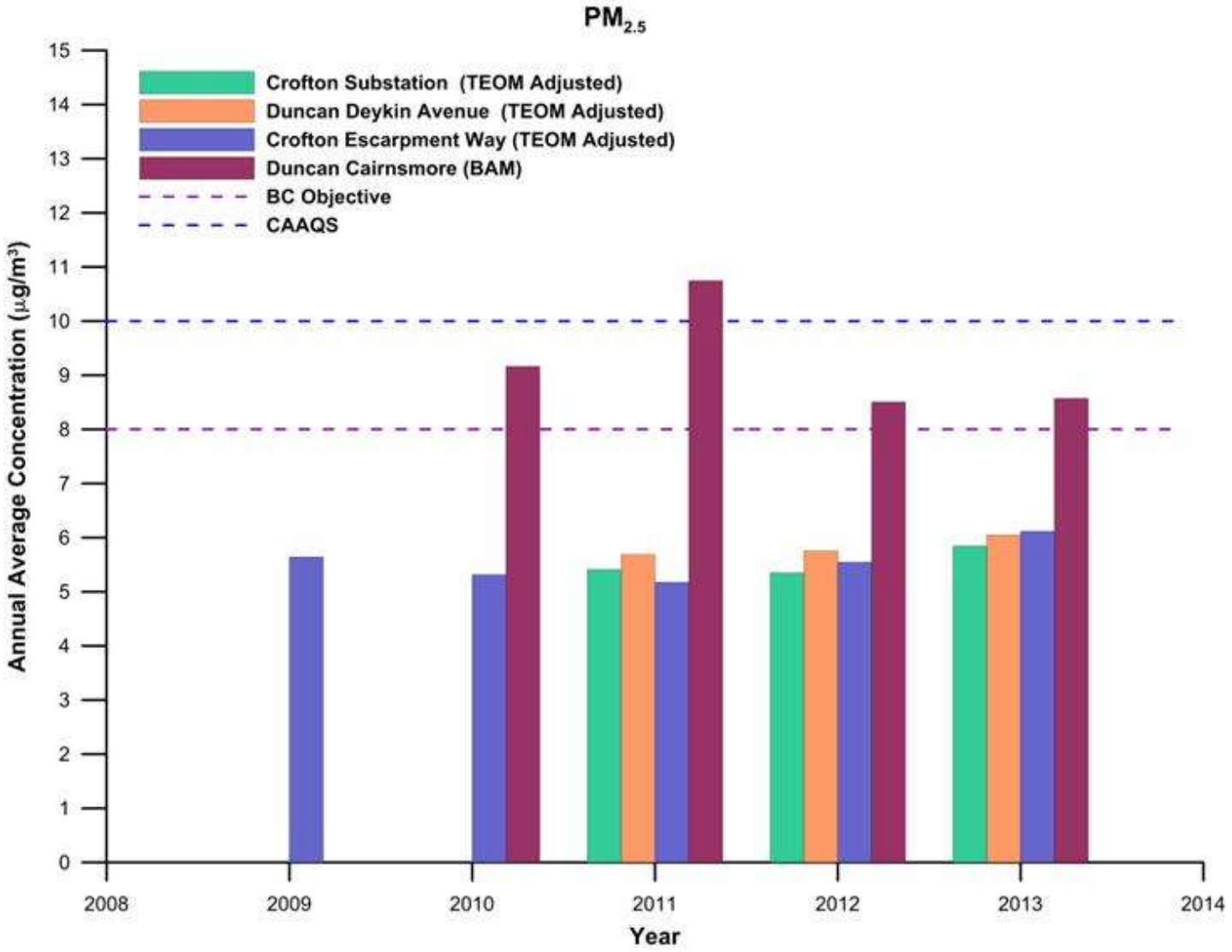

Figure 1. Annual Average $PM_{2.5}$ Concentrations in the CVRD

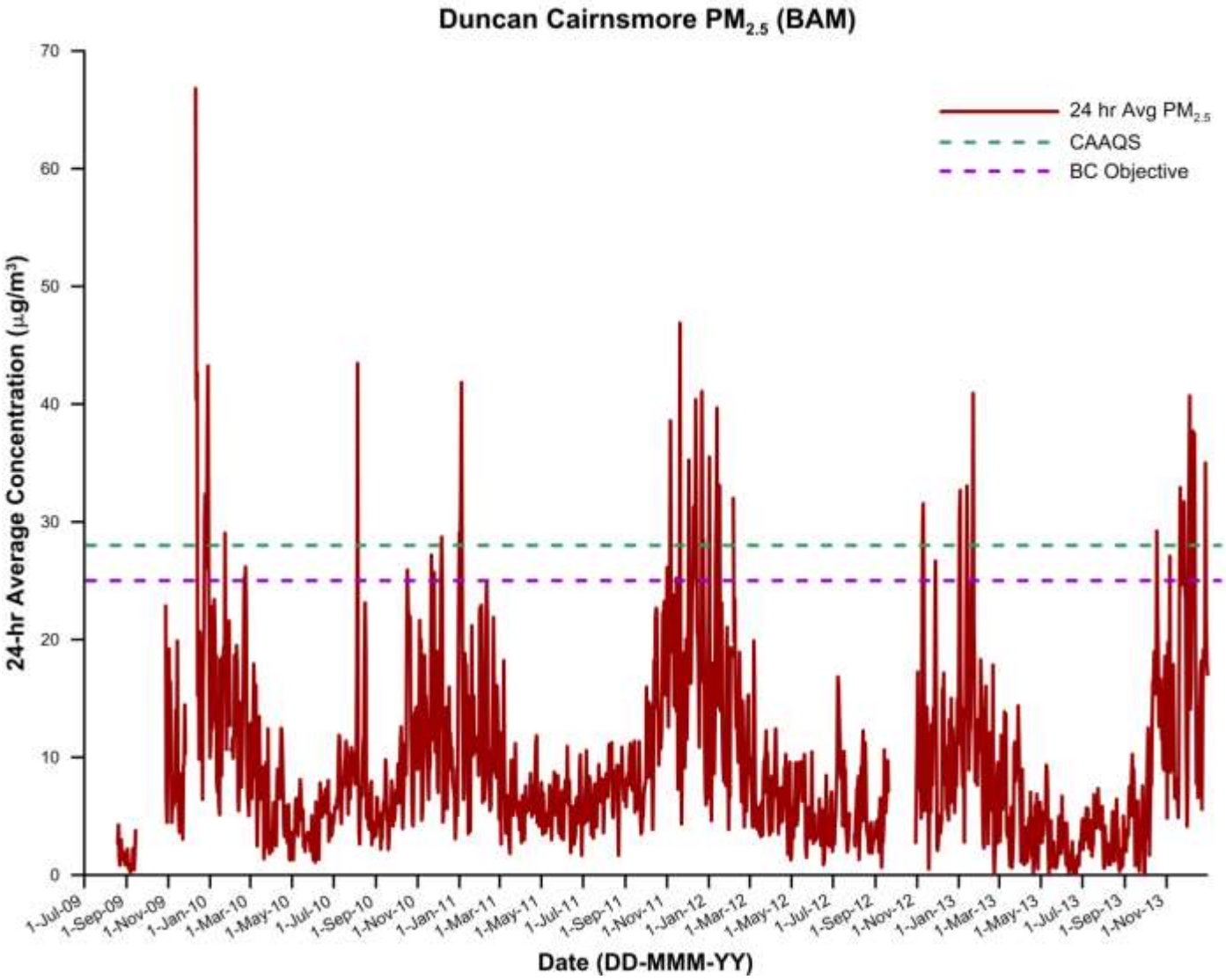

Figure 2. 24 Hour Average $PM_{2.5}$ at Duncan Cairnsmore

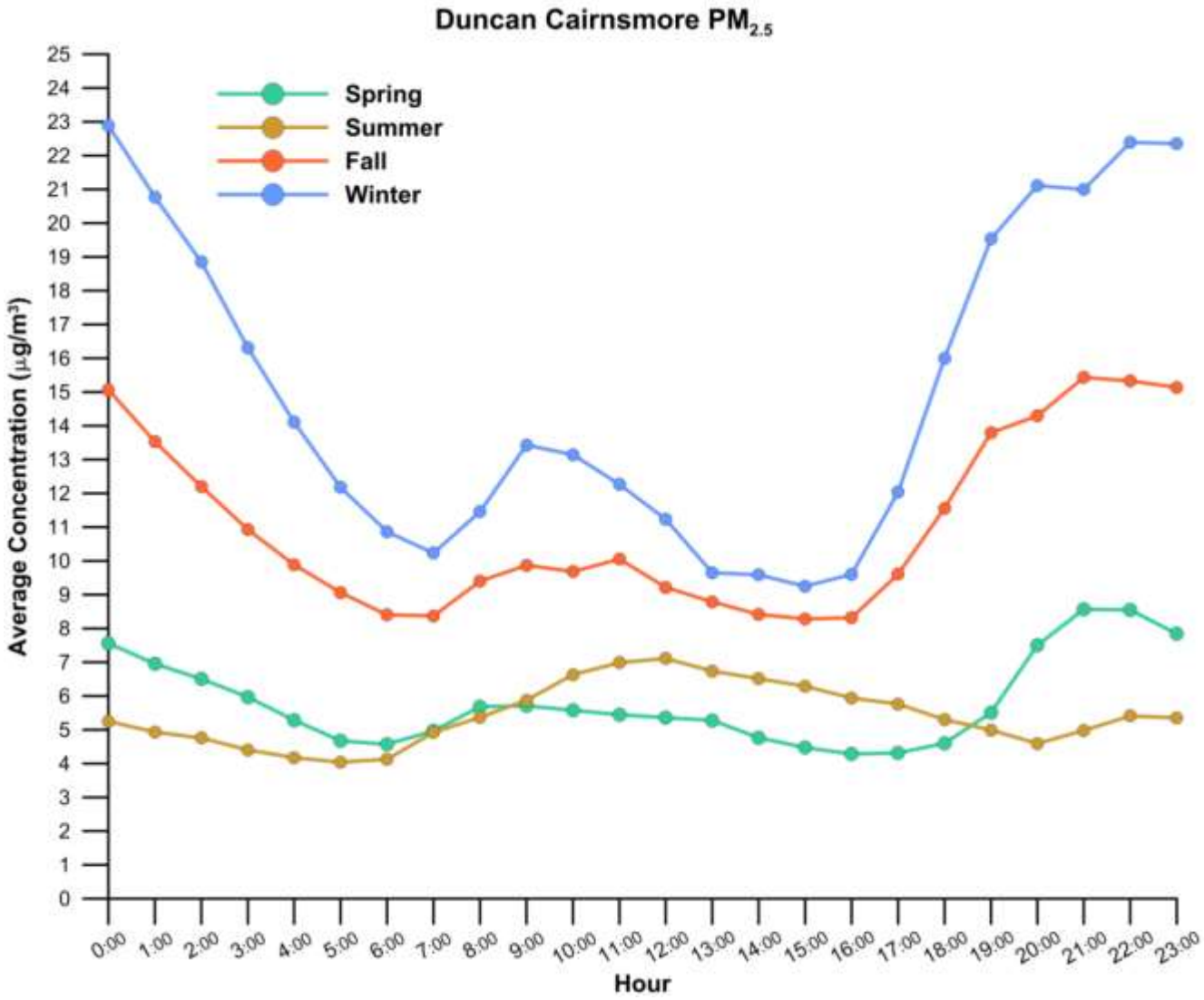

Figure 3. Diurnal Trends in $PM_{2.5}$ Concentration at Duncan Cairnsmore by Season.

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Inhalable Particulate Matter – PM_{10} (particulate size will irritate and cause coughing, become lodged in respiration system)

At Crofton Substation, there was just one day when the 24 hour average PM_{10} concentration exceeded the BC AAQO (Figure 4). There were no exceedances of the provincial objective at Duncan Deykin Avenue from 2003 to 2010 (Figure 5). At Crofton substation, there is minimal seasonal trend with slightly higher concentrations in the spring and summer compared to the fall and winter. At Duncan Deykin Avenue, there were higher concentrations in the late fall and early winter due to activities such as space heating and open burning.

Impact of pollutant

PM_{10} refers to particulate matter that is less than 10 microns in length. These particles can irritate the nose and throat, but do not normally penetrate deep into the lungs. Particulate matter is the main source of haze that reduces visibility. These particles can also make lakes and other sensitive areas more acidic, causing changes to the nutrient balance and harming aquatic life.

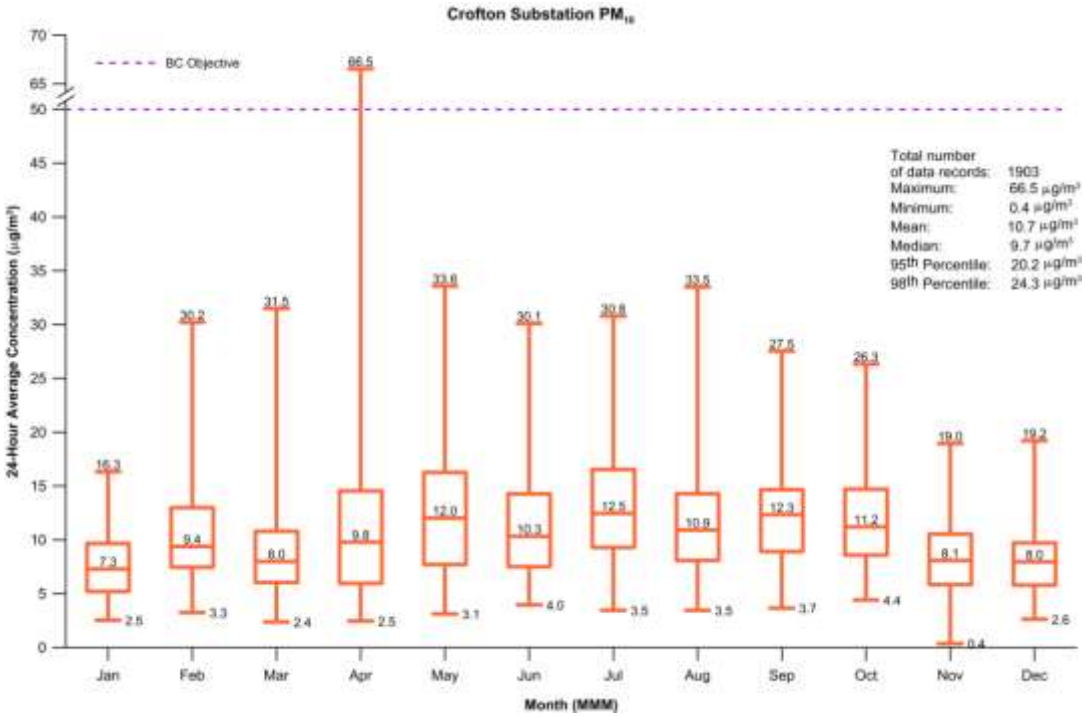

Figure 4. Monthly Variation of 24-Hour Average PM_{10} Concentration at Crofton Substation Based on 2005–2010 Data

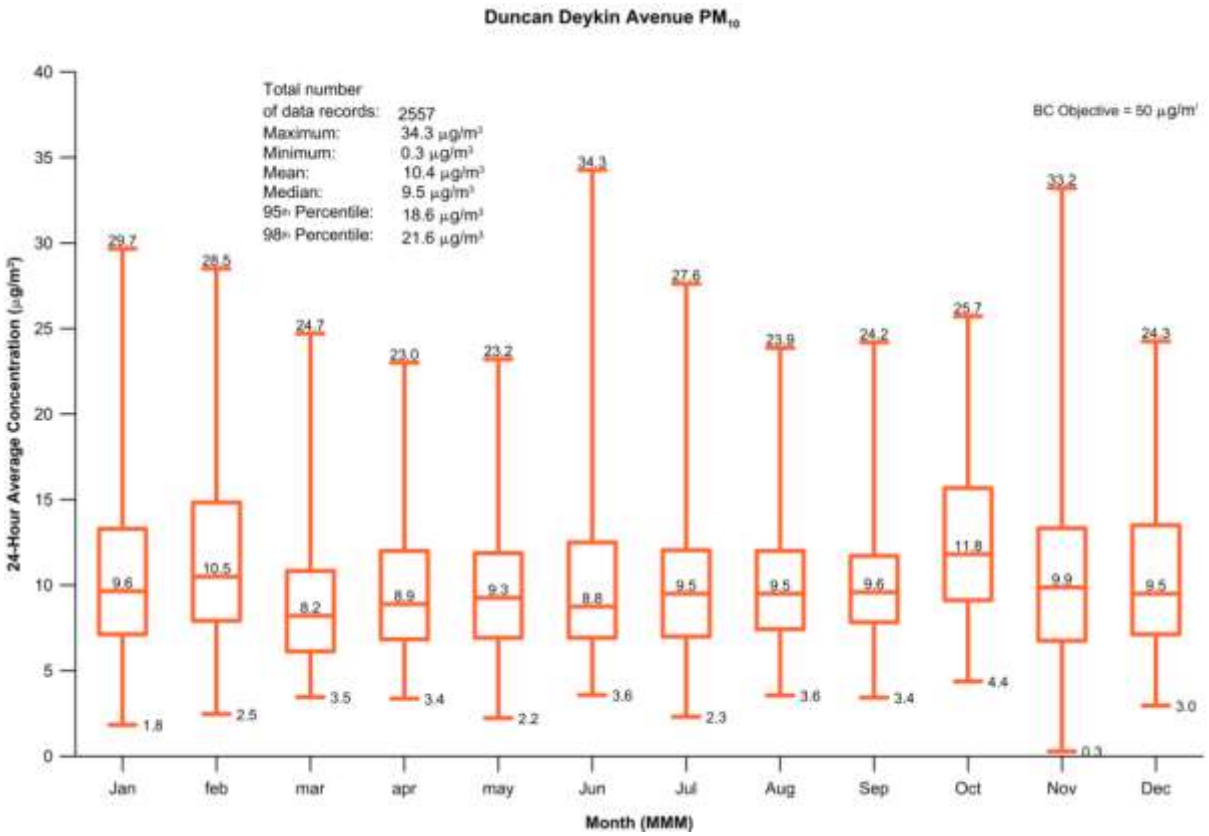

Figure 5. Monthly Variation of 24-Hour Average PM_{10} Concentration at Duncan Deykin Avenue Based on 2003–2010 Data

Ozone

Ozone was measured at the Duncan Cairnsmore station starting in mid-2009. Ozone (O_3) is more prevalent during summertime high pressure systems, as its formation is dependent on sunlight and warm temperatures. Average monthly concentrations exhibited a springtime peak, but the highest 1-hour average concentrations occurred in August (figure 6). A well-defined daily cycle in O_3 concentration with a late afternoon maximum was observed for all seasons, indicating some local photochemical production – entirely consistent with the small urban setting (figure 7). Further analysis of two high-concentration episodes found these patterns were

associated with periods of hot, sunny weather. Analysis of O_3 into regimes suggests that transport of O_3 from the Lower Fraser Valley (or most distant sources) is not an important factor. This analysis is illustrated in the Air Quality Study Report. There were no exceedances of the national AAQO for O_3.

Impact of Pollutant

Low concentrations of ground-level ozone can irritate the eyes, nose and throat. O_3 can also irritate the lung airways, and make them red and swollen (inflammation). People with lung problems are most at risk, but even healthy people who are active outdoors can be affected when ozone levels are high. O_3 can also damage plants and trees when levels are high.

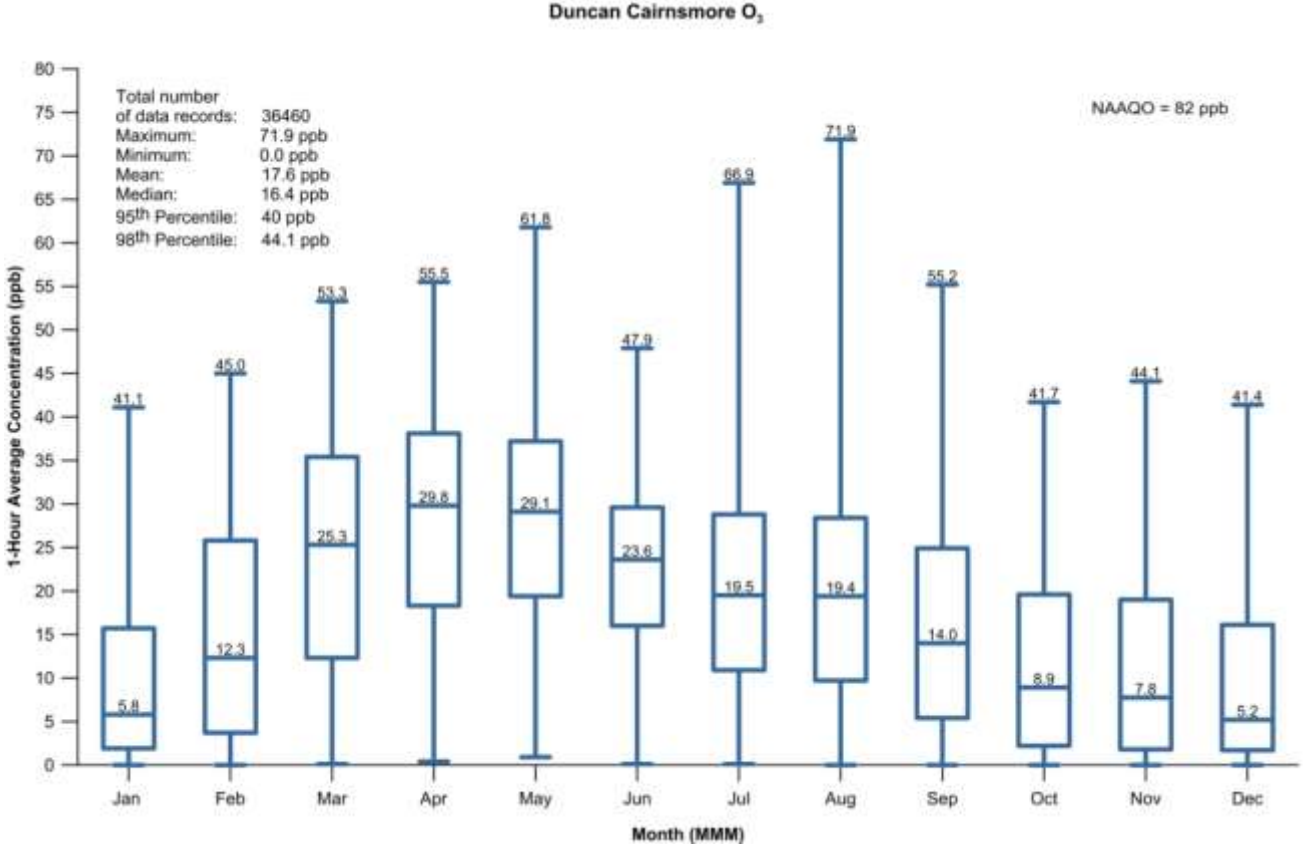

Figure 6. Monthly Variation of 1-Hour Average O_3 Concentration at Duncan Cairnsmore based on 2009–2013 Data

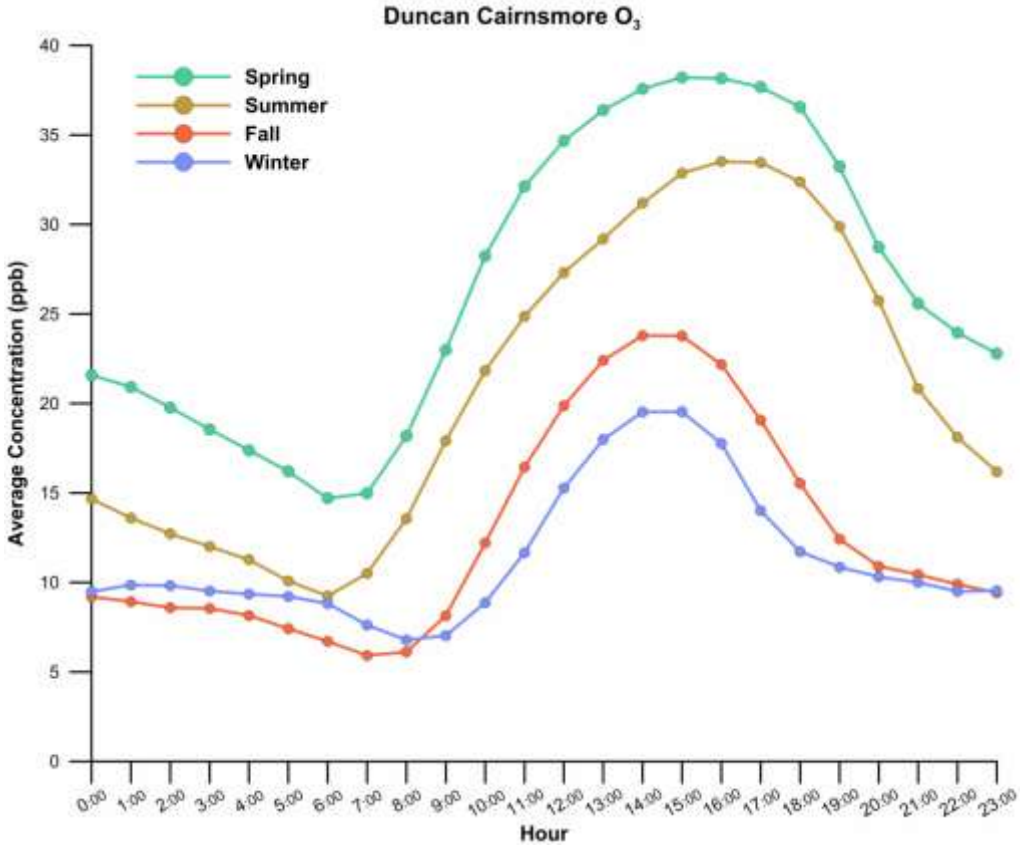

Figure 7. Diurnal trends in O3 concentration at Duncan Cairnsmore by Season

Sulphur Dioxide

A daily pattern was found for SO_2 concentrations in which average values peaked in late morning and decreased through the night. This pattern was likely due to shoreline fumigation (clearing of air) after the onset of onshore (easterly) wind flow. No day of week pattern was apparent for SO_2. There were no exceedances of national or provincial AAQO for SO_2 (Figure 8).

Impact of Pollutant

Sulphur dioxide can transform in the atmosphere to sulphuric acid, a major component of acid rain. Inhalation of high levels of sulfur dioxide is associated with increased respiratory symptoms and disease, difficulty in breathing and premature death.

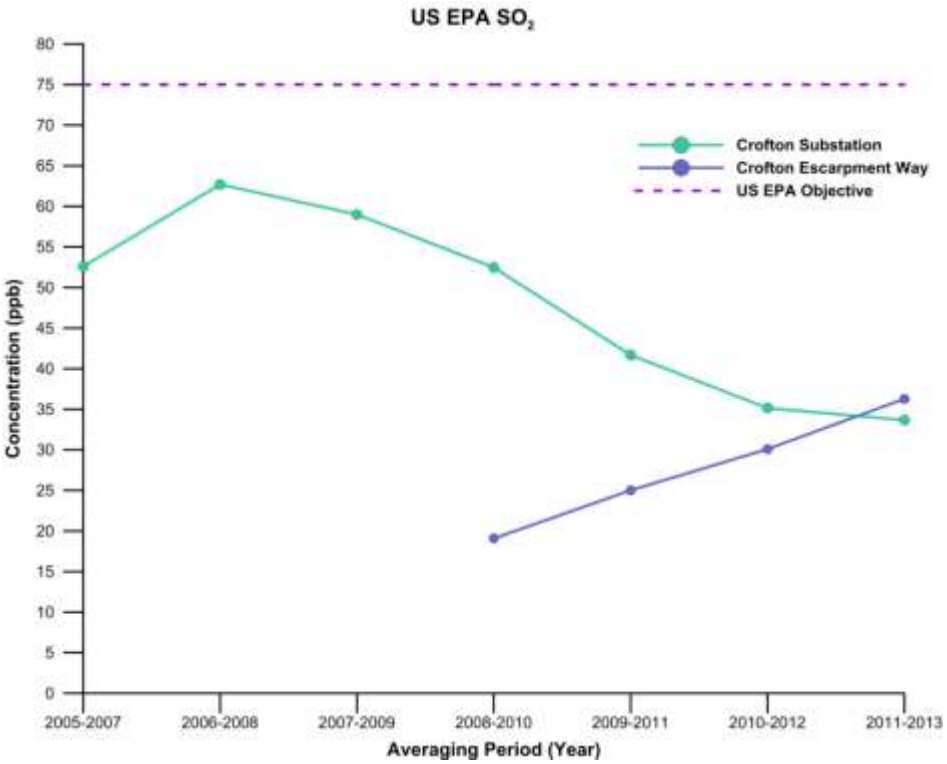

Figure 8. 1-Hour Average SO2 Results for the US EPA Supplemental Objective at the Crofton Substation and Crofton Escarpment Way Monitoring Stations

Nitrogen Dioxide

A daily pattern was found for NO_2 concentrations as well. The pattern for NO_2 showed two peaks, one in the morning and one in the evening, corresponding to times of peak motor vehicle traffic (Figure 9). There appears to be a downward trend in the annual average NO_2 concentrations likely linked to improving combustion efficiencies in motor vehicles (Figure 10). There were no exceedances of national or provincial AAQO for NO_2.

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Impact of Pollutant

High levels of Nitrogen dioxide can irritate the lungs and lower resistance to respiratory infections such as influenza. Nitrogen oxides in the air can significantly contribute to acid rain and eutrophication in coastal waters.

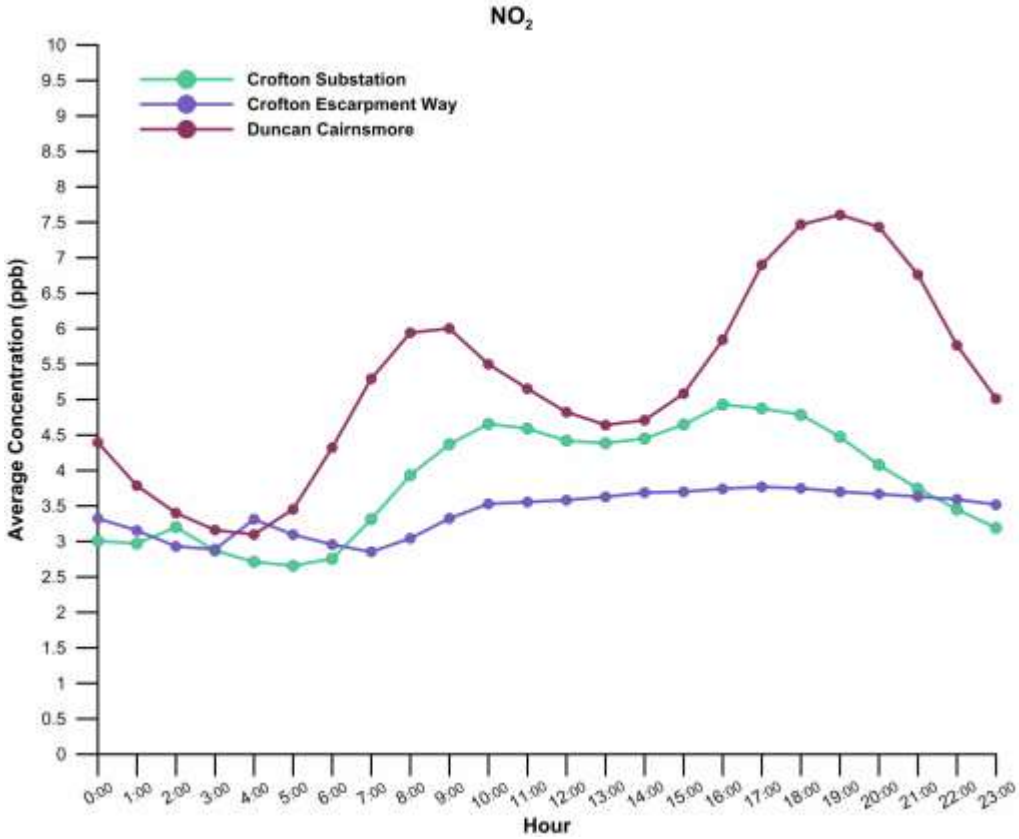

Figure 9. Diurnal Trends in NO2 Concentration Based on all Available Hourly Data

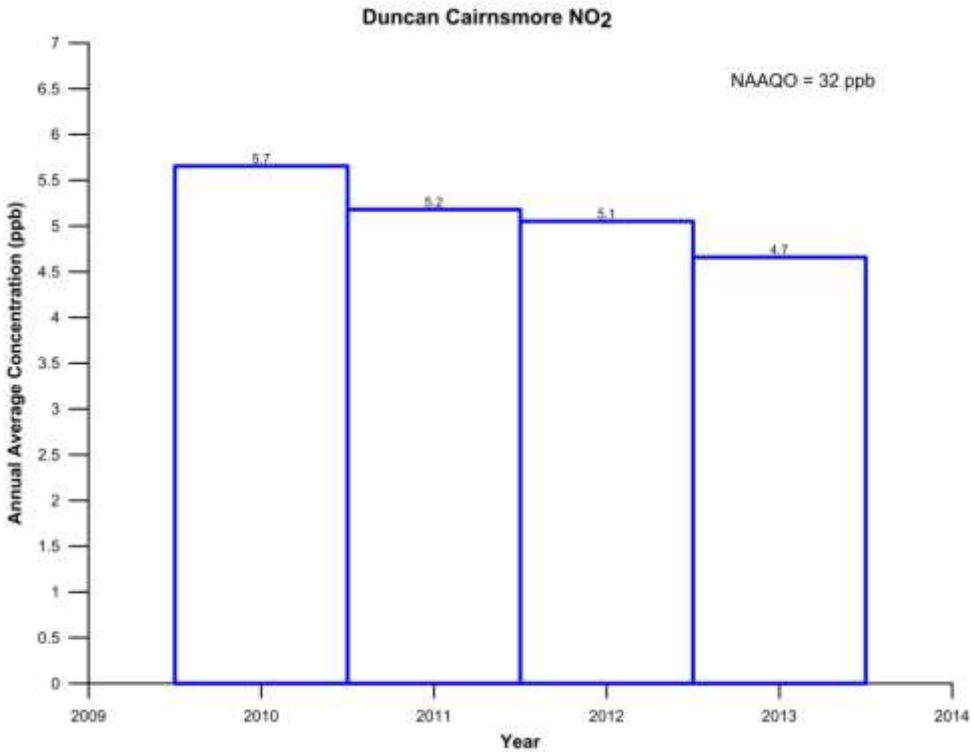

Figure 10. Annual Average NO_2 Concentrations at Duncan Cairnsmore for 2010–2013

Total Reduced Sulphur

Total reduced sulphur (TRS) exhibited low average concentrations with short-term peaks that exceeded the most stringent BC AAQO for the 1-hour and 24-hour averaging periods (Figure 11). These episodes of higher TRS concentration are most likely associated with emissions from the Pulp Mill in Crofton. Exceedance of the TRS AAQO for the 24-hour averaging period occurred up to 30% of the time on an annual basis at Crofton Substation which is 250 m south of the Pulp Mill, but only up to 1.5% of the time at Duncan Deykin Avenue which is more than 8 km away from the Pulp Mill (illustrated in the Air Quality Study Report). The meteorological data analysis revealed that these sporadic exceedances may be due to the Crofton Mill emissions.

Impact of Pollutant

TRS is a mixture of compounds including hydrogen sulphide, mercaptan, dimethyl sulphide and dimethyl disulphide. TRS compounds are not considered a health hazard at typical environmental levels. They are however, a primary cause of odours. Exposure to high concentrations of hydrogen sulfide can lead to respiratory distress or arrest.

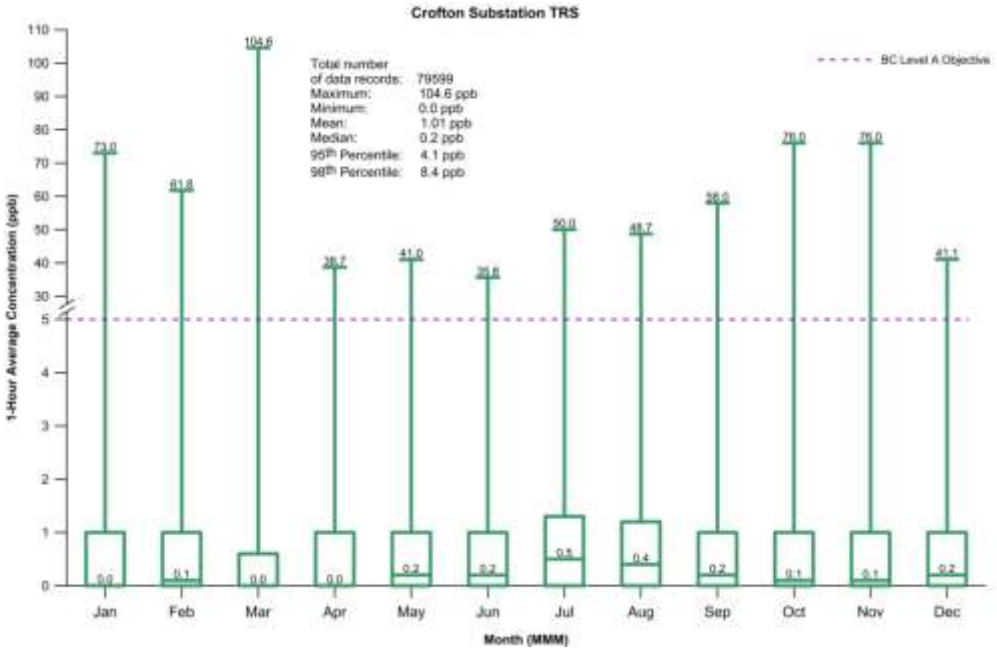

Figure 11. Monthly Variation of 1-Hour Average TRS Concentration at Crofton Substation Based on 2003–2013 Data.

For additional details on the Air Quality Study please visit: ftp://ftp.cvrd.bc.ca/Environment/Airshed%20Protection/AirQualityStudyFinal.pdf

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Appendix C – Our Indicators and Targets

The following indicators and targets were developed to help us understand whether we are achieving our goals

Parameter	Indicator	Sources	Rationale	Targets ⇨ Denotes key target	Units	Monitoring
Health	a) Childhood respiratory illness		a) Health effects	Zero	# of people	Island Health
Population	b) Resident population c) Visitors by demographic categories		b) Measure of population growth c) Measure of tourism health	N/A	# of people	Census data
Particulate matter	a) Annual average $PM_{2.5}$	Open burning and wood burning appliances	Health effects (respiratory, cardiovascular), vegetation damage, visibility degradation.	⇨ **a) Zero exceedance of BC AAQO (8 µg/m^3)** & zero exceedance of National AAQO	µg/m^3	Yes
	b) Daily $PM_{2.5}$		Reduce the frequency and duration of episodes that lead to *air quality advisories*.	⇨ **b) Zero exceedance *of BC AAQO (25 µg/m^3)*** & zero exceedance of National AAQO		
NOx	a) Provincial and National objectives	industry, mobile sources, wood burning, etc.	Health effects (respiratory), vegetation damage, acidification, secondary particles, O3 precursor	Decreasing trend		
SO_2	a) Provincial and National objectives guideline of 7.5 ppb	Crofton Pulp Mill; combustion of fossil fuels containing sulphur. Marine Vessels.	At high concentrations - health effects (respiratory), vegetation damage, acidification, fine particulate formation, visibility	a) WHO 24 h 7.5 ppb		
Ozone	a) Provincial and National Objectives for 1 hr and 8 hr	A secondary pollutant formed from reactions between oxides of	Health effects (respiratory and eyes), vegetation damage, visibility (photochemical smog)			

		nitrogen (NOx) and volatile organic compounds (VOCs) in the presence of sunlight			
Odour	a) # of odour complaints b) TRS – Provincial Level A odour objective	Point sources Crofton pulp mill; sewage treatment; swamps, bogs and marshes.	Offensive odours	a) Reduction in odour complaints b) Continuous improvement in TRS	
Visibility	a) Visibility b) Complaints c) Good Visibility	Mobile sources Ozone, NOx, VOC and PM	can effect tourism, outdoor recreation and public perception	a) Reduction in visibility complaints b) Visibility index of good	
Partnerships & Leadership	a) Annual reports b) Partnerships c) Stewardship programs d) Public Awareness Campaign			**⇨ Form an Airshed Protection Round Table** **⇨ Implement Actions in this Strategy**	- Website hits. - #of AQ pres. given to others. # of requests for info AQ planning. - # of visitors with a positive perception of air quality and environmental health.

Appendix D - Contaminant Prioritization

To focus the planing of actions on those that will have the greatest impact on our air quality, high priority pollutants have been determined based on the following critieria:

- Does the pollutant have exceedance(s) of national or provincial air quality objectives?
- Is the pollutant normally considered to be a significant hazard to human health, the environment or the economy?

Pollutant	Exceedance of AQ objective	Hazard		
		Human Health	Environmental	Economic
SO2		√	√	√
TRS	√			√
NOx		√	√	√
Ozone		√	√	√
PM_{10}		√	√	√
$PM_{2.5}$	√	√	√	√

Appendix E – References

1. Provincial Framework for Airshed Planning – BC Government (http://www.bcairquality.ca/reports/pdfs/airshedplan_provframework.pdf)

2. A Review of Airshed Planning in British Columbia – BC Government - March 31, 2009 (http://www.bcairquality.ca/reports/pdfs/airshed-planning-review_03_2009.pdf)

3. A Community-Based Approach to Airshed Management in the Sea to Sky Corridor – Sea to Sky Airshed Society – 2005 (http://www.seatoskyairquality.ca/pdf/SharingTheAirMarch2005.pdf)

4. Sea to Sky Air Quality Management Plan – Sea to Sky Airshed Society – 2007 (http://seatoskyairquality.ca/wp-content/uploads/aqmp2007.pdf)

5. City of Kamloops Air Management Plan – City of Kamloops (http://www.city.kamloops.bc.ca/environment/pdfs/13-05-AirshedManagementPlan.pdf)

6. National Pollutant Release Inventory Online Data Search – Environment Canada - Facility Reported Data (http://www.ec.gc.ca/inrp-npri/donnees-data/index.cfm?lang=En)

7. CVRD 2010 State of the Environment Report – Cowichan Valley Regional District's Environment Commission – 2010 (http://www.12things.ca/12things/uploads/2010S0Ereportsm.pdf)

8. Agency for Toxic Substances & Disease Registry – Public Health Statement – Hydrogen Sulfide http://www.atsdr.cdc.gov/toxprofiles/tp114-c1-b.pdf

9. Carlton, A.G., R.W. Pinder, P.V. Bhave and G.A. Pouliot. "To What Extent Can Biogenic SOA be Controlled?", Environmental Science & Technology 44:3376-3380 (2010).

10. Emissions Inventory Compilation and Forecast for the Cowichan Valley Regional District – BC Ministry of Environment and Cowichan Valley Regional District – Prepared by Levelton Consultants – June 25th, 2014

11. Air Quality Study, Cowichan Valley Regional District – BC Ministry of Environment and Cowichan Valley Regional District – Prepared by Stantec – January 29th, 2015

STAFF REPORT TO COMMITTEE

DATE OF REPORT	April 12, 2017
MEETING TYPE & DATE	Regional Services Committee Meeting of April 26, 2017
FROM:	Environmental Services Division Engineering Services Department
SUBJECT:	Climate Adaptation Program update
FILE:	

PURPOSE/INTRODUCTION

To provide the Board with an update on the progress of the Climate Adaption Program.

RECOMMENDED RESOLUTION

That Phase 1 Recommendations (Cowichan Valley Regional District Climate Projection and Impacts: Establishing a Common Understanding), of the New Normal Cowichan program as detailed in the Environmental Services Division April 26, 2017 Staff Report to Regional Services Committee, be implemented.

BACKGROUND

The Cowichan Valley Regional District (CVRD) is currently working on New Normal Cowichan: a multi-phased program to take action on climate change. This work involves 4 phases:

- Phase 1: Climate Projections and Impacts Analysis
- Phase 2: Vulnerability and Risk Assessments
- Phase 3: Adaptation and Mitigation Strategy
- Phase 4: Implementation of the Strategy

This program is focused on adaptation not carbon mitigation as carbon mitigation is covered under the CVRD energy strategy and the Visions 2050 process that will address the built environment. Regardless of what carbon mitigation is possible our region will need to consider climate adaption in the near term.

The climate adaption process is also focused on a risk based approach to identify the highest areas of impact and begin to develop appropriate policies, upgrades to infrastructure and emergency management. Adaptation to a changing environment is a complex process and will involve a concerted effort on the part of many players in the community outside of the CVRD. As such, the supporting technical team has been made up of a wide variety of community stakeholders, provincial resource agencies, local governments, first nations, forestry holders, stewardship groups, health providers, emergency management personnel, research institutions and consultants.

The next phase of work will involve specialized groups undertaking specific assessments as well as a series of case study based exercises focused on structured risk and vulnerability assessments.

ANALYSIS

The projections as developed by the Pacific Climate Impacts Consortium (PCIC) highlight a very different future for the region than the past. This includes substantial shifts in water resources and temperature. These changes will be profound and affect a wide range of areas of importance to our communities. Including but not limited to:

- Ecosystems and Biodiversity;
- Watershed and Groundwater Health;
- Health and Wellbeing;
- Infrastructure;
- Economic Development; and
- Bioregional Carrying Capacity.

During the development of this report, the technical committee has offered the following early recommendations to be considered as the region continues to prepare to take action on climate change adaptation. Detailed analysis and structured recommendations will follow as a part of the overall adaptation planning exercise.

- Take a “no-regrets” approach when planning for adaptation, as the time for action is now;
- Utilize existing projections in all master planning processes;
- Establish stretch goals and visions in Regional Cowichan 2050 planning process to ensure that adaptation is not an automatic fallback position;
- Incorporate projections and impacts into all engineering and water security planning;
- Conduct additional analysis of drought-related indicators to more fully understand specific impacts to soil, water supply, and ecosystem health at the landscape level;
- Develop long-term community water security plans and update watershed strategies with climate projections to address future conflicts over water use;
- Develop an integrated hydrological monitoring and climate network;
- Identify and map areas affected by increased climate sensitivity (flooding, erosion, landslides) to assist in identifying specific risks;
- Conduct a regional, engineering-based analysis of infrastructure risks to inform asset management;
- Develop IDF curves that reflect climate projections for engineering decision making related to infrastructure;
- Incorporate APEG BC recommendations for additional tolerances above projections;
- Develop sea level rise land use management zones;
- Recognize the rural nature of the region and how this can affect the services provided;
- Work in partnerships with other levels of government to address infrastructure shortages/deficiencies; and
- Conduct a full risk assessment of policy and infrastructure in partnership with other levels of government.

Communicate long-term projections to the general community, stakeholders, and partners, along with other relevant projections concerning sea level rise and forestry

FINANCIAL CONSIDERATIONS

N/A

COMMUNICATION CONSIDERATIONS

Presentations will be provided to all local governments as well as information on both the CVRD website and New Normal Cowichan sub site.

STRATEGIC/BUSINESS PLAN CONSIDERATIONS

Response to Climate Change Strategic Focus Area, in particular the development of a climate risk assessment process and the development of prioritized strategies for adaptation.

Referred to (upon completion):

- ☐ Community Services *(Island Savings Centre, Cowichan Lake Recreation, South Cowichan Recreation, Arts & Culture, Public Safety, Facilities & Transit)*
- ☒ Corporate Services *(Finance, Human Resources, Legislative Services, Information Technology)*
- ☐ Engineering Services *(Environmental Services, Recycling & Waste Management, Water Management)*
- ☐ Planning & Development Services *(Community & Regional Planning, Development Services, Inspection & Enforcement, Economic Development, Parks & Trails)*
- ☐ Strategic Services

Prepared by:

Kate Miller, MCIP, RPP, LEED AP
Manager

Reviewed by:

Not Applicable
Not Applicable

Hamid Hatami, P. Eng.
General Manager

ATTACHMENTS:

Attachment A – New Normal Cowichan – A Climate Change Adaption Plan for the Cowichan Region Phase 1. Climate Projections and Impacts: Establishing a common Understanding.
Attachment B – Visual – New Normal Cowichan

New Normal Cowichan

A Climate Change Adaptation Plan for the Cowichan Region

Phase 1

Cowichan Valley Regional District Climate Projections and Impacts: Establishing a Common Understanding

April 2017

Submitted to: Kate Miller

Submitted by: Gillian Aubie Vines
Pinna Sustainability Inc

Pinna Sustainability

Executive Summary

Temperatures in the Cowichan Valley are warming. Global climate models project an average increase of about 3°C (models range from 2°C to 4°C of warming) in our region by the 2050s. Our region's ability to adapt to climate change requires specific information on how changes in temperature and precipitation will play out locally, how impacts may differ throughout the seasons, and what new climate extremes our region may face. Work has been completed by the Pacific Climate Impacts Consortium (PCIC) to understand how the climate in our region may change by the 2020s, 2050s, and 2080s. This report provides the results of PCIC's work, together with information to enable our region to adapt to the changes ahead. High-level changes for temperature and precipitation for the 2050s are also summarized.

The Cowichan Valley Regional District (CVRD) is currently working on New Normal Cowichan: a multi-phased project to take action on climate change. This work involves 4 phases:

- Phase 1: Climate Projections and Impacts Analysis
- Phase 2: Vulnerability and Risk Assessments
- Phase 3: Adaptation and Mitigation Strategy
- Phase 4: Implementation of the Strategy

This report completes the Phase 1 climate projections and impacts analysis to support the next two phases of the planning process, by providing climate projections for the region that illustrate the dramatic changes we can expect in years to come. The projections for the Cowichan Valley are based on highest resolution information about future climate available for our region: daily climate model projections from Global Climate Models, statistically downscaled to 10 km resolution, and then elevation corrected using historical gridded climatology at 800 m resolution. This report also identifies high-level impacts for our region, and sets the stage for further exploration planning and prioritization in Phase 2. In addition to the projections presented here, ongoing work to project future sea level rise and increases to water levels are being completed and will be presented in a separate document.

As our climate warms, our region can expect more than a doubling in the number of summer days above 25°C, from an average of 16 days per year to 39 days per year. The 1-in-20 hottest temperature is projected to increase from 33°C to 36°C by the 2050s. This projected warming has implications for future water and cooling demands, and translates into changes that are important to our ecosystems, watersheds, and communities, including an overall 28% increase in the length of the growing season and a 49% increase in growing degree days regionally.

Warmer winters mean the region will experience a 63% decrease in the number of frost days and heating demand will decrease overall, although both high and low temperature extremes are still possible in a less stable climate.

A modest 5% increase in annual precipitation is projected in our region by the 2050s. Projections indicate that fall will see the greatest increase in precipitation. This precipitation is expected during increasingly extreme events, with about 30% more precipitation on very wet days (R95p) and 65% more on extremely wet days (R99p). Despite the projected increased intensity of wet events, the amount of rain in summer is expected to decrease by 17%, and the duration of dry spells will be lengthened by about 20%, from 22 consecutive days to 26 days.

Most of the projected climate changes described in this report will be felt more or less uniformly throughout the region. Certain impacts, however, may differ substantially between low-lying developed areas (where the majority of the population is situated), the water supply areas, and the west coast. A sub-analysis has been undertaken for each of those areas to assist in local planning initiatives. On the whole, sub-regional projections largely mimic regional projections, though past precipitation values are generally wetter in the Water Supply Watersheds and West Coast Watersheds, while past temperatures are generally warmer in the Developed Areas. This is important for temperature indicators like frost days, which illustrate that in the future, only the highest elevations in our region will experience frost. Outcomes from the sub-analysis also indicate the wettest areas in the mountains of the west coast will become even wetter, as a result of warmer temperatures and more precipitation falling as rain. April 1 snowpack depth is projected to decrease by nearly 85% by the 2050s.

Table of Contents

1 Introduction

The impacts of climate change are becoming increasingly evident and are challenging all levels of government to develop more resilient communities. Ensuring our region is as prepared as possible is critical to maintaining community well-being, environmental health, and a vibrant local economy over the long term. The 2014–2018 Cowichan Valley Regional District (CVRD) Corporate Strategic Plan has set a mandate to understand our region's climate risks and to complete adaptation plans that strengthen resilience, reduce risks, and take advantage of potentially emerging opportunities.

The first step towards planning is understanding what changes are projected for our region and beginning to build relationships between the community and government to improve our ability to adapt to changes ahead. To support this, the Pacific Climate Impacts Consortium (PCIC) has worked with the CVRD and a multi-stakeholder team to produce high-resolution regional projections to understand how the climate in our region may change by the 2050s and 2080s. This report presents information on temperature, precipitation, and related extreme indicators that, taken together, tell a story of how our climate is expected to change over time. High-level comments on the possible impacts of these changes are also presented as a first step in working collaboratively as a region to understand and prepare for the changes ahead. New approaches, to infrastructure, planning processes, and other regional management, require long timelines to change, and this report gives decision makers a clear sign that action is required today to adapt and mitigate further impacts.

This report offers a general description of our changing climate, followed by an expanded section on precipitation, summer temperatures, and winter temperatures. Each section includes a description of each indicator, along with a summary of projected trends. Cases where the results for a particular sub-regional indicator vary substantially from the regional average are noted in the analysis. The second chapter of this report provides a brief narrative describing how these changes could impact our region. These impact themes are broken into the Natural Environment and the Human Environment.

Sea level rise impacts are addressed by utilizing different sea level rise scenarios (1m, 2m, and 3m) along the regions east coast. This work will contribute to and be included in the next phase of the overall "New Normal Cowichan" climate adaption process using detailed coastal mapping.

Information provided in this document is not intended to serve as design guidelines for future planning. Rather it is intended to describe a probable future and enable our region's planners, engineers, policy makers, and community decision makers to make better-informed decisions on how to plan for and adapt to changes ahead.

2 Process and Acknowledgements

This work was developed as a collaboration between the CVRD and regional stakeholders, as represented in the Phase 1 Technical Committee. The Phase 1 Technical Committee met over six months to review climate projections for the region, discuss regional impacts of the projections, and identify recommendations for Phase 2 of this project. This report and process has also benefited from a variety of external partners including Lillian Zaremba with Metro Vancouver and Amanda Broad at the Capital Regional District. Together the work of our combined local governments will ensure we build on each other's successes.

Contributing authors to this report include Trevor Murdock from The Pacific Climate Impacts Consortium (PCIC), who provided regional downscaled climate projections at locally relevant scales, Kate Miller from the Cowichan Valley Regional District, who acted as the project manager, and Gillian Aubie Vines from Pinna Sustainability, who served as the workshop facilitator and lead writer of this report.

Phase 1 Technical Committee Membership

- Hamid Hatami, CVRD
- Mike Tippett, CVRD
- Kate Miller, CVRD
- Conrad Cowan, CVRD
- Amy Melmock, CVRD
- Keith Lawrence, CVRD
- Jeff Moore, CVRD
- Sybille Sanderson, CVRD
- Craig Sutherland, Kerr Wood Leidal
- Tom Rutherford, Cowichan Watershed Board
- Ken Epps, Island Timberlands
- Dominico Iannidinardo, TimberWest
- Chris Cole, TimberWest
- Lisa Brinkman, Town of Ladysmith
- Sharon Horsburgh, Regional District of Nanaimo
- Natalie Anderson, Cowichan Tribes
- Summer Goulden, Social Planning Cowichan
- Michelle Staples, Social Planning Cowichan
- Lynne Magee, VIHA
- Jade Yehia, VIHA
- Stacey Sowa, VIHA
- Ian Foss, EMBC
- Cathy LeBlanc, MCSCD
- Pat Lapcevic, FLNRO
- Derek Masselink, MOA
- Trevor Murdock, PCIC
- Brian Branting, SD 79
- Bruce Fraser
- Bruce Sampson
- Scott Aikenhead
- Jane Kilthei
- Goetz Schuerholz
- Emily MacNair, Climate Action Initiative
- Brian Epps, MFLNRO
- Ralph Mohrmann, MOTI

3 Methodology

Climate Scenario Selection

Various future trajectories of greenhouse gas (GHG) emissions are possible, and depend directly on global political initiatives and socio-economic changes that will occur over the coming years. This report presents the internationally recognized roughly "business as usual" GHG emissions scenario, known as Representative Concentration Pathway 8.5 (RCP8.5). Additional information from lower emissions scenarios (RCP4.5 and RCP2.6) is available for sensitivity analysis and to illustrate the relationship between adaptation and GHG emissions reductions (see Appendix 1).

In general terms, RCP8.5 corresponds to "business as usual" GHG emissions for the remainder of the century. The RCP4.5 "medium stabilization" scenario represents mitigation efforts that result in about half of the emissions compared to the RCP8.5 scenario. Substantial and sustained reductions in GHG emissions—for example, extensive adoption of biofuels and vegetarianism, along with carbon capture and storage—would be required to achieve RCP2.6, which is the only pathway that would keep global warming below 2°C above pre-industrial temperatures. The projected global temperature change for each pathway is illustrated below.

To date, public policy continues to reflect the RCP8.5 pathway, even though recent commitments, including the 2015 COP21 Paris Agreement, correspond with RCP2.6. It is prudent to plan for an RCP8.5 future until global mitigation actions begin to catch up with commitments.

Representative Concentration Pathways (RCPs)

RCPs describe potential 21st century scenarios of GHG emissions, atmospheric GHG concentrations, aerosols, and land use. These RCPs are used for making projections, and are based on the factors that drive anthropogenic GHG emissions: population size, economic activity, lifestyle, energy use, land use patterns, technology adoption, and climate policy. Each of the RCPs is achievable, and directly relates to the choices made by global society.

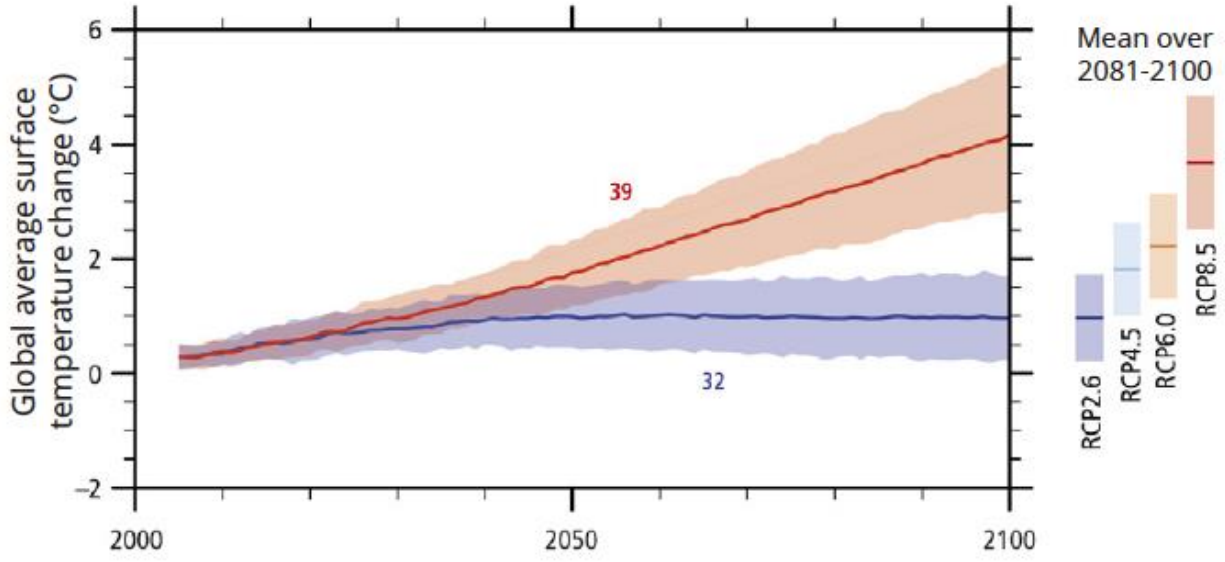


Figure SPM.6(a) from IPCC's Climate Change 2014: Synthesis Report shows modeled global average surface temperature change relative to 1986-2005. The mean of the projections (lines) and a measure of uncertainty (shading) are shown for RCP8.5 (red) and RCP2.6 (blue). The number of climate models used to calculate the mean is indicated.

Figure 1: Emissions Scenarios

Climate Model Selection

Many different, highly sophisticated models are used to simulate how the earth's climate will respond to changes in GHG concentrations, each with different strengths and weaknesses. To manage the uncertainty associated with modelling, it is best practice to apply an "ensemble" approach that uses several models to describe the bounds of projected climate change.

The results in this report are based on a subset of climate models selected from the Coupled Model Intercomparison Project 5 (CMIP5). The CMIP5 climate models were first screened to remove those that least accurately represented historical data, and from the remainder, an ensemble of 12 models was chosen to provide the widest range of projected change for a set of climate parameters.

Information from the large-scale global climate models was translated into predictions at regional scales using a procedure called downscaling. The model projections were downscaled to a 10 km grid by making use of a historical daily time series (ANUSPLIN) in conjunction with the climate model projections. A hybrid climate analogue/quantile mapping method was used for statistical downscaling (BCCAQ). Daily temperature and precipitation observations and

future projections at 10 km resolution were then draped over an 800 m grid (PRISM) of 1971–2000 average temperature or precipitation to generate high-resolution maps and data.

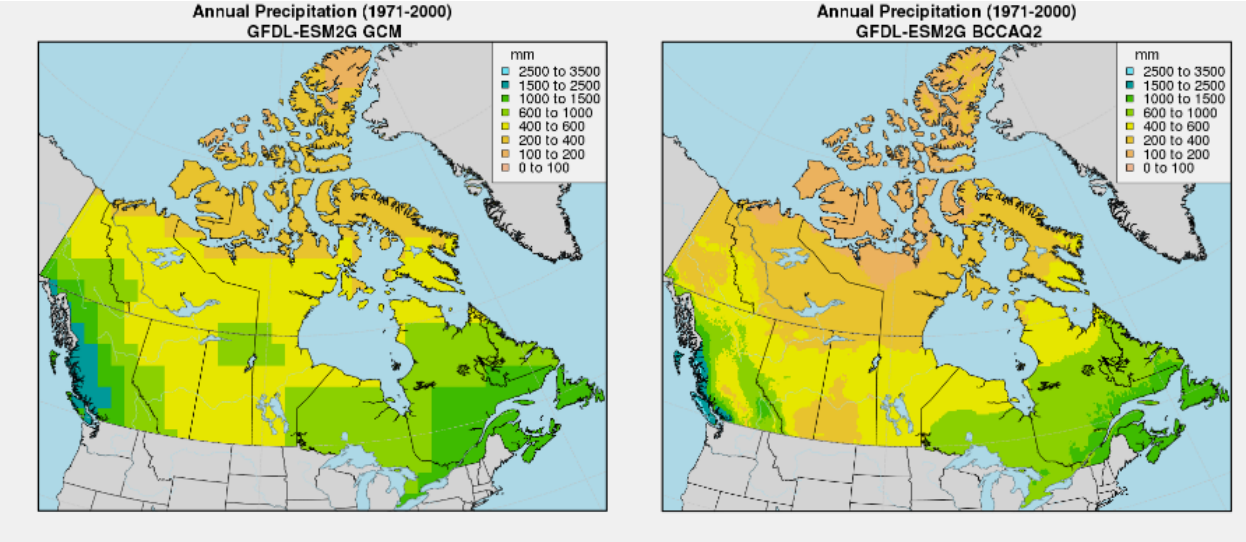


Figure 2: Example of Improved Resolution from Downscaling Climate Models

Indicator Derivation

The historical baseline period used for all indicators in the report is 1971–2000. Values are averaged over this 30-year period to smooth out annual variability. The future projections are for the 2020s, 2050s (which is an average of modelled values over the 2041–2070 period), and 2080s (averaged over the 2071–2100 period). The three RCP scenarios have somewhat similar GHG concentrations in the 2050s, but diverge considerably by the 2080s. Indicators of climate change take a similar divergent pattern by the 2080s.

Many of the indicators of extreme events used in this report are derived using the definitions recommended by the Expert Team on Climate Change Detection and Indices (ETCCDI), known as the CLIMDEX indices. The indicator names used in this report have been translated into plain language. Some indicators are defined by ETCCDI on a monthly basis only, such as TXx (monthly maximum daytime high temperature). In some cases, we consider seasonal and annual versions of CLIMDEX indices by taking the corresponding maximum (or minimum) from the highest (or lowest) month in that season or year. The values given as projected changes for the 2050s and 2080s in this report are the average values across all 12 models.

Sub-Regional Analysis

The higher elevations and rain shadow effect from the mountainous regions result in considerable variation in climatic conditions across our region. For example, the west coast of the region receives over three times the annual precipitation compared to the east coast. In order to account for sub-regional variation in climate change, projections for the various indicators have been summarized both for the region as a whole and for three sub-regions. Cases where the results for a particular indicator vary substantially from the regional average are noted in the analysis. These sub-regions were defined using watershed and sub-watershed boundaries to reflect efforts at watershed-based planning within the region. The three sub-regions are defined as follows (also see Figure 3: Sub-Regions):

- **Developed Area**: This sub-region includes the smaller, eastward-flowing watersheds and coastal benchland areas in which the majority of the region's population is located. For the larger Cowichan, Chemainus, and Koksilah River watersheds, only the lower sub-basins are included in this sub-region.

- **Water Supply Watersheds**: This sub-region includes the upper portion of the sub-basins for the Cowichan, Koksilah, and Chemainus River watersheds and consists mainly of resource lands within the privately managed forest landbase.

- **West Coast Watersheds**: This sub-region includes the very wet, west-flowing watersheds, which include a mix of parks and resource lands.

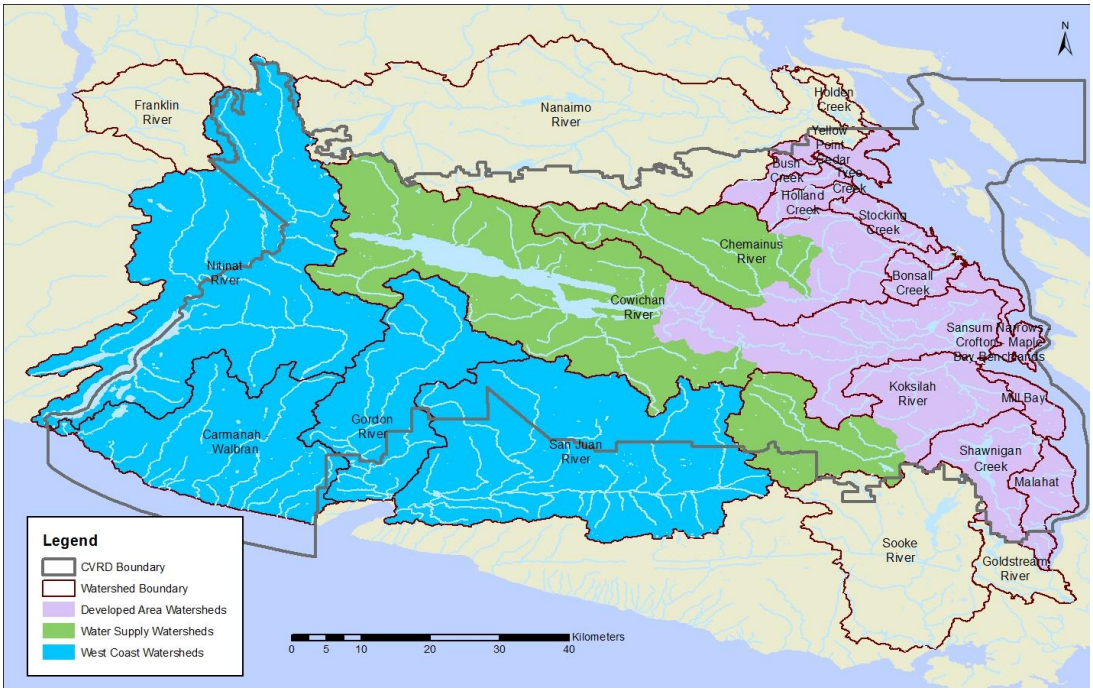


Figure 3: Sub-Regions

While this work provides projections at the regional and sub-regional level, future work will need to consider the impacts of projected climate change and the responses to those impacts at a much finer scale. Differences in hydrological, ecological, social, and other conditions at a watershed or sub-watershed level will play a significant role in determining the extent and nature of the impacts of the projected climate change and the appropriate adaptations to those impacts over time.

How to Read Figures

The following methods were used when developing the values shown in the tables, maps, and plots in this report:

- Values for each time period (past, 2050s, and 2080s) are averaged over each 30-year period. The 30-year period used to calculate past values is 1971–2000; the 2050s refer to 2041–2070, and the 2080s refer to 2071–2100.
- Seasons are presented as winter (December-January-February), spring (March-April-May), summer (June-July-August), and fall (September-October-November).
- In tables throughout the document, projected change is given for the **average** of the model ensemble along with the range (10th to 90th percentile) of the model ensemble. The 10th to 90th percentile range describes the uncertainty among the models and natural climate variability.

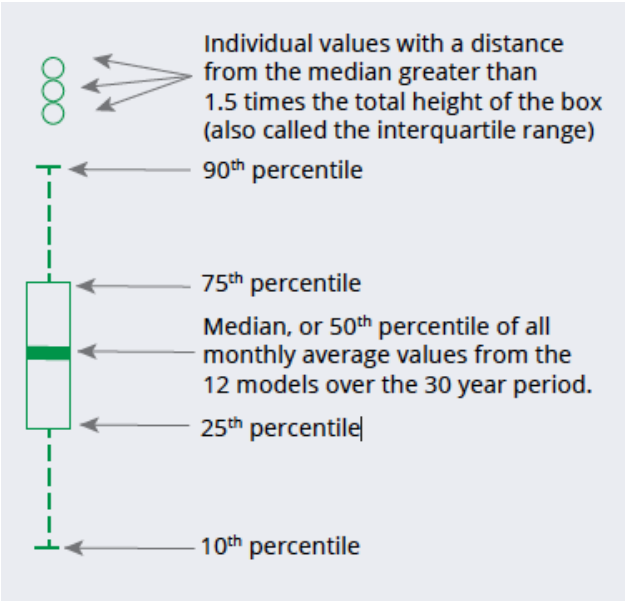
	Past (°C)	2050s Change (°C)	
		Average	(Range)
Winter	5	2.4	(1.3 to 3.0)
Spring	12	2.9	(1.7 to 4.7)

Average or mean of model ensemble

10th percentile of model ensemble

90th percentile of model ensemble

- Values in the tables (averages, ranges, percentiles, etc.) are provided for the region as a whole, as well as for the sub-regional geographies where relevant.
- Maps show only the average values of the model ensemble. Maps are provided in the body of the report when they add meaning to data interpretation, with additional maps for remaining indicators presented in Appendix 2.
- For the 1-in-20 events described in this report, the "5% chance of occurrence" is based on an average over each 30-year period. This means that, since climate change will occur throughout that time, there is slightly less than a 5% chance of such an event occurring at the beginning of the period and more than 5% chance at the end of the period, with an average 5% chance over the period.
- This report provides several box-and-whisker plots to illustrate year-to-year and model-to-model variability over time. The diagram below illustrates how these plots are to be interpreted.



A Note on Interpretation

This report tells the story of how we can expect temperature and precipitation to change in the Cowichan Valley region. When reviewing the data provided in the tables and figures below, it is important to note the following:

- The 10th to 90th percentile values projected by the ensemble models are important for adaptation planning, as they take into account the range of uncertainty when projecting future climate change. Risk managers may find it appropriate to consider 90th percentile values when planning critical infrastructure investments.
- For some indicators, values for specific geographic areas may be more appropriate than the regional or sub-regional averages presented in the tables. These values can be obtained by looking at the maps presented in the report body and in Appendix A, or utilizing the associated GIS files.

4 General Climate Projections

The Cowichan Valley Regional District is already seeing the impacts of climate change and can expect to see increased changes and interrelationships in the years to come. At a broad level, this will mean the following physical changes:

- Warmer temperatures
- Longer dry spells in summer months
- More precipitation in fall, winter, and spring
- A decrease in snowpack
- More intense extreme events

These changes will not always happen consistently over the region or over time because seasonal and annual variations will occur. For most variables, projected change appears somewhat different from the past by the 2050s, and by the 2080s, projections indicate substantial changes, resulting in a very different climate than in the Cowichan region of today. This is particularly true for the temperature-related variables.

This section of the report presents general projections for our region, and is followed by sections with more detailed climate indicators, including indices of extremes for precipitation, summer temperatures, and winter temperatures. Each section includes a definition of the indicator and a summary of projected values.

Warmer Temperatures

About this Indicator

Daytime high and **nighttime low** are averaged over each month, each season, or annually in the tables and plots below.

Projections

All models project that daytime high and nighttime low temperatures will rise. While temperature can be expected to increase year round, the greatest increases will occur in the summer months. By the 2050s, daytime high temperatures will be substantially warmer (an increase of 3.2°C) in summer. By the 2080s, we can expect summer daytime highs to increase by 5°C.

Nighttime lows are also projected to rise by approximately 4°C in all seasons by the 2050s. In winter, this will mean an average low of 3°C by the 2050s, compared to an average low of -0.6°C in the past, increasing to 4°C by the 2080s. Summer nighttime lows are also projected

to increase dramatically, from 9°C in the past to 13.5°C by the 2080s. These trends are also seen in each of the three sub-regions.

Maps indicate that warming is expected to be relatively uniform throughout the region, with the most warming expected in the valleys and low-lying areas. In the past, the average winter nighttime low temperature was below freezing. In future, only the highest elevations will experience nighttime lows below freezing.

Table 1: Regional Average Daytime High Temperature

	Past (°C)	2050s Change (°C)	2080s Change (°C)
Winter	5	2.4 (1.3 to 3.3)	4.4 (2.6 to 6.4)
Spring	11	2.7 (1.5 to 4.6)	4.3 (2.7 to 7.1)
Summer	19	3.2 (1.9 to 4.2)	5.2 (3.6 to 7.0)
Fall	12	2.6 (1.3 to 3.8)	4.2 (2.8 to 5.8)
Annual	12	2.7 (1.4 to 4.0)	4.5 (2.9 to 6.2)

Table 2: Regional Average Nighttime Low Temperature

	Past (°C)	2050s Change (°C)	2080s Change (°C)
Winter	-1	2.6 (1.6 to 3.2)	4.4 (3.2 to 5.3)
Spring	2	2.5 (1.7 to 3.6)	4.1 (2.8 to 5.8)
Summer	9	2.8 (1.7 to 4.0)	4.7 (3.4 to 6.5)
Fall	5	2.6 (1.6 to 3.7)	4.2 (2.8 to 5.6)
Annual	4	2.6 (1.6 to 3.6)	4.3 (3.0 to 5.8)

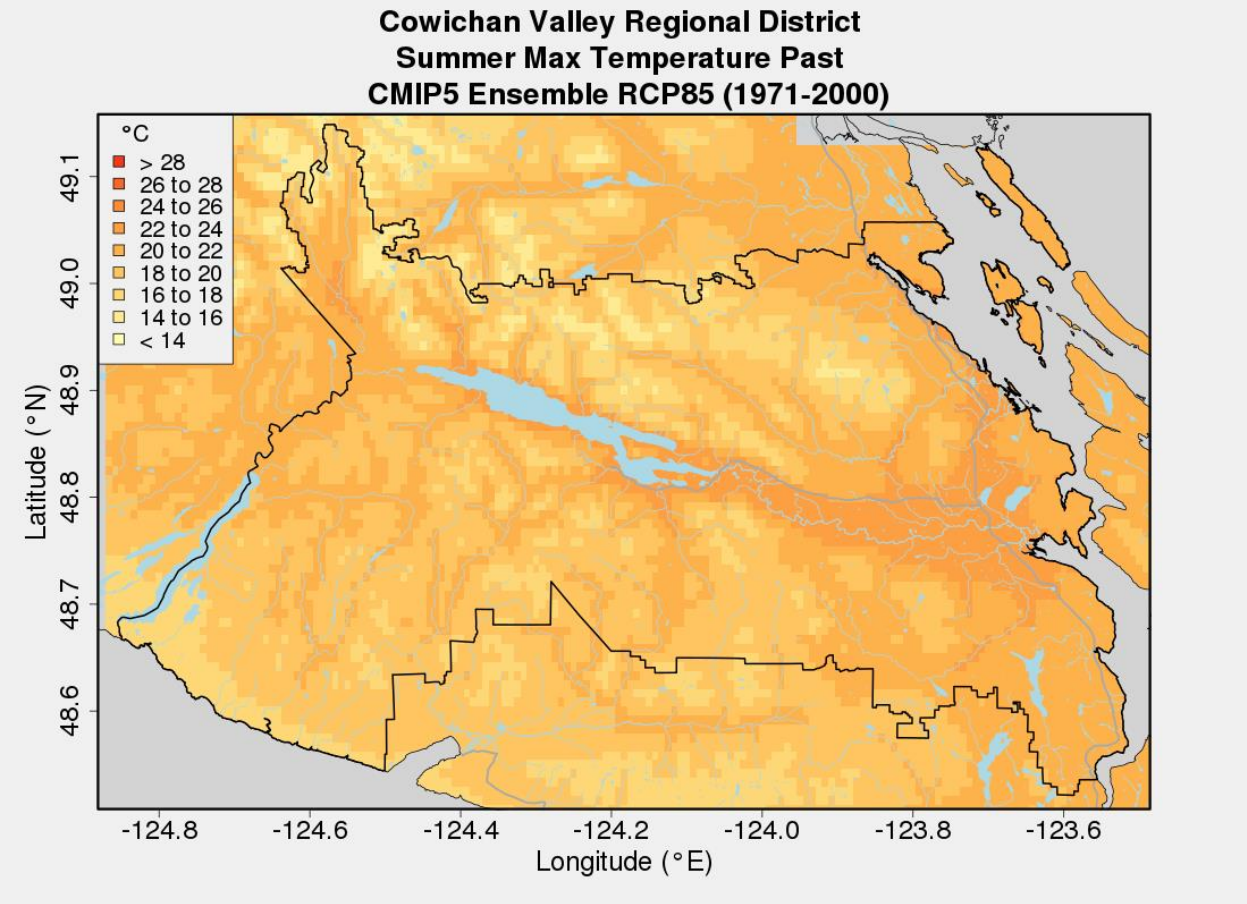


Figure 4: Summer Average Daytime High Temperature – Past

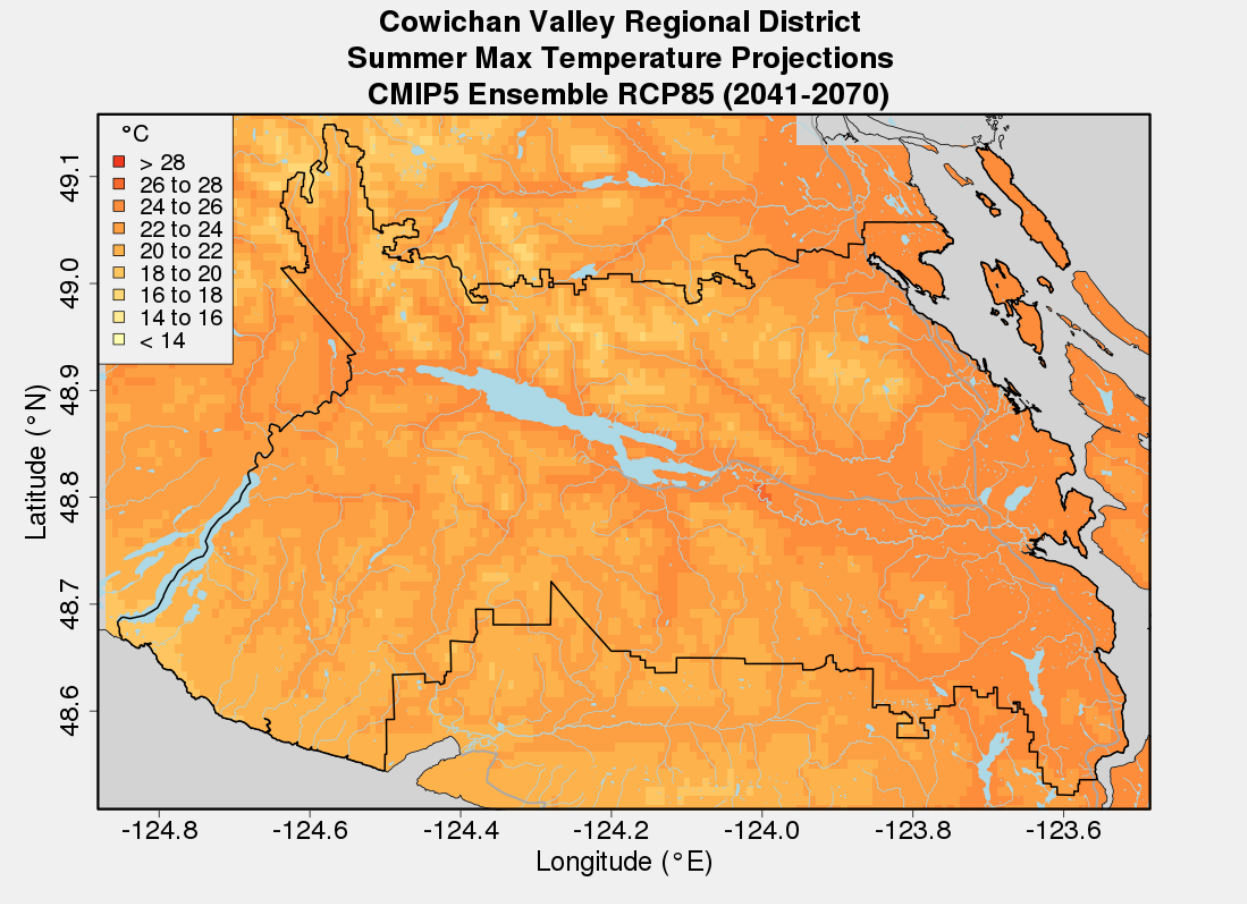


Figure 5: Summer Average Daytime High Temperature – Future (2050s)

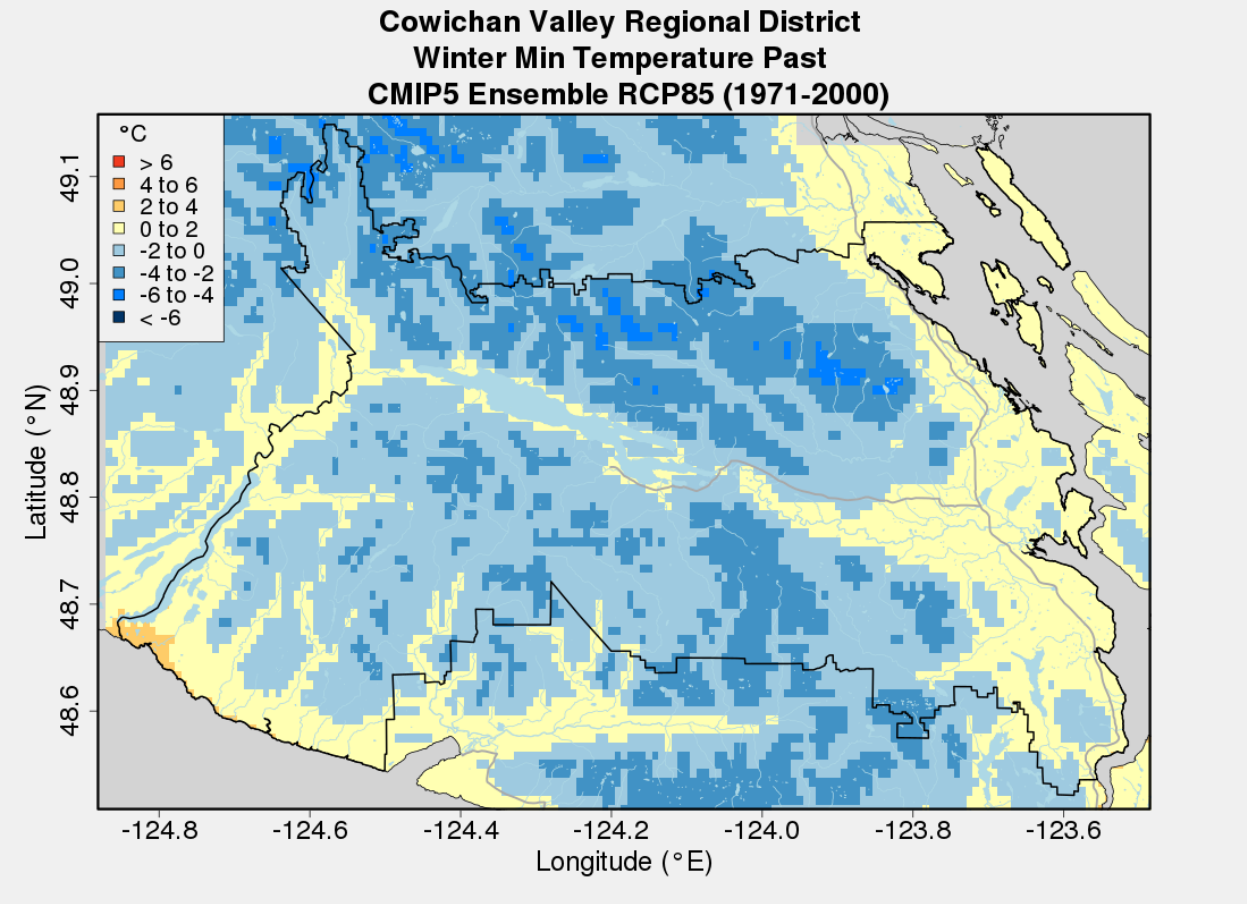


Figure 6: Winter Average Nighttime Low Temperature – Past

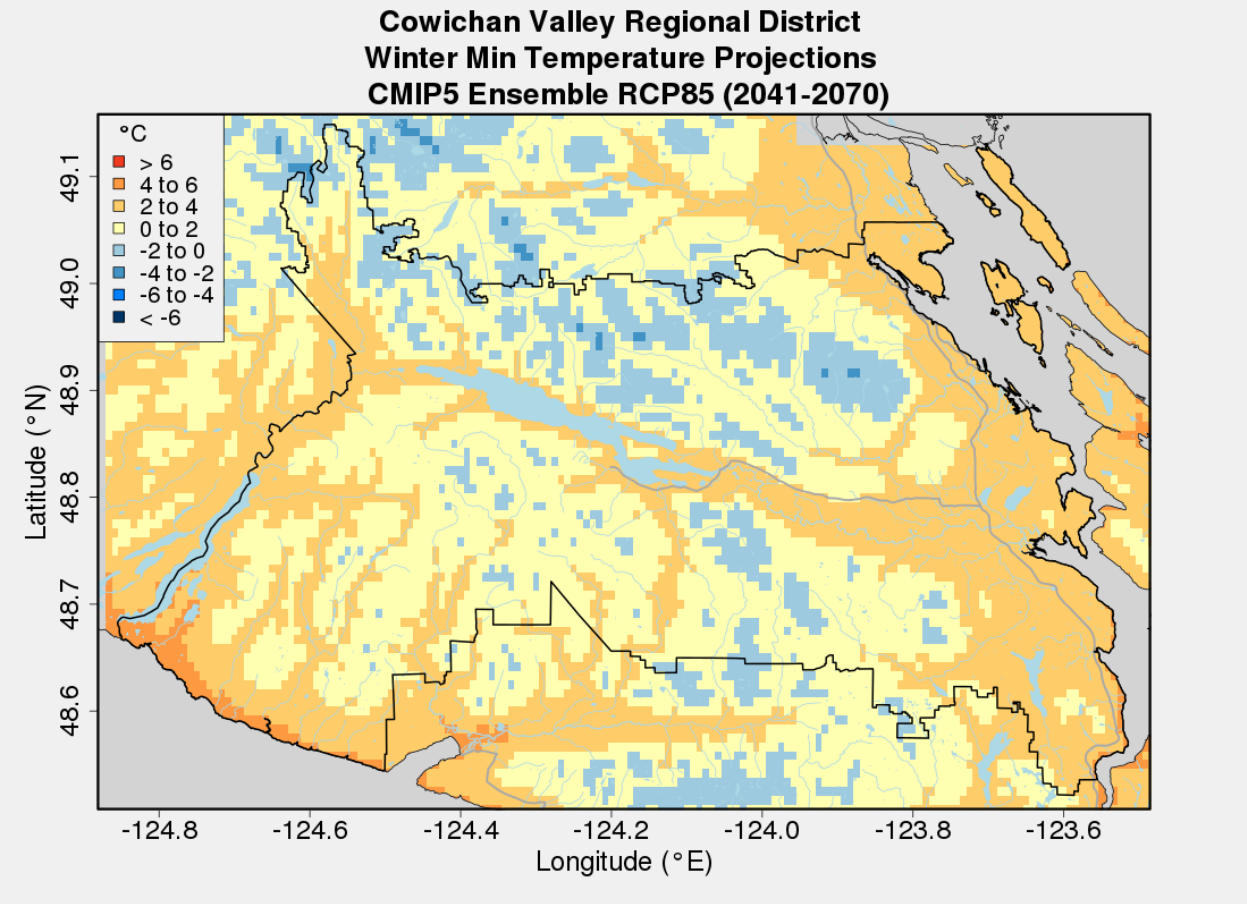


Figure 7: Winter Average Nighttime Low Temperature – Past

Seasonal Variability in Temperature

The box-and-whisker plots of monthly daytime high and nighttime low temperatures provide a comparison of the year-to-year variability in future to that experienced in the past. This shows that the new normal for the region may be very unlike the past.

The daytime high temperature plot shows that the median daytime high in the 2080s are projected to be hotter than the 90th percentile of warm days in the past in many months, with the most notable changes projected for July, August, and September. In the 2080s, most September temperatures can be expected to be hotter than past August temperatures. In the 2080s, January daytime highs are projected to be similar to past March temperatures.

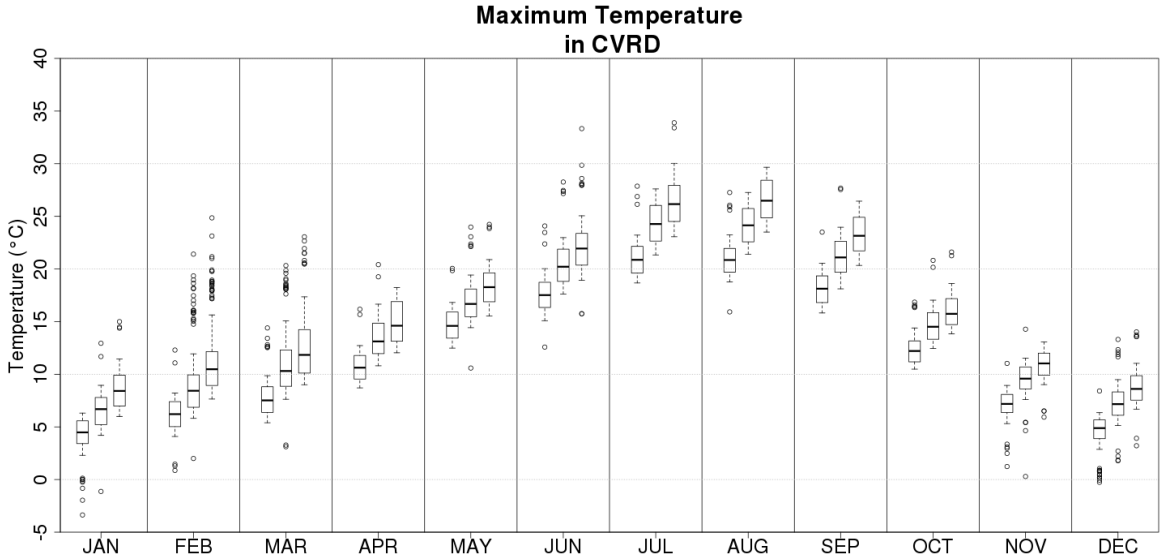


Figure 8: Monthly Daytime High Temperature – Past, 2050s, and 2080s

Boxes from left to right in each month indicate past, 2050s, 2080s. Further explanation of how to read the box-and-whisker plots is provided above in the Methodology section.

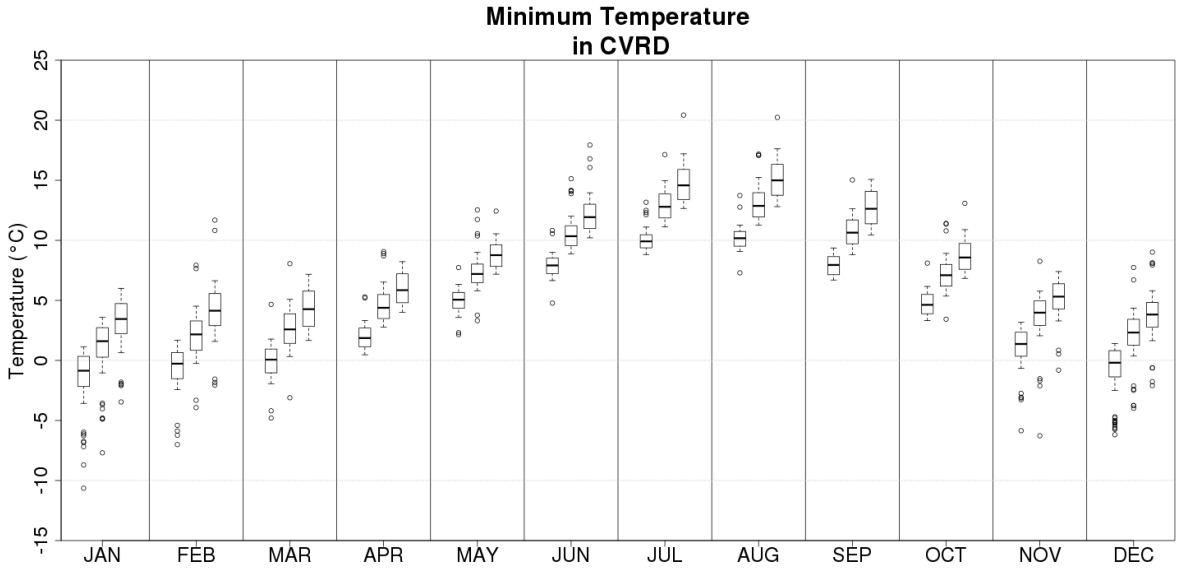


Figure 9: Monthly Nighttime Low Temperatures – Past, 2050s, and 2080s

Boxes from left to right in each month indicate past, 2050s, 2080s. Further explanation of how to read the box-and-whisker plots is provided above in the Methodology section.

Wetter Winters, Drier Summers

About this Indicator

Total precipitation is all precipitation summed over a month, season, or year, including rain and snow water equivalent. This is a high-level indicator of how precipitation patterns can expect to change.

Projections

Projections indicate that our region will experience a modest increase in total annual precipitation of 5% by the 2050s, and a more substantial increase of 11% by the 2080s. While these increases alone are not a dramatic departure from the past, the increase in precipitation is expected to be distributed unevenly over the seasons.

Most rain in our region falls over the winter months, and this is projected to continue to occur in the future. The largest percentage increase in rainfall is expected to occur in the fall season, increasing 11% by the 2050s, and 19% by the 2080s. Models indicate winter and spring precipitation will both increase as well. Summer, already our region's driest season, may experience a decline of 17% by the 2050s, and a decline of 26% by the 2080s. While the models indicate a range of possible change, they mostly agree about the direction of change for each season.

The main distinction between the regional and sub-regional numbers is that the baselines for precipitation are different. The percent changes are the same throughout the region.

Table 3: Total Precipitation Over Seasons in a Year

	Past (mm)	2050s (mm)	2080s (mm)	2050s Percent Change (%)		2080s Percent Change (%)	
Winter	818	856	932	5	(-2 to 11)	14	(2 to 26)
Spring	413	433	442	5	(-6 to 13)	7	(-5 to 17)
Summer	158	131	117	-17	(-41 to 2)	-26	(-49 to -6)
Fall	612	676	727	11	(-3 to 25)	19	(6 to 38)
Annual	2028	2124	2250	5	(1 to 10)	11	(2 to 16)

By the 2080s, summer precipitation in the Water Supply Watersheads are expected to be similar to summer precipitation in the Developed Area today. Conversely, by the 2080s, winter precipitation in the Water Supply Watersheds will look like winter precipitation in the West Coast Watersheds today. This is important when planning for stormwater management and flood control.

Table 4: Sub-Regional Seasonal Precipitation

	Developed Area			Water Supply Watersheds			West Coast Watersheds		
	Past (mm)	2050s change (mm)	2080s change (mm)	Past (mm)	2050s change (mm)	2080s change (mm)	Past (mm)	2050s change (mm)	2080s change mm)
Winter	612	27 (-14 to 68)	88 (12 to 163)	857	40 (-21 to 93)	119 (17 to 221)	968	47 (-24 to 101)	136 (20 to 248)
Spring	279	16 (-17 to 40)	24 (-11 to 60)	435	21 (-25 to 55)	31 (-19 to 76)	506	23 (-27 to 63)	33 (-27 to 81)
Summer	109	-20 (-44 to 3)	-29 (-56 to -5)	169	-30 (-67 to 3)	45 (-84 to -12)	186	-31 (-74 to 6)	-47 (-91 to -11)
Fall	429	48 (-20 to 11)	89 (32 to 174)	649	67 (-20 to 158)	121 (40 to 236)	736	75 (-19 to 181)	134 (46 to 258)
Annual	1514	74 (-10 to 148)	179 (42 to 264)	2126	102 (11 to 220)	234 (53 to 333)	2403	115 (20 to 262)	257 (52 to 358)

The maps below show the amount of precipitation projected, and indicate that the wetter areas are expected to experience the largest increases in precipitation.

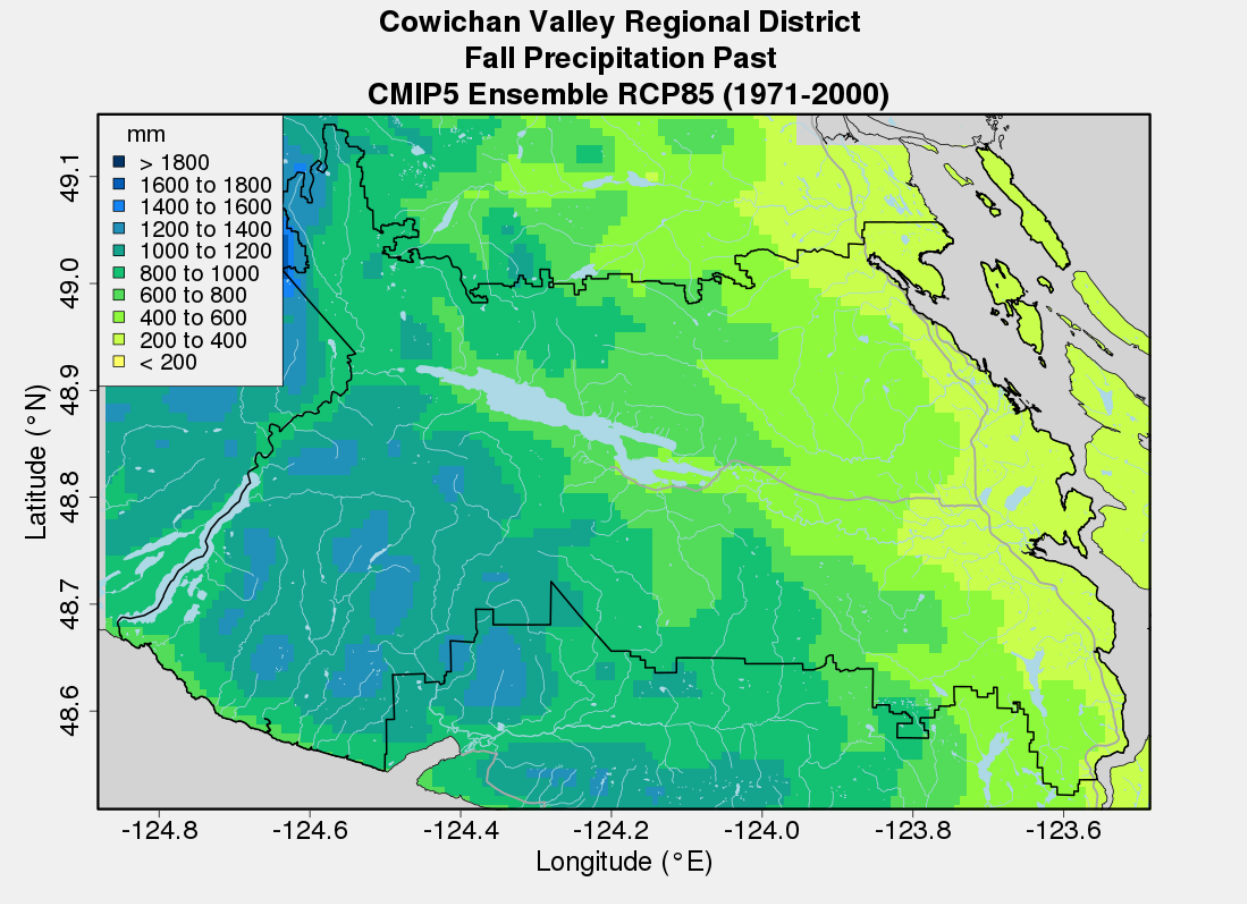


Figure 10: Fall Precipitation – Past

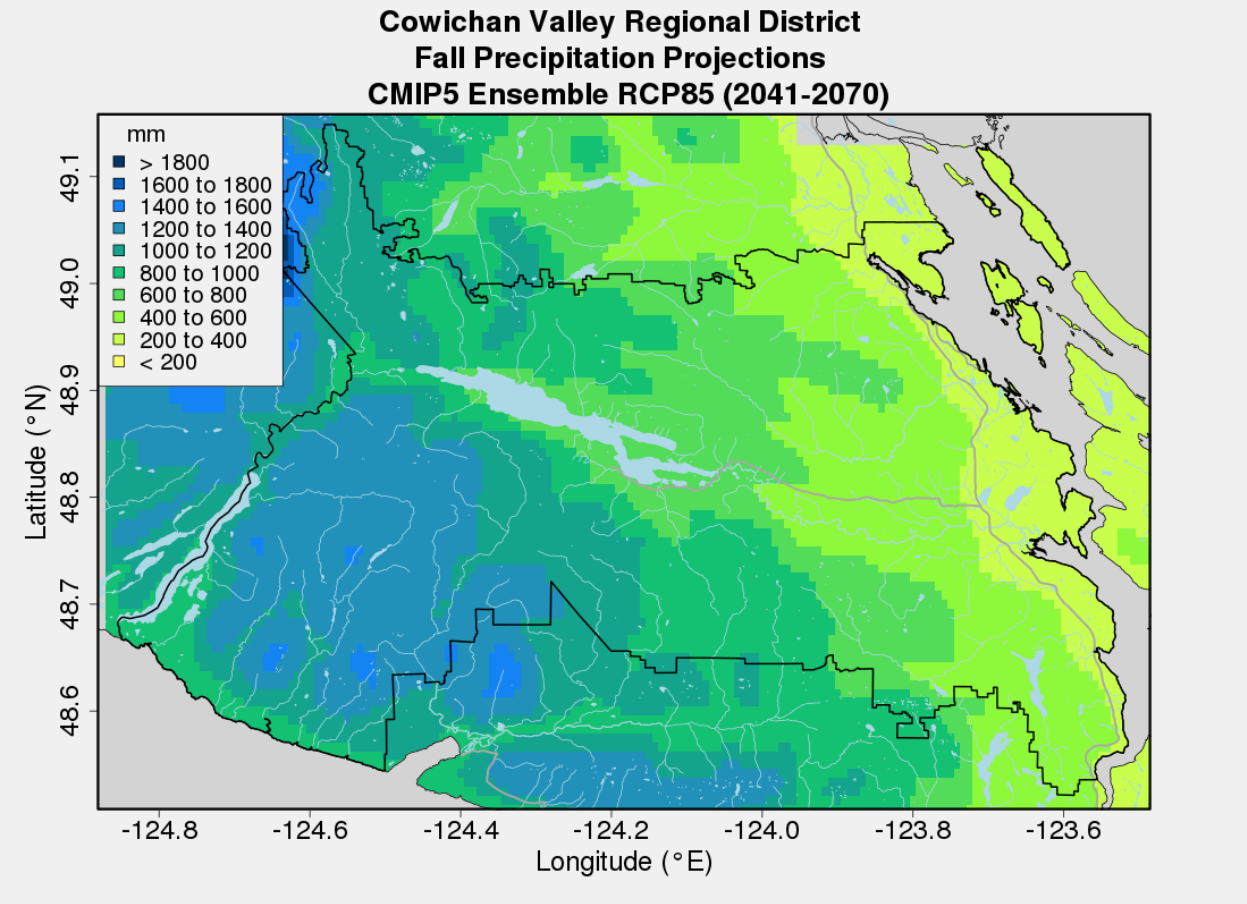


Figure 11: Fall Precipitation – Future (2050s)

Seasonal Variablility in Precipitation

When examining monthly precipitation values in the plot below, we see that the increases within a season are not uniform across months. For example October, November, and December show the largest precipitation increases in both absolute and relative terms. The plot also indicates the potential for drier summer months in the future. September is projected to get drier over time, extending the dry season into fall.

The models illustrate that we can expect more precipitation in the already wet seasons, less precipitation in already dry summers, and considerably more rain falling in some years, while other years will experience droughts.

In southwestern BC, year-to-year precipitation variability is modulated by the Pacific Decadal Oscillation (PDO), which has varied between warm and cool phases a few times over the last century. As well, the El Niño-Southern Oscillation (ENSO) varies between three phases: neutral

years, El Niño events that typically mean a warmer and drier winter and spring, and La Niña events that are cooler and wetter.

The magnitude of the natural variability of PDO and ENSO cycles is comparable to the projected changes due to climate change in some cases. However, because future projections are based on the ensemble of 12 model runs, and the timing of modes of natural variability will differ between the runs, the effects of ENSO and PDO can generally be assumed to be averaged out over the 30-year periods analyzed. Looking at the ranges of yearly results in box-and-whisker plots below can tell us about the year-to-year variability in the future projections. As natural variability will still exist in future and projected changes are superimposed on variability, individual events that are more intense than those experienced in the past are expected occur.

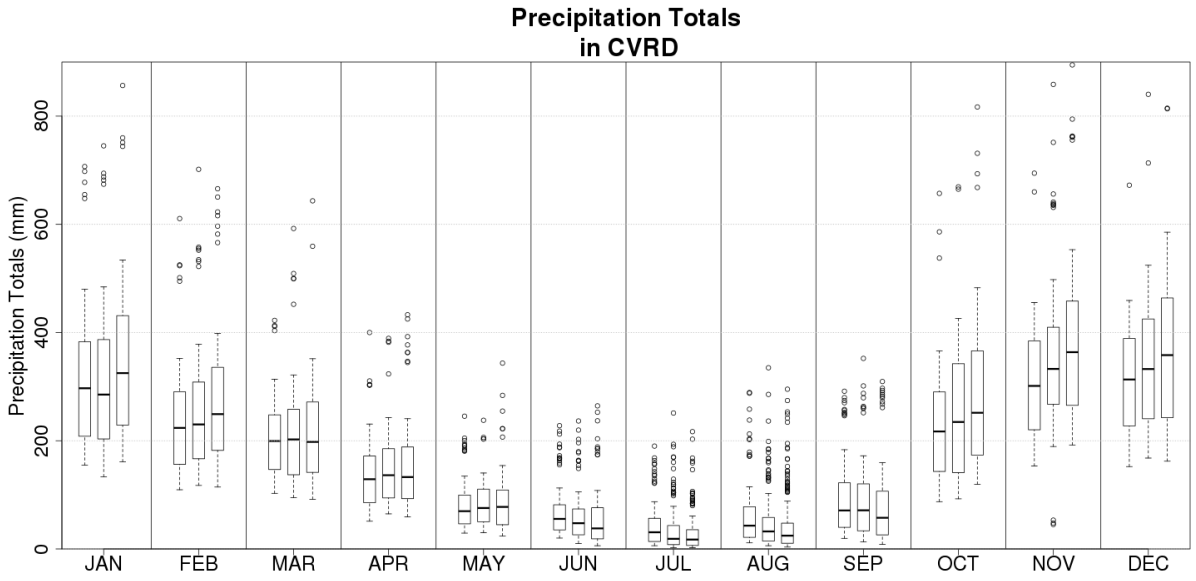


Figure 12: Monthly Total Precipitation – Past, 2050s, and 2080s

Boxes from left to right in each month indicate past, 2050s, 2080s. Further explanation of how to read the box-and-whisker plots is provided above in the Methodology section.

5 Precipitation Indicators

Our region's drinking water, as well as water for industry and agriculture, comes from a variety of sources including lakes, rivers, and groundwater. Some utilities in the region have reservoirs, but these are small and have limited capacity for additional storage. Changes in precipitation patterns will have impacts on surface water availability, lake and river system levels, and ultimately on groundwater resources. Changes in precipitation will also have impacts on water quality, both in winter due to increasing sedimentation, and in summer due to algal events driven by water temperature and levels.

The majority of the region outside of municipal boundaries relies on natural drainage infrastructure (wetlands, watercourses, and floodplains) to withstand extreme weather events. The region's network of roads and drainage systems, operated by the provincial Ministry of Transportation and Infrastructure (MOTI) and the municipalities, was designed to withstand past rainfall patterns. For each degree the climate warms, 7% more moisture is held in the atmosphere and released during precipitation events, resulting in more intense future storm events. Also, with changing global climate patterns, weather systems like atmospheric rivers are likely to stall on the coast and, when combined with an increased precipitation intensity, we can expect to see much longer and more intense storm events coming off the Pacific in the future. During these events, new thresholds for extreme weather events are likely to challenge the capacity of the regional sewerage and drainage infrastructure currently in place.[1]

Dry Spells

About this Indicator

Dry spells is a measure of the number of consecutive days where daily precipitation is less than 1 mm. The value denotes the longest stretch of dry days in a year, typically in summer. This indicator reflects times of the year when watersheds/water resources are not recharged by rainfall.

Projections

The past average longest period of consecutive days without rain (under 1 mm) in our region is 22 days. Dry spells on average are expected to increase to 26 days by the 2050s, and 29 days by the 2080s. Sub-regional trends align with regional trends.

[1] For more information, see https://www.pacificclimate.org/sites/default/files/publications/Atmospheric%20Report%20Final%20Revised.pdf

Table 5: Annual Dry Spells

Consecutive dry days	Past (days)	2050s (days)	2080s (days)	2050s Percent Change (%)	2080s Percent Change (%)
Regional	22	26	29	20 (4 to 36)	32 (16 to 48)

Single-Day Maximum

Single-day maximum precipitation describes the largest amount of rain that falls on any single day in the year.

Projections

As noted previously in the General Climate Projections section, a modest increase (5%) in total annual precipitation is expected by the 2050s. Models project that the increase will be concentrated into the wettest days. The wettest single day of the year is expected to see 17% more rain by the 2050s, and 30% more by the 2080s. The percent changes are similar across the sub-regions. Like the general precipitation numbers, the baseline values for single-day maximum precipitation in the sub-regions are different, while the future trends are in line with regional averages.

5-Day Maximum

About this Indicator

5-day maximum precipitation (Rx5day) describes the largest amount of rain that falls over a period of 5 consecutive days in the year.

Projections

Again, as noted earlier, a modest increase (5%) in total annual precipitation is expected by the 2050s, with models projecting the increase will be concentrated into the wettest days. The amount of rain in the wettest 5-day period is projected to increase by 10% by the 2050s, and 23% by the 2080s. Sub-regional trends are in line with the regional projections.

95th-Percentile Wettest Days

About this Indicator

The **95th-percentile wettest days** precipitation indicator points to the total amount of rain that falls on the wettest days of the year, specifically on days when precipitation exceeds a threshold set by the annual 95th percentile of wet days during the baseline period (1971–2000).

This measure indicates how much total annual precipitation falls during these heavy events, which is a combination of both how often these events occur and the size of these events.

Projections

The wettest periods in our region are projected to become wetter. The wettest days that exceed the baseline 95th-percentile threshold are projected to produce 30% more rain by the 2050s, and **52% more rain by the 2080s**. Most of this increase in rain is due to those heavy rain days becoming more frequent in the future. Sub-regional trends are in line with the regional projections.

99th-Percentile Wettest Days

About this Indicator

The **99th-percentile wettest days** precipitation indicator points to the total amount of rain that falls on the wettest days of the year, specifically on days when precipitation exceeds a threshold set by the annual 99th percentile of wet days during the baseline period (1971–2000). This measure indicates how much total annual precipitation falls during these heavy events, which is a combination of both how often these events occur and the size of these events.

Projections

More precipitation is expected to fall during the 99th-percentile wettest days extreme storm events in the future. Larger 99th-percentile wettest days events could mean up to 65% more rain by the 2050s, and 120% by the 2080s. In the past, on average, 305mm of precipitation fell during the entire month of January (see Figure 12). By the 2080s, there will be a 5% chance that this amount of rain could fall during a 99th-percentile wettest days event. These projected large increases mean that we can expect more frequent and more intense storms in the future, with more rain falling during extreme downpours. Sub-regional trends are in line with the regional projections.

1-in-20 Wettest Day

About this Indicator

The **1-in-20 wettest day** is the day so wet that it has only a 1-in-20 chance of occurring in a given year. That is, there is a 5% chance in any year that a 1-day rainfall event of this magnitude will occur. This indicator is useful when planning for future infrastructure and forest production.

Projections

More precipitation is expected to fall during the 1-in-20 (or 5% chance) wettest day extreme storm events in the future. Larger 1-in-20 wettest day events could mean up to 20% more rain by the 2050s, and about the same by the 2080s. The percent change between the 2050s and

the 2080s is modest because the variability in precipitation year-to-year is so large. That is, some years can be three times wetter than an average year, and some three times drier. Sub-regional projections indicate that the wetter areas will become increasingly wetter over time, and indicate we should expect year-to-year variability in precipitation levels.

Table 6: Extreme Precipitation

	Past (mm)	2050s Percent Change (%)	2080s Percent Change (%)
Single-day maximum precipitation	75	17 (4 to 28)	30 (10 to 40)
5-day maximum precipitation	177	10 (3 to 20)	23 (8 to 33)
95th-percentile wettest days precipitation	448	30 (9 to 57)	57 (36 to 81)
99th-percentile wettest days precipitation	134	65 (26 to 107)	120 (59 to 161)
1-in-20 wettest day	112	20 (0 to 40)	18 (-1 to 44)

Table 7: Extreme Precipitation in the Sub-Regions

	Developed Areas			Water Supply Watersheds			West Coast Watersheds		
	Past (mm)	2050s change (mm)	2080s change (mm)	Past (mm)	2050s change (mm)	2080s change (mm)	Past (mm)	2050s change (mm)	2080s change (mm)
Single-day maximum precipitation	61	10 (2 to 19)	18 (6 to 28)	79	14 (2 to 24)	24 (8 to 35)	87	15 (4 to 26)	25 (11 to 34)
5-day maximum precipitation	139	14 (5 to 29)	33 (8 to 47)	186	20 (4 to 37)	43 (14 to 60)	206	22 (7 to 38)	45 (20 to 65)
95th-percentile wettest days precipitation	329	96 (16 to 185)	193 (129 to 277)	471	139 (44 to 263)	265 (168 to 371)	536	158 (54 to 296)	297 (201 to 410)
99th-percentile wettest days precipitation	100	63 (26 to 105)	123 (59 to 182)	141	87 (38 to 144)	166 (92 to 219)	158	101 (50 to 163)	183 (107 to 231)
1-in-20 wettest day precipitation	95	23 (8 to 41)	34 (13 to 52)	118	38 (11 to 59)	49 (27-70)	128	42 (21 to 60)	48 (30 to 69)

6 Summer Temperature Indicators

The downscaled outputs from the climate models project increases in average summer (June-July-August) daytime high temperatures. While warmer temperatures may have benefits and be welcomed in some ways, they will also need careful consideration when planning for a growing population in the region. Descriptions of these indicators are offered below, and values for these projections are given in Table 8: Hot Summer Indicators. Sub-regional numbers illustrate that temperatures are generally warmer in the Developed Areas, and cooler in the West Coast Watersheds, while projected changes are relatively uniform across the region. Sub-regional values are given in Table 9: Hot Summers in the Sub-Regions. These indicators are useful when planning for agriculture, and for understanding how ecological systems will change over time, including fish productivity and plant growth.

Summer Days

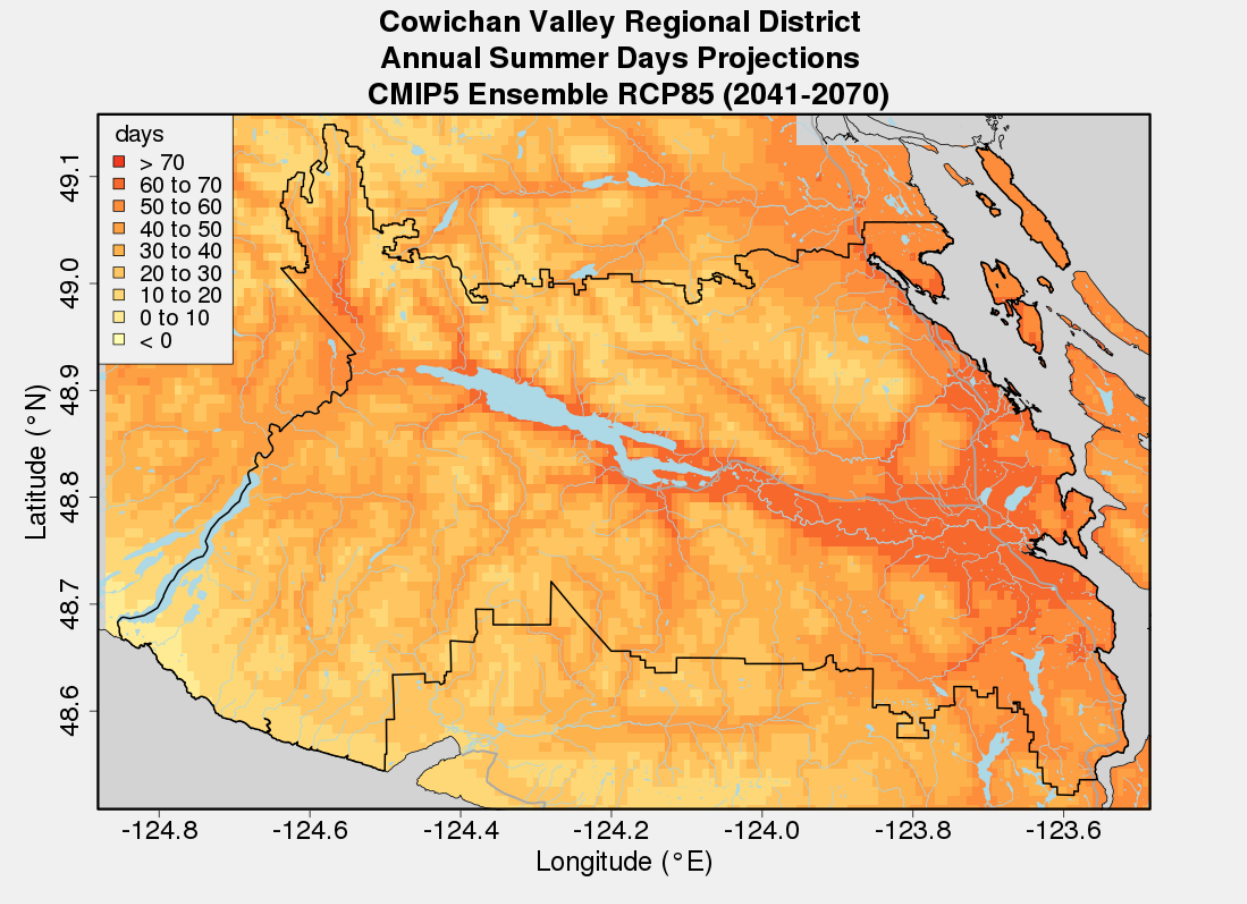
About this Indicator

Summer days tells us how many days reach temperatures over 25°C in any one year. This measure indicates how often we can expect "summer weather" to occur in the future.

Projections

In the past, our region experienced 16 summer days a year, and we can expect significantly more summer days in the future. Models project more than double the number of summer days by the 2050s, and more than triple by the 2080s. This means that future summers may have 39 days above 25°C by the 2050s, and 59 days by the 2080s. The Developed Area, where the majority of the population is concentrated, experienced 23 summer days in the past. By the 2050s, 54 summer days a year are projected, and 78 by the 2080s. This marks a significant change from the past.

The map for summer days included below shows that the number of hot days are projected to be highest in the eastern reaches of our region, with the greatest changes in the Developed Area with the most population that already experiences warmer temperatures.



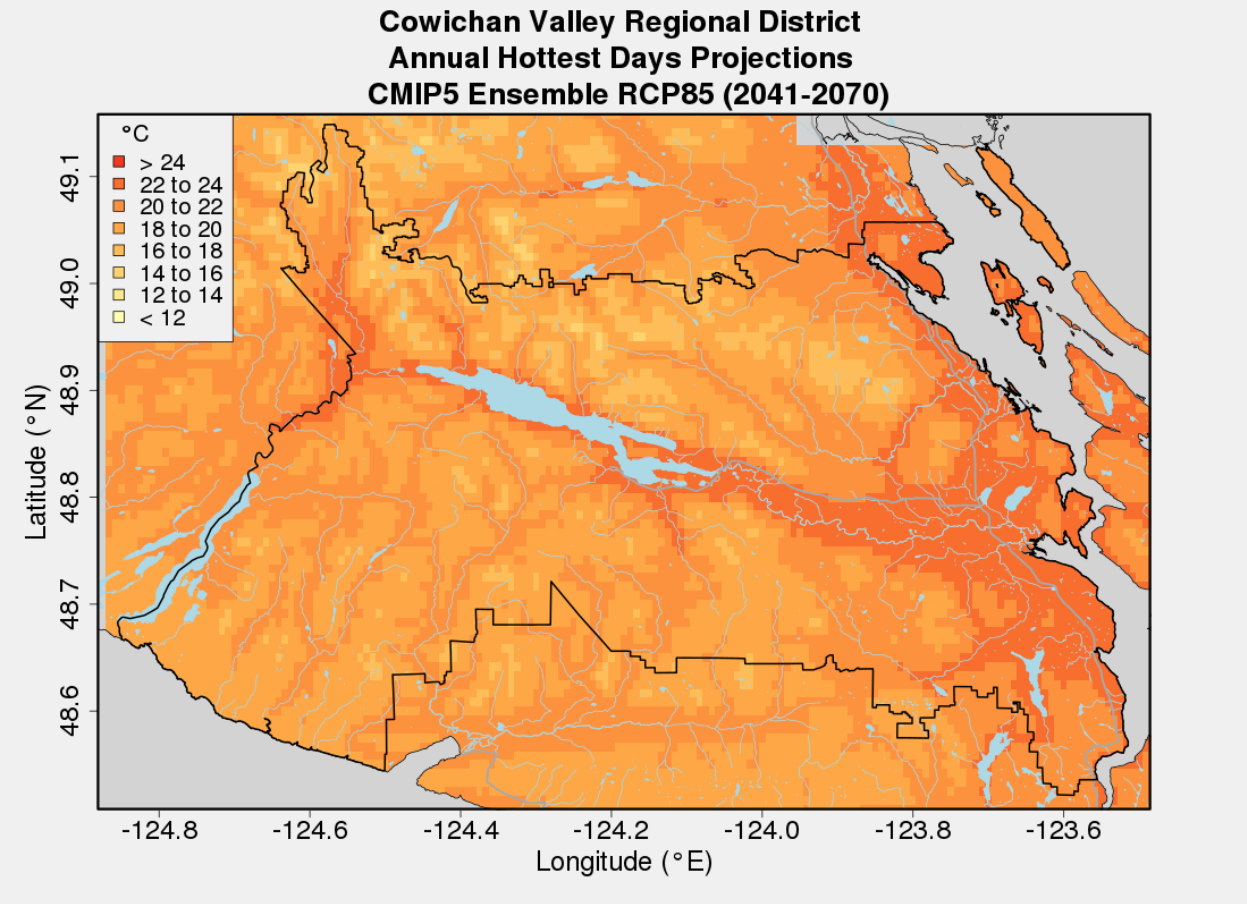
Hottest Day

About this Indicator

Hottest day refers to the highest daytime high temperature of the year, usually experienced during the summer months. The annual high for each year is an indicator of extreme temperatures and is averaged over a 30-year period.

Projections

The past hottest day temperature was 30°C for the region. We can expect increases to about 33°C by the 2050s, and to 35°C by the 2080s. Like summer days (shown above) the highest increases can be expected in our region's Developed Area. An increase in hottest day temperatures is projected to cause approximately one week of tropical nights (nights when temperatures do not decrease below 25°C) in the future. These warming trends are similar in the sub-regions.



1-in-20 Hottest Day

About this Indicator

1-in-20 hottest day refers to the day so hot that it has only a one-in-twenty chance of occurring in a given year. That is, there is a 5% chance in any year that temperatures could reach this magnitude.

Projections

As temperatures increase, so will extreme heat events. Our past 1-in-20 hottest day temperature is 33°C. By the 2050s we can expect this value to increase to 35°C, and to 36°C by the 2080s. In low-lying areas where the population is centered, like Duncan, we can expect 1-in-20 hottest day temperatures to rise by 4°C to 37°C by the 2050s, and to 41°C by the 2080s. This is a significant departure from what the region is accustomed to experiencing.

The 1-in-20 hottest day temperatures are projected to affect the entire region, and like other hot summer indicators, are mostly likely to affect valleys and eastern reaches.

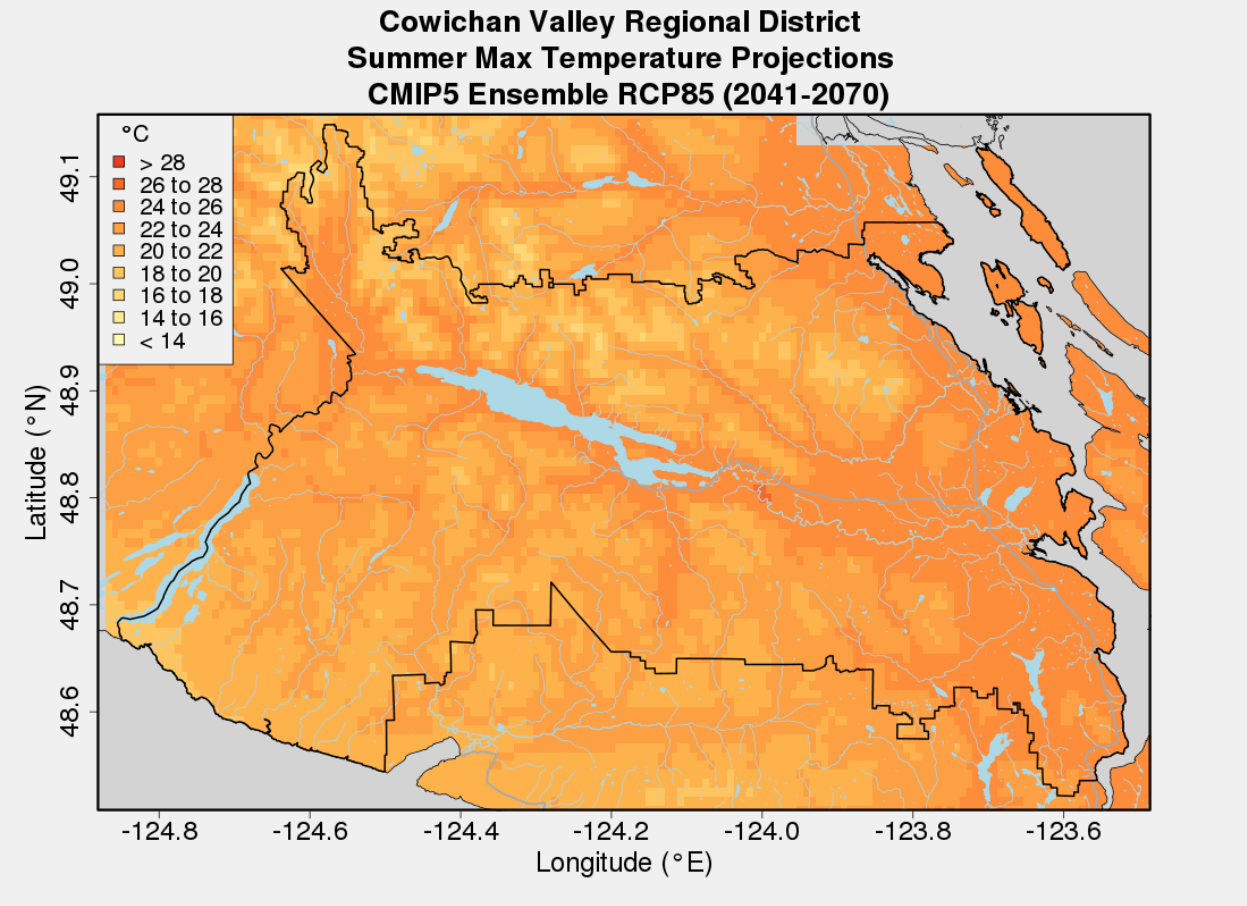


Table 8: Hot Summer Indicators – Regional Averages

	Past (days)	2050s (days)	2080s (days)	2050s Change (days)	2080s Change (days)
Summer days (# of days >25°C)	16	39	59	23 (15 to 32)	43 (28 to 62)
	Past (°C)	**2050s (°C)**	**2080s (°C)**	**2050s Change (°C)**	**2080s Change (°C)**
Hottest daytime high (°C)	30	33	35	3.3 (2.0 to 4.0)	5.5 (3.9 to 7.2)
1-in-20 hottest daytime high (°C)	33	35	36	2.1 (0.2-3.3)	2.6 (0.1 to 4.1)

Table 9: Hot Summers in the Sub-Regions

	Developed Area			Water Supply Watersheds			West Coast Watersheds		
	Past (days)	2050s Change (days)	2080s Change (days)	Past (days)	2050s Change (days)	2080s Change (days)	Past (days)	2050s Change (days)	2080s Change (days)
Summer days (# of days >25°C)	23	31 (19 to 42)	55 (35 to 78)	16	21 (13 to 30)	40 (27 to 57)	10	18 (11 to 26)	36 (25 to 48)
	Past (°C)	2050s (°C)	2080s (°C)	Past (°C)	2050s (°C)	2080s (°C)	Past (°C)	2050s (°C)	2080s (°C)
Hottest daytime high (°C)	31	3.5 (2.2 to 4.4)	5.7 (3.9 to 7.7)	30	3.3 (2.0 to 4.0)	5.5 (3.9 to 7.3)	29	3.1 (1.9 to 3.6)	5.2 (3.8 to 6.7)
1-in-20 hottest daytime high (°C)	34	4.3 (2.6 to 5.8)	6.3 (4.3 to 8.6)	33	4.2 (2.8 to 5.3)	6.0 (4.3 to 8.1)	33	3.8 (2.5 to 4.7)	5.6 (3.8 to 7.0)

Cooling Degree Days

About this Indicator

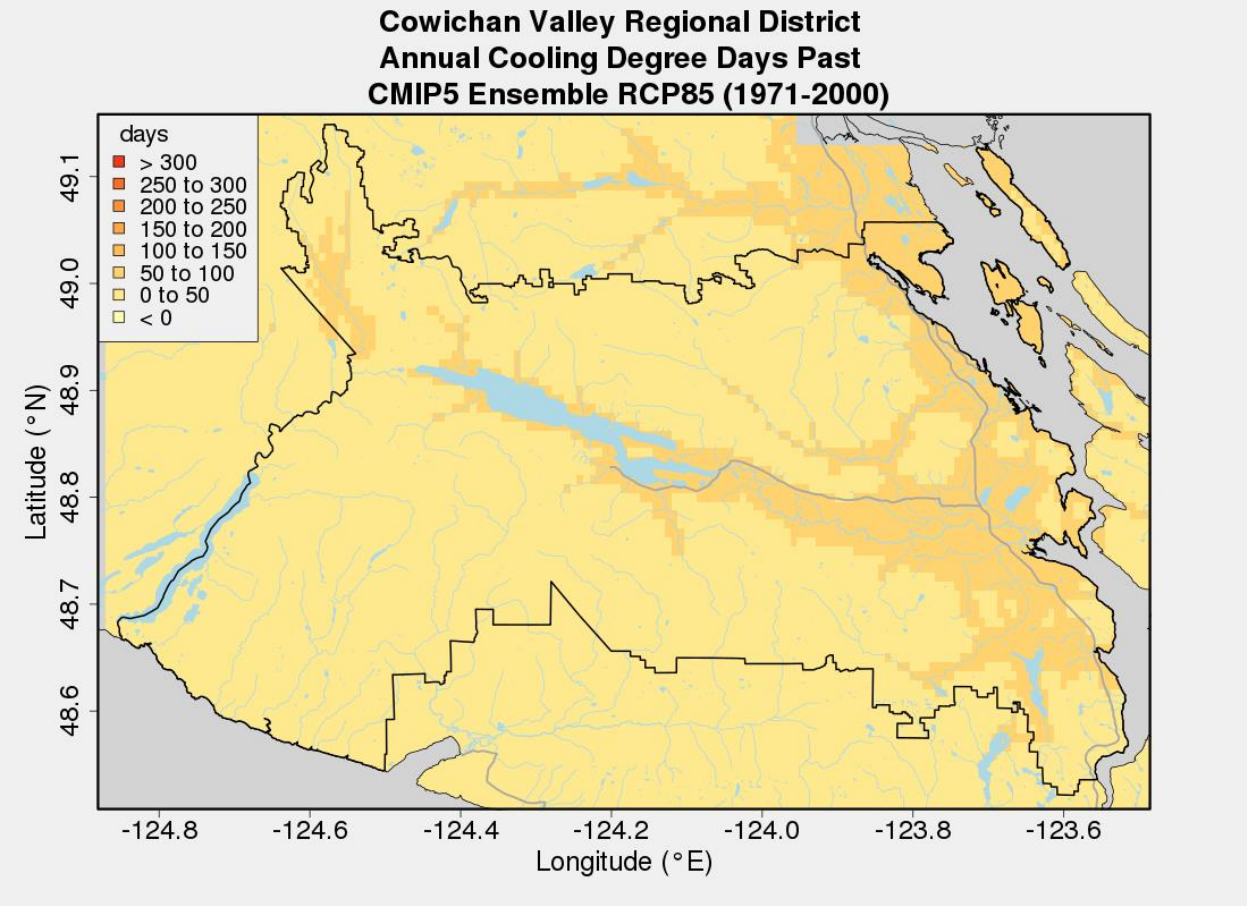
Cooling degree days refers to the number of degrees that a day's average temperature is above 18°C, and is used to estimate the use of air conditioning to cool buildings. To determine the number of cooling degree days in a month, the number of degrees that the daily temperature is over 18°C for each day is added to give a total value.

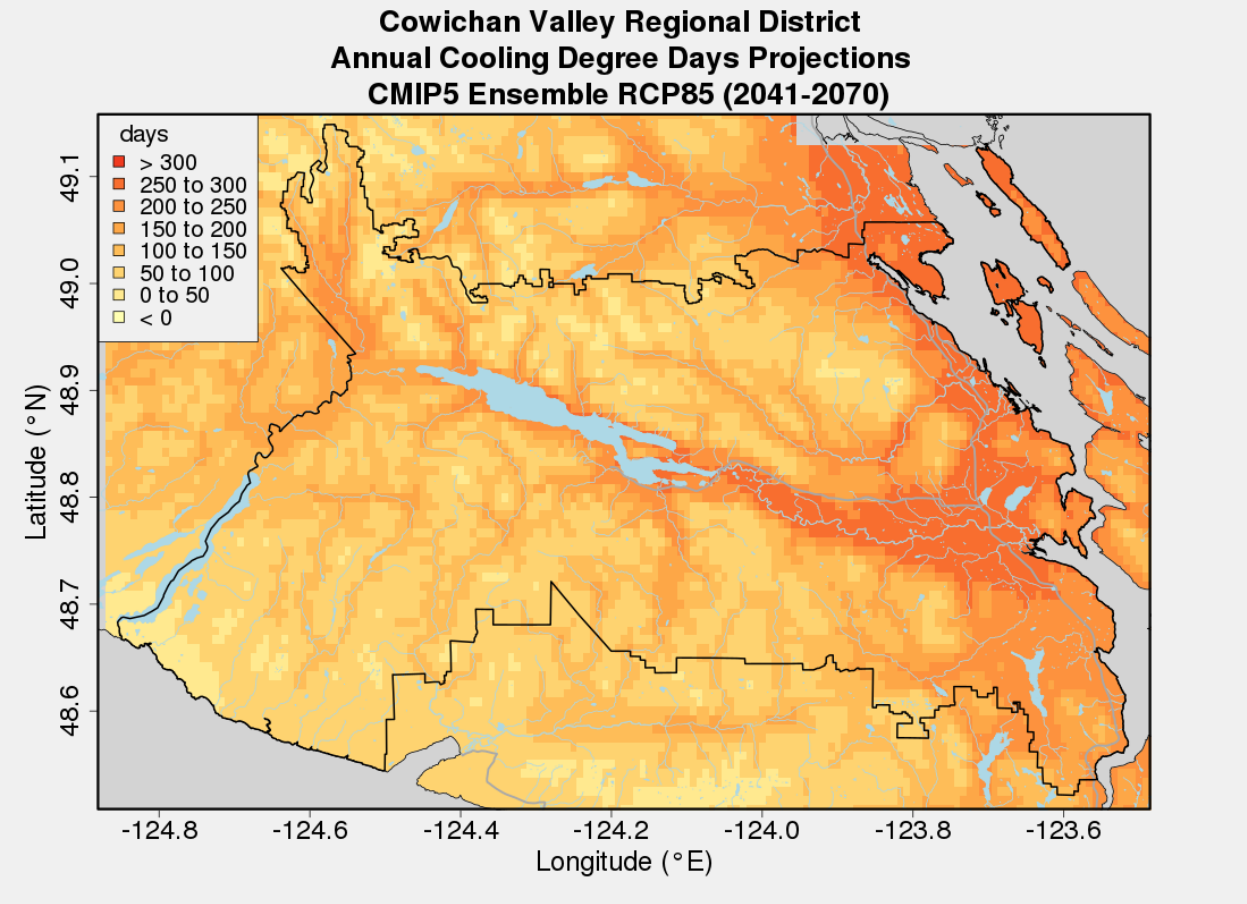
Projections

Historically there has been very little demand for cooling in the developed areas of our region. This is reflected in the baseline average of 47 cooling degree days in the past. In the future it is projected that there will be a 342% increase in cooling degree days by the 2050s, and a 720% increase by the 2080s. The large relative increases are partly due to a low historical baseline. Regional trends are in line with Developed Area projections.

Table 10: Cooling Degree Days

	Past (Degree days)	2050s (Degree days)	2080s (Degree days)	2050s Change (%)		2080s Change (%)	
Region	28	136	272	387	(213 to 575)	868	(512 to 1387)
Developed Areas	47	208	387	342	(198 to 515)	720	(439 to 1172)





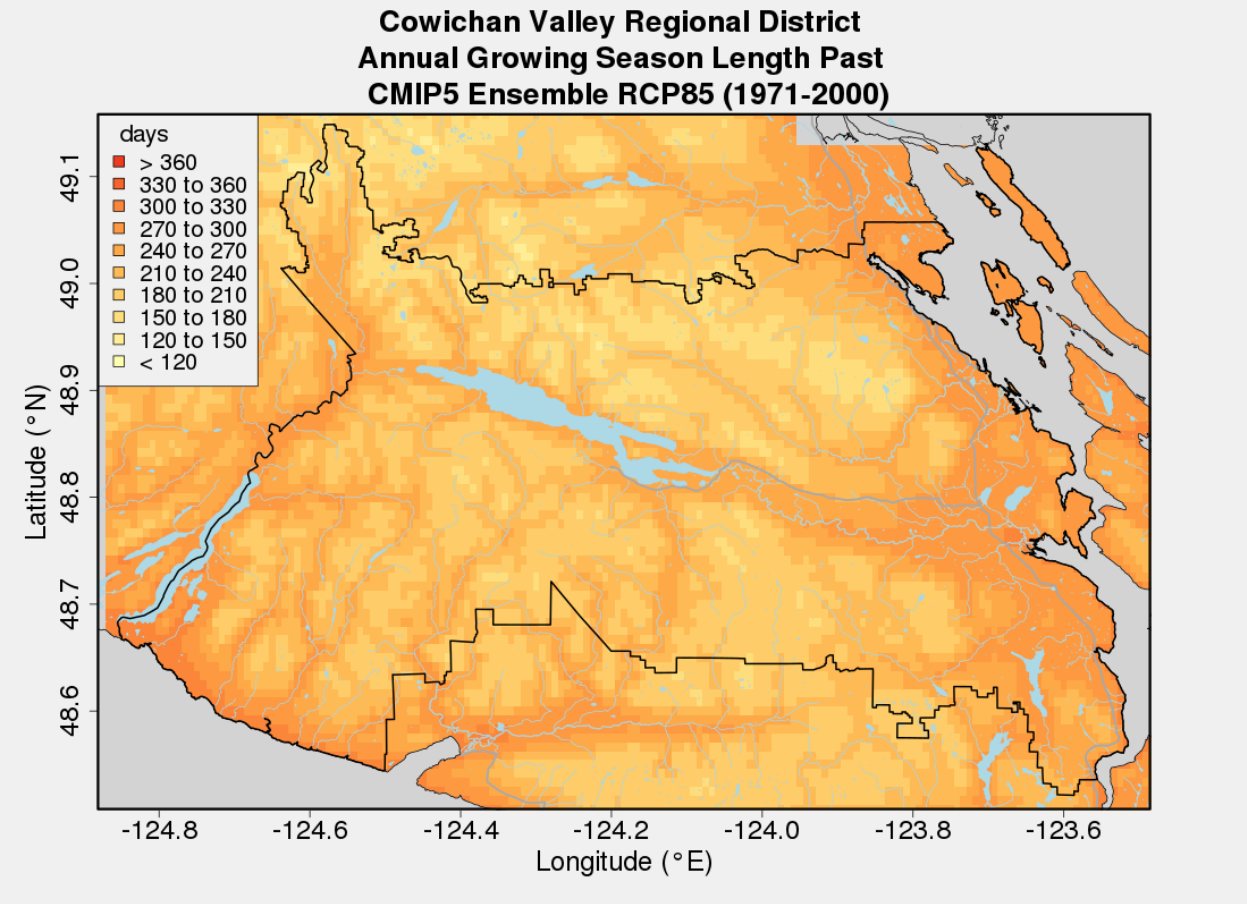
Growing Season Length

About this Indicator

Growing season length is an annual measure that counts the number of days between the first span of at least six days with a daily average temperature greater than 5°C and the first span after July 1 of six days with temperature less than 5°C. It indicates the length of the growing season for typical plants or crops.

Projections

In the past, our region had an average of 237 days in the growing season. We can expect 66 days will be added to the growing season by the 2050s, and 100 days by the 2080s, resulting in nearly a year-round growing season of 337 days on average. In forest ecosystems at higher elevations, the growing season will lengthen by more days as higher temperatures creep up the mountains and more days tip over the 5°C threshold. By the 2080s, we will see a growing-season length at higher elevations similar to that projected for the Developed Area (337 days and 349 days respectively).


Cowichan Valley Regional District
Annual Growing Season Length Past
CMIP5 Ensemble RCP85 (1971-2000)
days
> 360
330 to 360
300 to 330
270 to 300
240 to 270
210 to 240
180 to 210
150 to 180
120 to 150
< 120
Latitude (°N)
49.1
49.0
48.9
48.8
48.7
48.6
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-124.4
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-123.6
Longitude (°E)

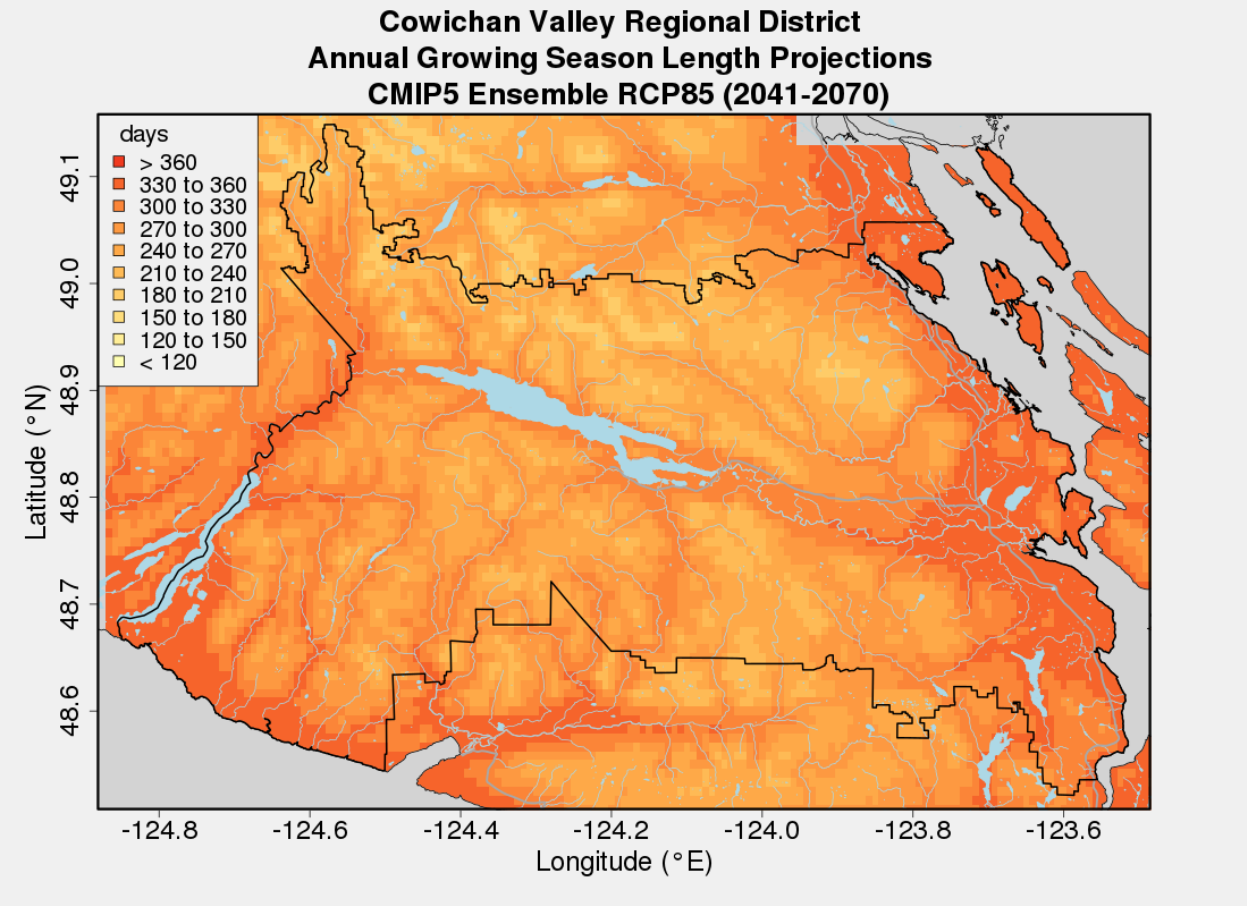


Table 11: Growing Season Length

GSL	Past (days)	2050s (days)	2080s (days)	2050s Change (days)		2080s Change (days)	
Region	237	303	337	66	(46 to 80)	100	(85 to 113)
Developed Area	262	322	349	60	(47 to 71)	87	(78 to 94)
Water Supply Watersheds	218	287	328	69	(46 to 86)	110	(89 to 126)
West Coast Watersheds	232	301	337	69	(49 to 85)	105	(92 to 118)

Growing Degree Days

About this Indicator

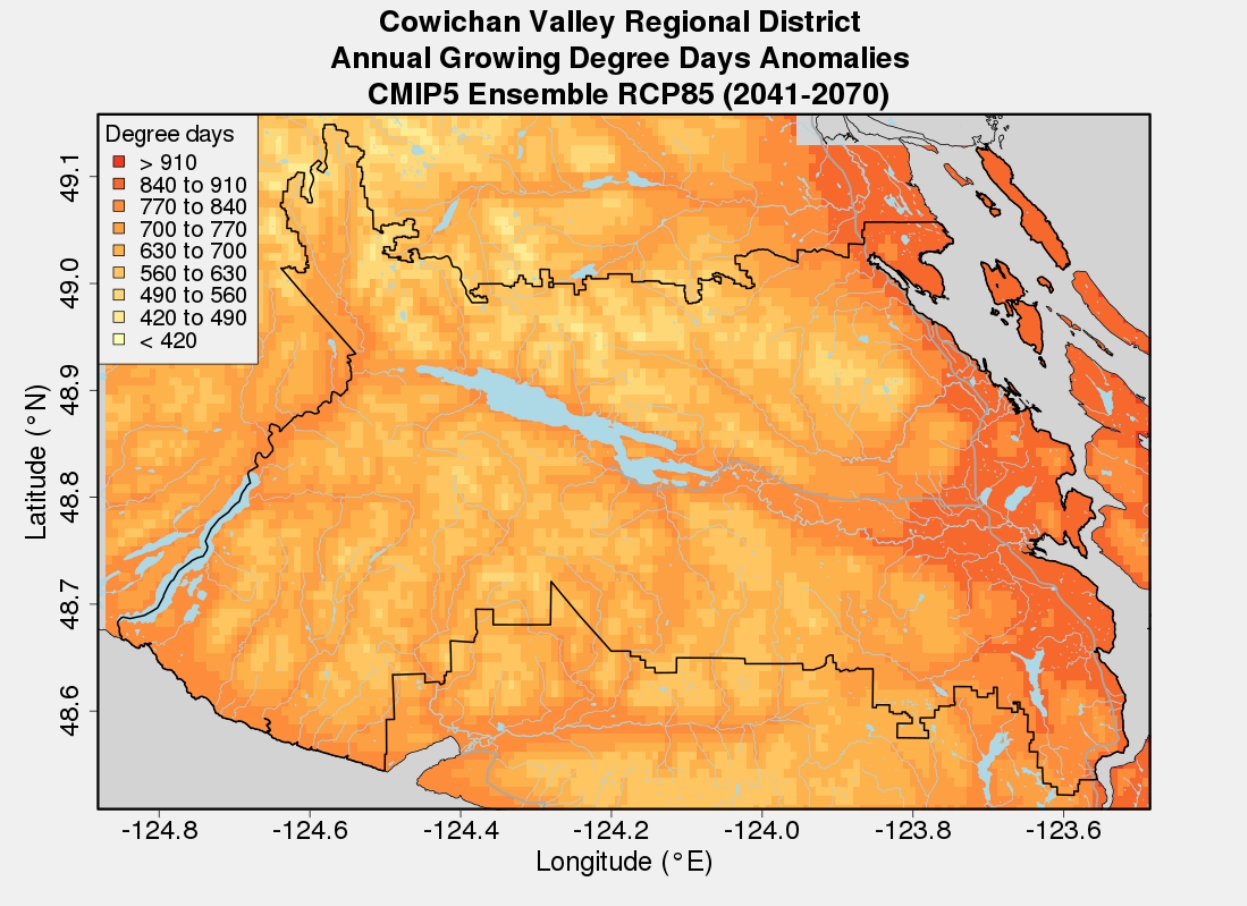
Growing degree days are a measure of heat accumulation that is useful for agriculture and horticulture. Growing degree days are calculated by how much warmer daily temperatures are compared to a base temperature of 5°C (note: 5°C is used for this report, though different base temperatures may be used for different crops). For example, if a day had an average temperature of 11°C, that day would have a value of 6 growing degree days. Annual growing degree days are the total of adding this for each day of the year. This measure is useful for determining future agricultural opportunities, and to understand drivers of change in ecological systems, for example fish productivity.

Projections

In the past, there were 1505 growing degree days in our region. Projections indicate increases in growing degree days throughout the region. By the 2050s, we can expect 49% more growing degree days, and 85% more growing degree days by the 2080s. Similar to the growing season length, trends in the sub-regions are in line with regional projections, with slightly more increases in higher elevations.

Table 12: Annual Growing Degree Days

	Past (Degree days)	2050s (Degree days)	2080s (Degree days)	2050s Change (%)		2080s Change (%)	
Region	1505	2238	2807	48.9	(25.8 to 74.4)	85.3	(52.5 to 121.4)
Developed Areas	1772	2588	3177	46.2	(24.8 to 69.4)	79.4	(48.4 to 113.2)
Water Supply Watersheds	1380	2074	2605	50.5	(25.8 to 78.2)	88.8	(53.7 to 127.3)
West Coast Watersheds	1384	2079	2611	50.4	(27.6 to 76.5)	88.8	(54.6 to 125.7)


Cowichan Valley Regional District
Annual Growing Degree Days Anomalies
CMIP5 Ensemble RCP85 (2041-2070)
Degree days
> 910
840 to 910
770 to 840
700 to 770
630 to 700
560 to 630
490 to 560
420 to 490
< 420
Latitude (°N)
49.1
49.0
48.9
48.8
48.7
48.6
-124.8
-124.6
-124.4
-124.2
-124.0
-123.8
-123.6
Longitude (°E)

7 Winter Temperature Indicators

Future climate projections suggest our region can expect to see warmer winter months. These indicators provide insight into the "new normal" for winter temperatures in our region, and are useful when trying to determine how local ecological systems will change over time.

Warmest Winter Day

About this Indicator

Warmest winter day is the highest temperature recorded during the winter months, in an average year. This indicator is helpful to understand winter temperature trends when considered in combination with the coldest winter night temperatures below.

Projections

By the 2050s, we can expect to see the warmest winter temperature to rise from 12°C to about 14°C. This value may increase to about 16.8°C by the 2080s (projections range from 13°C to 22°C nights, depending on the model). Sub-regional trends are similar to regional trends.

Coldest Winter Night

About this Indicator

Coldest winter night refers to the lowest temperature of the year, usually experienced at nighttime during the winter months.

Projections

In the past, the coldest night had a temperature of -10°C. Models project annual lows to increase by roughly 4°C by the 2050s, to -6°C, and by 7°C by the 2080s, to -3°C. In the future, temperatures below freezing will rarely occur anywhere but at the highest elevations. Sub-regional trends are similar to regional trends.

1-in-20 Coldest Night

About this Indicator

1-in-20 coldest night refers to a nighttime low temperature so cold that it has only a one-in-twenty chance of occurring in a given year. That is, there is a 5% chance in any year that a minimum temperature of this value will occur. This indicator is a marker of extreme winter cold temperatures.

Projections

The 1-in-20 coldest night across the region is projected to increase by 2°C by the 2050s to -15°C, and 2°C by the 2080s to -15°C. Sub-regional trends are similar to regional trends.

Table 13: Warmer Winter Temperatures

	Past (°C)	2050s (°C)	2080s (°C)	2050s Change (°C)		2080s Change (°C)	
Warmest winter day	11.6	14.3	16.8	2.7	(0.2 to 5.2)	5.2	(1.8 to 10.3)
Coldest winter night	-10.1	-6.0	-3.4	4.1	(2.3 to 5.7)	6.7	(4.8 to 7.9)
1-in-20 coldest night	-16.5	-15.0	-14.5	1.5	(-0.6 to 3.4)	2.0	(1.1 to 3.8)

Table 14: Warmer Winter Temperatures in the Sub-Regions

	Developed Area			Water Supply Watersheds			West Coast Watersheds		
	Past (°C)	2050s Change (°C)	2080s Change (°C)	Past (°C)	2050s Change (°C)	2080s Change (°C)	Past (°C)	2050s Change (°C)	2080s Change (°C)
Warmest winter day	12.2	2.9 (0.4 to 5.5)	5.5 (2.0 to 10.5)	11.2	2.7 (0.0 to 5.4)	5.3 (1.8 to 10.7)	11.4	2.6 (0.1 to 4.8)	5.0 (1.7 to 10.0)
Coldest winter night	-9.7	4.3 (2.5 to 5.8)	6.8 (4.8 to 8.1)	-11.0	4.2 (2.3 to 5.8)	6.8 (4.8 to 8.1)	-9.8	3.9 (2.2 to 5.5)	6.4 (4.6 to 7.6)
1-in-20 coldest night	-15.5	3.9 (1.8 to 5.8)	6.3 (4.6 to 8.1)	-17.7	3.8 (1.8 to 5.7)	-6.6 (4.5 to 8.2)	-16.3	3.5 (1.1 to 5.4)	6.4 (4.3 to 7.9)

Heating Degree Days

About this Indicator

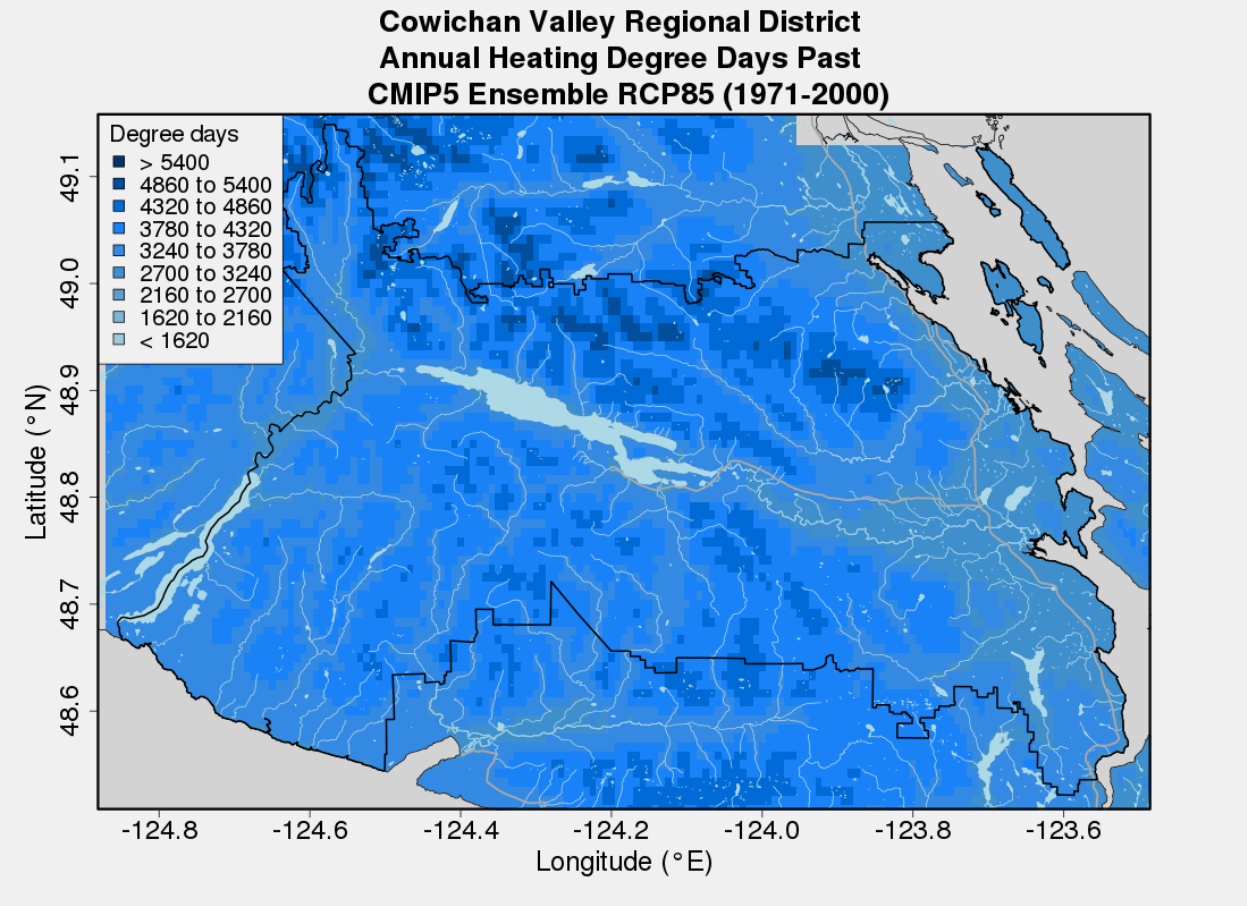
Heating degree days refers to the number of degrees that a day's average temperature is below 18°C, and is used to estimate the amount of energy used to heat buildings. To determine the number of heating degree days in a month, the number of degrees that the daily temperature is below 18°C for each day would be added to give a total value.

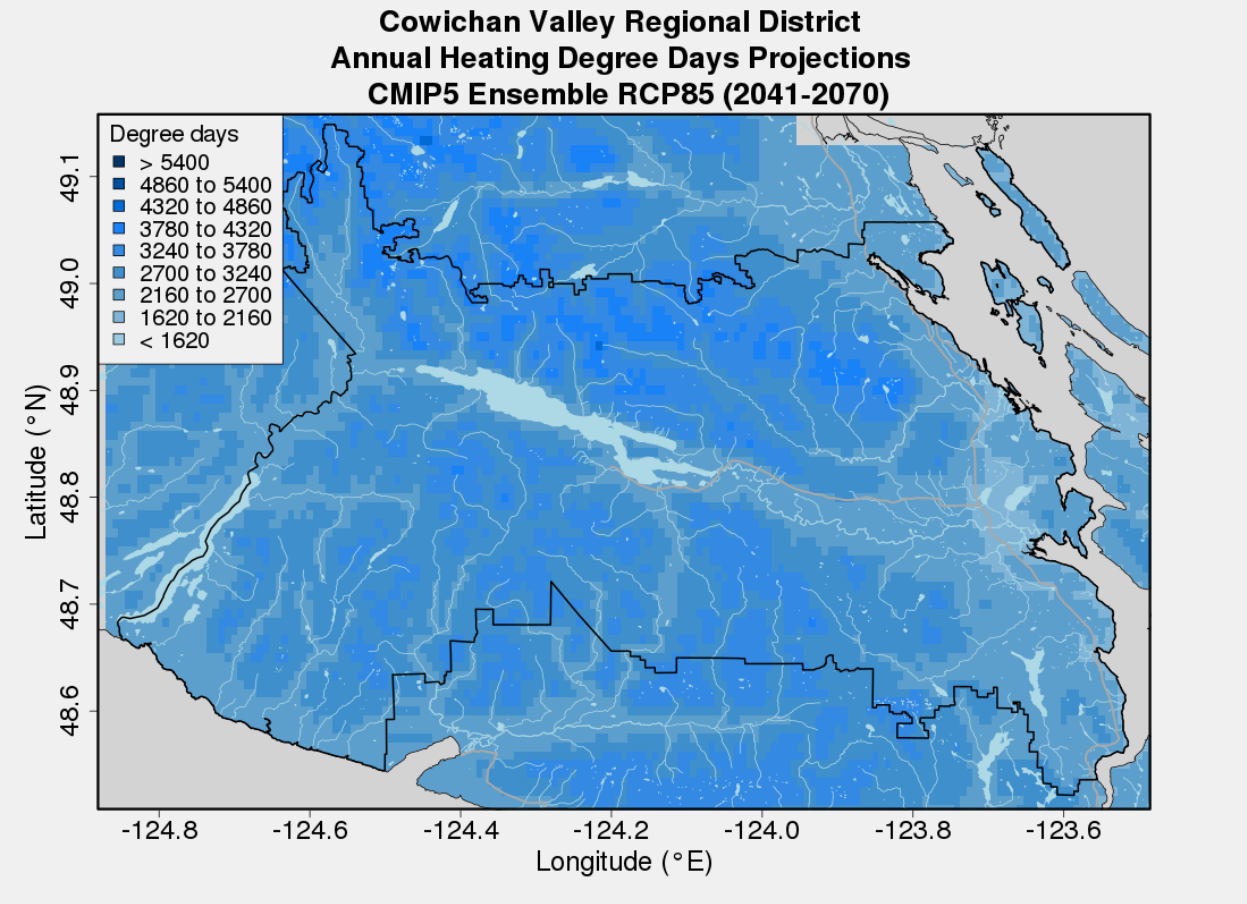
Projections

Our region experiences many more heating degree days compared to cooling degree days. Our past regional annual average of heating degree days is 3659. Heating degree days are projected to decrease by 24% by 2050s, and by 37% by the 2080s. Sub-regional trends are similar to regional trends, and we can expect a decrease of 23–26% by the 2050s.

Table 15: Annual Heating Degree Days

	Past (Degree days)	2050s (Degree days)	2080s (Degree days)	2050s Change (%)		2080s Change (%)	
Region	3659	2793	2290	-24	(-33 to -14)	-37	(-51 to -26)


Cowichan Valley Regional District
Annual Heating Degree Days Past
CMIP5 Ensemble RCP85 (1971-2000)
Degree days
> 5400
4860 to 5400
4320 to 4860
3780 to 4320
3240 to 3780
2700 to 3240
2160 to 2700
1620 to 2160
< 1620
Latitude (°N)
49.1
49.0
48.9
48.8
48.7
48.6
-124.8
-124.6
-124.4
-124.2
-124.0
-123.8
-123.6
Longitude (°E)



Frost Days

About this Indicator

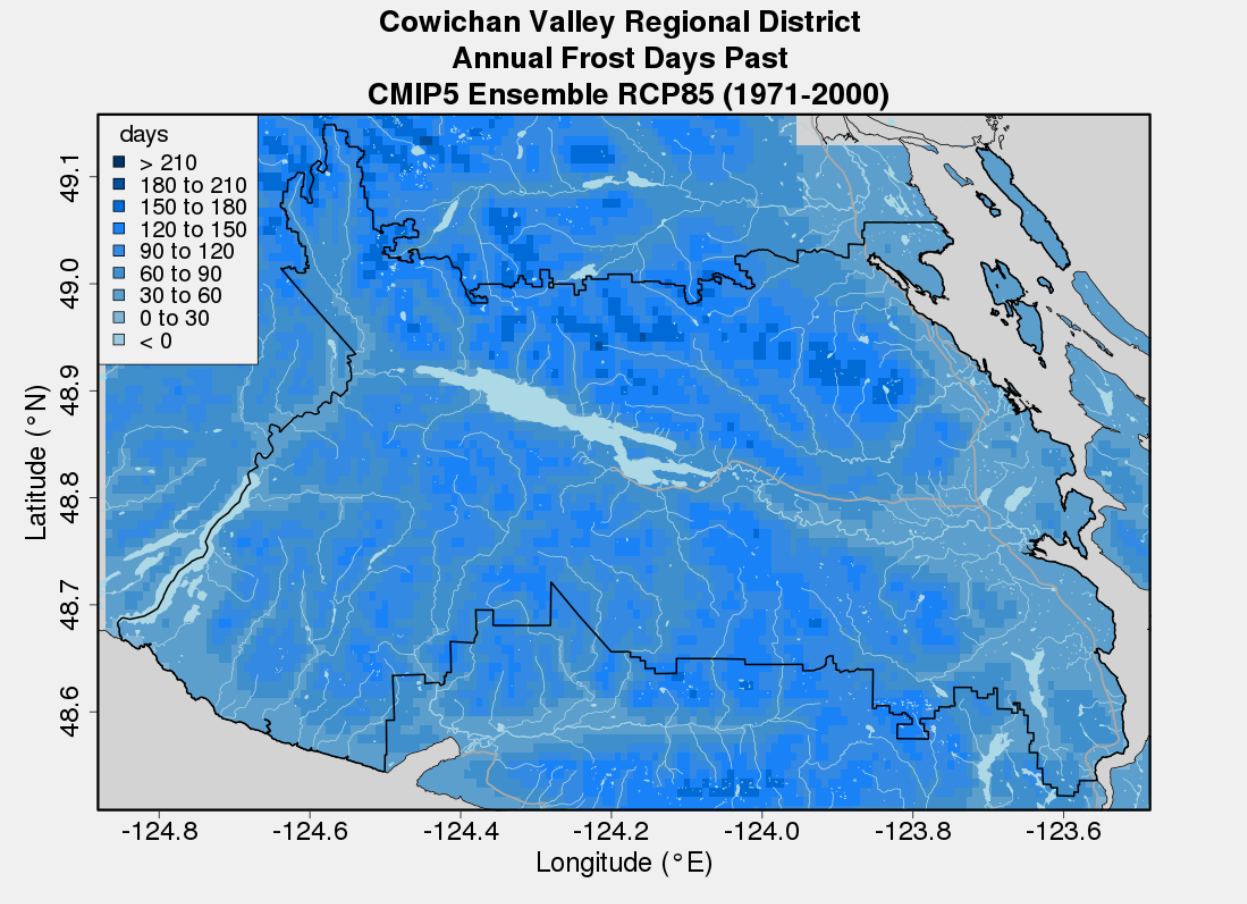
Frost days is an annual count of days when the daily minimum temperature is less than 0°C, which may result in frost on the ground. This indicator is useful when predicting which species may thrive in our shifting ecosystem.

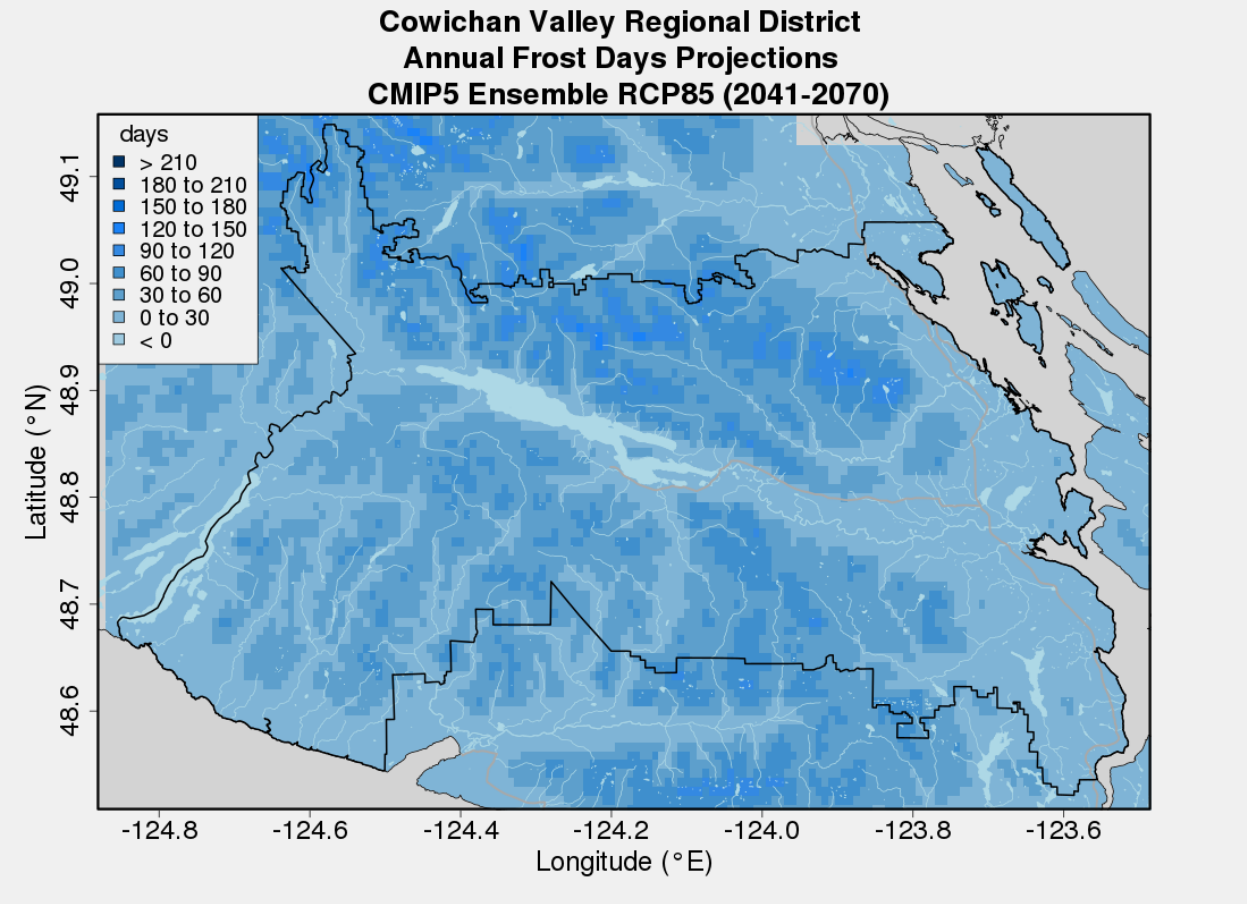
Projections

In the past, our region had 86 frost days a year. Lower elevations experienced only 66 frost days, while there were 101 days in the Water Supply Watersheds. Future projections indicate the region may expect 32 frost days by the 2050s, and 15 by the 2080s. Trends are relatively uniform across the region. By the 2080s, the "new normal" is a climate that is almost entirely frost-free in lower elevations, with higher elevations experiencing only two to three weeks of frost days a year.

Table 16: Annual Frost Days

FD	Past (days)	2050s (days)	2080s (days)	2050s Change (days)		2080s Change (days)	
Region	86	32	15	-54	(-66 to -41)	-71	(-80 to -60)
Developed Areas	66	20	8	-46	(-56 to -35)	-58	(-63 to -50)
Water Supply Watersheds	101	41	19	-60	(-75 to -46)	-82	(-93 to -68)
West Coast Watersheds	88	33	15	-55	(-69 to -42)	-73	(-82 to -62)





Ice Days

About this Indicator

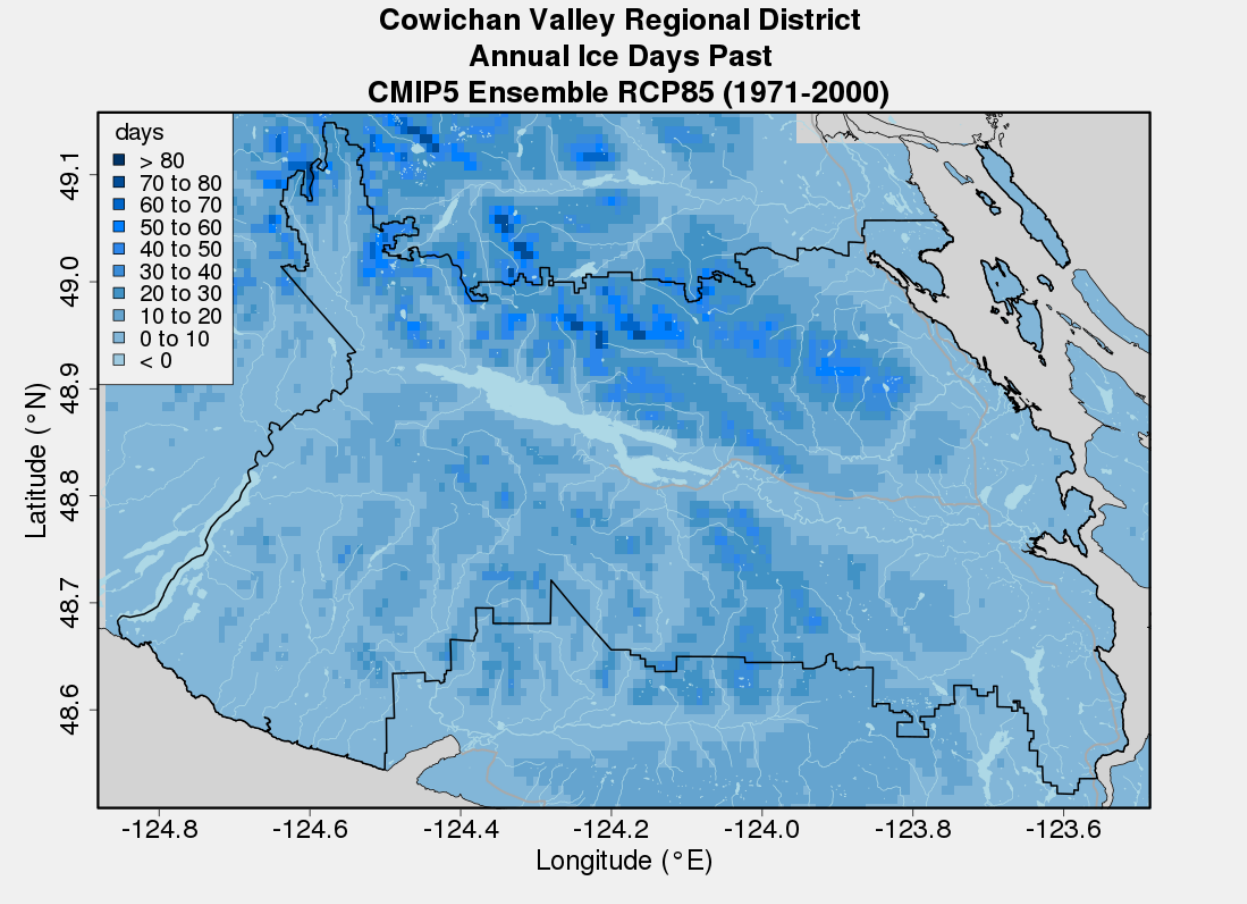
Ice days are days when daytime high temperature is less than 0°C.

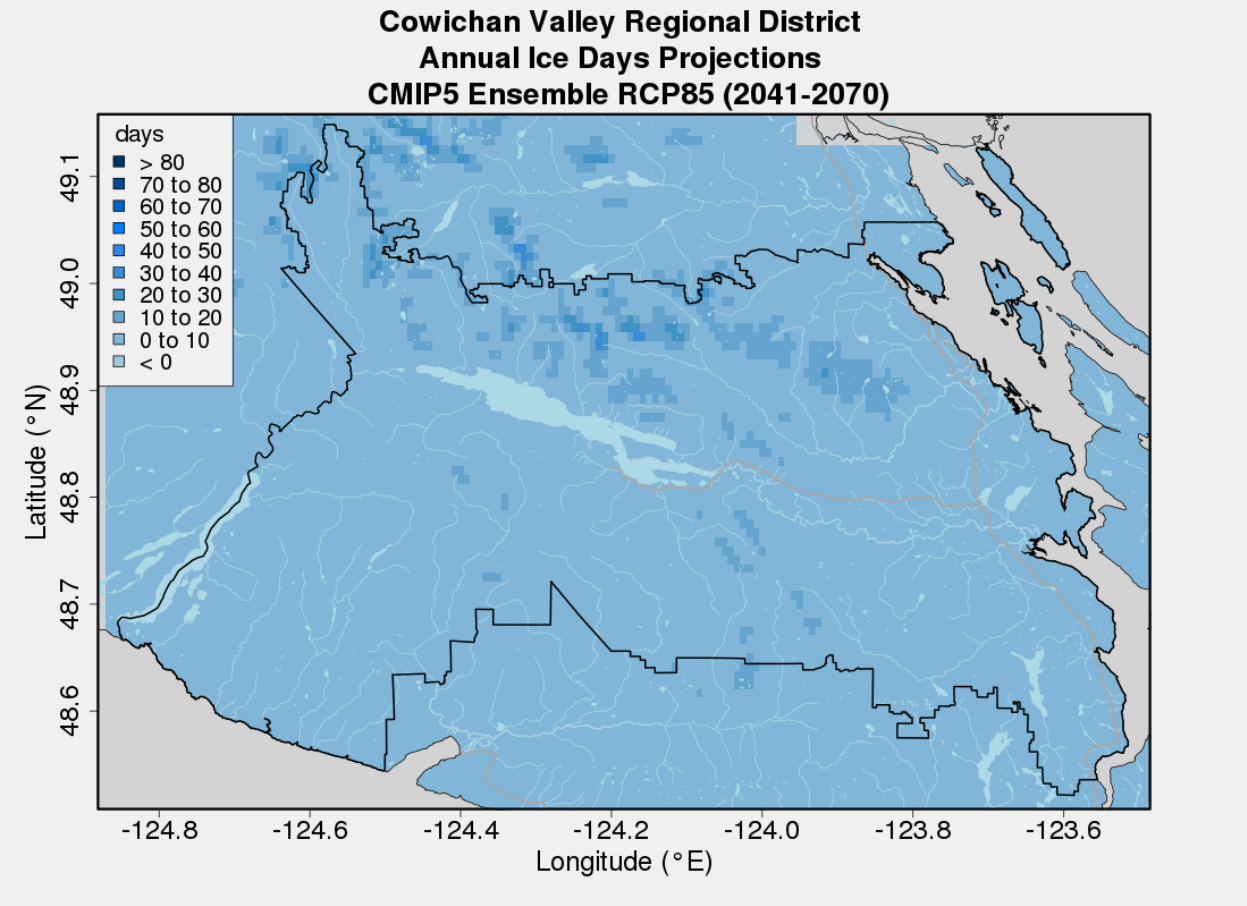
Projections

In the past, our region had 6 ice days per year, mainly in areas of higher elevation. Future projections indicate a "new normal" where higher elevation areas experience very few days, if any, when the daily high temperature remains below freezing. The region may expect 2 ice days by the 2050s, and by the 2080s temperatures below freezing will rarely occur anywhere but at the highest elevations, as shown in the plots below. Trends in the sub-regions are similar to the region.

Table 17: Annual Ice Days

	Past (days)	2050s (days)	2080s (days)	2050s Change (days)		2080s Change (days)	
Ice days (# of days >0°C)	6	2	0	-4.5	(-5.6 to -2.4)	-5.6	(-6.6 to -4.6)




Cowichan Valley Regional District
Annual Ice Days Projections
CMIP5 Ensemble RCP85 (2041-2070)
days
> 80
70 to 80
60 to 70
50 to 60
40 to 50
30 to 40
20 to 30
10 to 20
0 to 10
< 0
Latitude (°N)
49.1
49.0
48.9
48.8
48.7
48.6
-124.8
-124.6
-124.4
-124.2
-124.0
-123.8
-123.6
Longitude (°E)

8 Regional Impacts

The projected changes to our climate discussed in this report will have multiple impacts in our region, and on the land- and water-based ecosystems on which we depend. Temperature rise, and the dramatic increase in variability, or "unusual weather for this season," can expect to cause stress to some and create opportunities for others. This section provides a brief overview of the types of impacts we can expect in various sectors. A more in-depth analysis of these impacts will be the focus of the next phase of New Normal Cowichan, which will explore these in more detail and develop a suite of actions. This report is intended to spark a deeper discussion among community leaders involved in conducting land-use planning, managing and designing safe and sustainable infrastructure, managing the health of our population and ecosystems, and anticipating the economic challenges and opportunities ahead. This will be further examined in the following phases of New Normal Cowichan.

The impacts of climate change are complex and interrelated. For the purposes of this high-level scan they are organized into the following categories:

- Ecosystems and Biodiversity
- Watershed and Groundwater Health
- Health and Well-being
- Infrastructure
- Economic Development
- Bioregional Carrying Capacity

This section is followed by reflections on regional collaboration, and recommendations for the next phase of this work.

Ecosystems and Biodiversity

As climate change occurs, ecosystems and species can be expected to experience stress, resulting in changes to biological diversity. At a high level, we can predict higher temperatures and increased variability to upset the timing of biological cycles and strain sensitive habitat. Warmer temperatures will also enhance the potential for invasive species, pests, and pathogens to increase across the region, which are likely to compromise native species.

Terrestrial ecosystems (forests, wetlands, connections to aquatic ecosystems)

While some terrestrial species may thrive in our future climate, others may decline. Longer drought periods, coupled with more intense precipitation at other times, is likely to have an impact on soil chemistry and the soil's capacity to absorb and retain water, which may lead to increased risk of slope failure, overland flooding, stream collapse, and transport of silt to water bodies. Compromised soil conditions and root systems may increase the risk of trees being blown down. An increase in the risk of wildfires can also be expected, further stressing upland forest water-holding capacity, exposing soils directly to the elements, and causing further erosion.

Earlier springs and a longer growing season may cause some species' reproductive and biological cycles to be out of sync with the new climate. Early leaf development could shade the understory of deciduous forests, which could cause species loss and impacts throughout the food chain. We can expect Cedar, a sentinel species to the region already under stress, to reduce in range, while Garry Oak, a rare and imperiled ecosystem, may have the potential to expand in range. New species seeking refuge from a warming south may migrate to our region through a variety of means. With warmer, drier summers, we can expect an increasing scarcity of water, changes to plant growth rates, heat stress, and reduced quality of forage crops.

Aquatic ecosystems and species health

Temperature increases and changes in precipitation over the seasons can be expected to affect our regional water-based ecosystems. Aquatic habitat and species may be stressed in summer by decreasing streamflow, warmer water temperatures, and an earlier freshet. In the fall/winter/spring, aquatic habitat and species will be stressed by increased erosion bringing silt and sediments into watercourses and estuaries. These changes may affect salmon migration and their long-term survival in many of the region's watersheds. Loss of salmon as a key nutrient driver would affect the long-term viability of forest ecosystems particularly with increased rainfall further reducing nutrient levels. Fish species in upland water bodies, and those that migrate between fresh water and the ocean would also be affected by the expected changes to habitat described above. Warmer water also enhances the potential for algal blooms, invasive weed growth, and low oxygen levels that would further stress these sensitive ecosystems.

Watershed and Groundwater Health

Water supply and demand

The majority of our region's drinking water supply comes from groundwater wells, and in some cases regional lakes and rivers, fed by rainfall and snowmelt. With warmer winter weather, more precipitation is expected during extreme events, while snowpack may be compromised, as well as the ability of watersheds, wetlands, lakes, and groundwater wells to hold and store water for summer use. Based on studies undertaken in the Cowichan Valley, existing groundwater recharge rates vary across the region's aquifers. Changes to precipitation patterns and snow will affect the region's groundwater resources unevenly, with some aquifers experiencing lower recharge values and some potentially becoming more productive.

At current levels of water use in our region, we can expect our water supply to be strained during times of the year when temperatures are high and water is in greatest demand. As our population grows, overall groundwater extraction rates can be expected to increase and water conservation will increasingly become a priority. Regional watershed and supply management will be necessary to balance competing water needs with diminishing surface and groundwater supplies.

Water quality

With warmer temperatures, decreased summer precipitation, and extreme rainfall at times, we may see a decrease in water quality throughout the region. Erosion of upland soils would introduce nutrients, silt, organic materials, and contaminants into our water systems. We may also see a decrease in water quality due to algal blooms, turbidity arising from flash floods and extreme events, and chemical and microbiological contaminants introduced during first flush events. Additionally, drawing down surface reservoirs can be expected to change the natural conditions and will likely have negative effects on water quality. With reduced water quality, surface water drinking water systems may be compromised, and existing water treatment facilities may not be adequate.

Health and Well-being

Physical

Temperature and precipitation have a direct relationship with air quality and human health. Hotter, drier summer conditions, combined with decreased snowpack, may lead to an increase in wildfire and slash-burning activity. Smoke contributes a significant amount of particulate matter into our air, which is a known human carcinogen. Uncertainty around future wind patterns and temperature inversions may compound this issue. Also, warmer summer temperatures cause increases in ground-level ozone, which can cause breathing problems, trigger asthma, reduce lung function, and cause lung disease, particularly in children, older adults, and people who are active outdoors. Warmer winters could result in less use of fireplaces and wood stoves for heating, potentially improving winter air quality and reducing human exposure to smoke from wood-burning appliances.

Hotter, drier summers also cause heat stress and have an impact on human health. Although heat stress may appear less threatening than in areas that already experience hot summers, stress levels

may be high because much of the population is accustomed to mild temperatures and is less prepared to accommodate high temperatures. Increased heat stress may require local governments to provide infrastructure to support cool-down areas. In extreme cases, we may see increased allergies and hospitalization of vulnerable populations due to poor air quality, heat stroke, and increases in environmental and vector-borne diseases. Also, as water quality is compromised, it will likely be more difficult to supply clean drinking water to regional citizens.

Social (social network stress, mental health)

The uncertainty posed by our changing climate, and the associated changes in how we are used to living in the region can lead to an increased level of stress and compromised mental health for individuals in our region. Vulnerable populations who do not have the resources to adapt to heat stress, loss of income, property damage, and other stresses that may come with a changing climate require increased social support. It is prudent to prepare for an increase in at-risk populations requiring assistance and support to protect public health in the future.

Emergency management

Emergency managers can plan for increased incidence of forest fires, floods, and landslides. Enhanced communications on the expected outcomes of climate change in the region, paired with information on the public's role in emergency preparedness is critical to improving our resilience during future increases in "natural disasters". It is also important for emergency managers to work closely with regional planners to ensure plans are not dependent on critical infrastructure that may be stressed during future extreme events.

Infrastructure

We can expect extreme precipitation events, more intense storms (including increases in localized storms), hotter temperatures, longer dry periods, and year-to-year variability of these conditions to put a strain on existing infrastructure and buildings. With increased flooding, drought, episodic snow events, and heat waves, the business case for “future-proofing” infrastructure will become stronger.

The extreme rainfall indicators illustrate future extreme events may be beyond the frequency and intensity of events for which we are currently prepared. It can be assumed that the trends projected (and their relative intensity) will continue past the end-of-century timeframe presented in this report. This information offers important context for those who design critical infrastructure in our region, and merits further detailed study to inform future Intensity-Duration-Frequency (IDF) curves and other design criteria, especially for infrastructure that is expected to last for many decades.

Stormwater systems

Increases in storm intensity is expected to put significant pressure on our region’s stormwater management and drainage systems. Extreme precipitation and an increase in 5-day events may cause drainage systems and streams to overflow, soil saturation, and flooding in low-lying areas. These impacts may also combine to affect slope stability, leading to increased risk of landslides. This can be expected to cause damage to personal property and public infrastructure.

Sewage and water treatment

Our sewage and water treatment facilities will likely struggle to keep up with increased flows during storm events. Increased rainwater inflows to sewage treatment facilities leads to a reduction in system efficiencies, resulting in a higher potential of overflow and impacts to the environment and public health. Overall turbidity in the surface water supply during storm events reduces water quality, resulting in increasing costs of treatment, maintenance, and boil-water orders affecting the community.

Roads and transportation

Preparing our transportation networks for the changes ahead requires an updated approach to design, materials, and maintenance programs. Changes to freeze-thaw cycles, shifting precipitation patterns, more frequent flooding events, and increased summer temperatures all have an impact on annual operations and maintenance plans, and long-range planning decisions. Warmer winters may provide more opportunities for year-round active transportation (cycling and walking), and may improve safety at certain times of the year for all road users.

Housing and buildings

There are opportunities to adapt housing to climate change on a building-by-building scale. The business case for technologies including onsite renewable generation, water capture and reuse, onsite stormwater detention and management, resilient landscaping, green roofs and walls, passive shading, and other alternative building approaches and materials will improve. Other siting parameters will likely become more critical, including the need for compact development in village centres, preservation of natural areas to buffer settlements from future extreme events, and avoiding new infrastructure in areas at risk of flooding. New buildings will likely need to withstand heavier snow loads in some years, higher and more frequent wind speeds, higher temperatures and duration of heat waves, higher maximum rainfalls, and rising sea levels. Additionally, a milder climate may increase indoor air humidity, leading to better conditions for mould and house dust mites, and decrease indoor air quality in some buildings.

Energy use and distribution

Substantial shifts in energy demand are anticipated as a result of increasing temperatures, with heating demands decreasing and cooling demands increasing over time. Currently, residential buildings are largely cooled by night air. As cooling degree days increase along with the introduction of tropical nights in the Developed Areas, the ability of buildings to cool without mechanical systems will decrease, and energy use for air conditioning may increase. With more buildings requiring energy for cooling, summer energy supply may become a challenge for our region and province. Long-term planning of provincial energy infrastructure could be significantly affected by the projected major shift in province-wide heating and cooling requirements, improving the feasibility of local renewable energy production.

Economic Development

A changing climate brings challenges and opportunities. It is thought that the biggest impacts in economic development will be in the agriculture and forestry industries, while tourism may also be affected. Warmer temperatures and prolonged summer drought, combined with extreme out-of-season storm events can be expected to bring uncertainty to the forestry, agricultural, and tourism sectors.

Agriculture

More growing degree days, along with a reduction of frost days would create a longer growing season in our region. Agricultural producers can expect earlier harvests, and potentially year-round productive growing. This benefit may be challenged by an increase in heat stress, sun scald, invasive species, pests, and plant diseases, which can threaten plant health and crop productivity. An increase in the intensity of spring storms may also damage young plants and their vulnerable root systems, requiring secondary planting some years. Additionally, increased competition for water resources in the region, and inappropriate timing of pollinators, may limit the ability of traditional crops and species to grow.

While some agricultural production may experience challenges, opportunities for diversity and higher crop productivity are also possible. Agricultural managers who are experiencing challenges may need to consider alternative crops, new irrigation systems, enhanced drainage, rainwater capture, nutrient management, livestock management, and soil conditioning techniques. Agricultural producers can expect to feel a shift in energy costs, as heating demand for greenhouses will likely decrease, and cooling needs for greenhouses and livestock facilities will likely increase. Additionally, food security may become an increasingly important issue as global food systems adapt to climate change, and local crop production may vary year to year due to the stressors mentioned above.

Forestry

Decreases in snowpack, frost days, and summer precipitation, combined with increasing temperatures, may cause tree growth to decline and mortality rates in vulnerable species to rise. Increased risk of extreme rain events in winter, with their increased erosion potential, can be expected to challenge harvest opening sizes, cut-block orientation, road-building and de-activation practices, slope-stability practices, blow-down prevention, rotation lengths, and commercial viability.

Certain tree species in our region's mountains may migrate to different elevations in search of suitable temperature and precipitation conditions. Forestry managers can expect to consider increased risk of forest fires, lower growth rates, stress to forest health posed by disease and pests, maintenance of infrastructure, and the introduction of new planting patterns and species that will be resilient in our new climate. Water shortages during the dry spells, and associated increases in water cost may have a significant impact on the viability of forestry in our region over the long term.

Tourism

Like other industries, climate change will likely bring a variety of benefits and challenges to the tourism industry. Warmer temperatures and drier summers may benefit tourism opportunities by attracting visitors in the warmer seasons, though drought conditions and increased temperatures may negatively impact the ability of people to enjoy summer tourism opportunities. Over time, we may see traditional winter sports becoming more difficult to sustain year over year, and these may be replaced by shoulder season or summer recreation activities all year round. Also, as our ecosystems experience stress, some recreation venues may become less attractive, while new economic opportunities may emerge associated with extended "summer-like" conditions.

Bioregional Carrying Capacity

The bioregional carrying capacity refers to the provision of key services for the health and well-being of our population. These services include clean drinking water, clean air, waste management, food security, and the generation of energy.

Regional growth (and limitations to growth)

Future water supply should be a central consideration when developing strategies to support changing regional demographics and populations. Long-range planners are advised to consider our region's future carrying capacity when planning for regional growth, ensuring substantial additional investments in supporting infrastructure in high-impact areas, and/or potentially limiting growth in these areas. Also, hazards including flooding, landslides, and others will need to be included in future planning frameworks.

Migration to the island (climate refugees)

Although projections indicate a significant departure from the past, the regional climate is projected to be mild relative to global climate changes, and may lead to new interest in human migration to our region. Our region may need to prepare for an increase in climate refugees, some with means, and others who will likely need support services.

9 Regional Collaboration

As made apparent above, preparing for the changes ahead will require provincial and regional governments, local authorities, and agencies to work together in developing a local, regional, and bioregional approach. Emergency preparedness and management will be an increasingly important issue in the planning and delivery of services, programs, and infrastructure. The public will also need to be informed and supported through the range of changes.

Recommendations

During the development of this report, the technical committee has offered the following early recommendations to be considered as the region continues to prepare and take action on climate change adaptation. Detailed analysis and structured recommendations will follow as a part of the overall adaptation planning exercise.

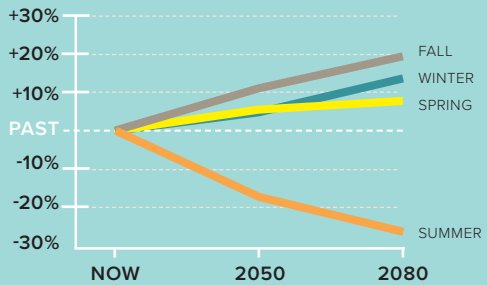
- Take a “no-regrets” approach when planning for adaptation, as the time for action is now.
- Utilize existing projections in all master planning processes.
- Establish stretch goals and visions in Regional Cowichan 2050 planning process to ensure that adaptation is not an automatic fallback position.
- Incorporate projections and impacts into all engineering and water security planning.
- Conduct additional analysis of drought-related indicators to more fully understand specific impacts to soil, water supply, and ecosystem health at the landscape level.
- Develop long-term community water security plans and update watershed strategies with climate projections to address future conflicts over water use.
- Develop an integrated hydrological monitoring and climate network.
- Identify and map areas affected by increased climate sensitivity (flooding, erosion, landslides) to assist in identifying specific risks.
- Conduct a regional, engineering-based analysis of infrastructure risks to inform asset management.
- Develop IDF curves that reflect climate projections for engineering decision making related to infrastructure.
- Incorporate APEG BC recommendations for additional tolerances above projections.
- Develop sea level rise land use management zones.
- Recognize the rural nature of the region and how this can affect the services provided.
- Work in partnerships with other levels of government to address infrastructure shortages/deficiencies.
- Conduct a full risk assessment of policy and infrastructure in partnership with other levels of government.
- Communicate long-term projections to the general community, stakeholders, and partners, along with other relevant projections concerning sea level rise and forestry http://www.genetics.forestry.ubc.ca/cfcg/BEM.html.

Climate Change

COWICHAN'S NEW NORMAL

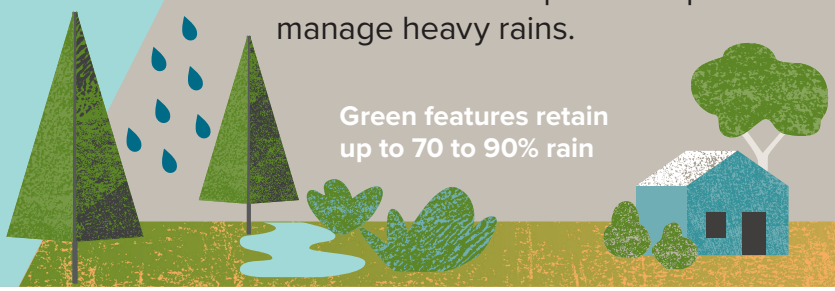
Summer will be drier, fall and winter wetter.

SEASONAL CHANGES IN PRECIPITATION

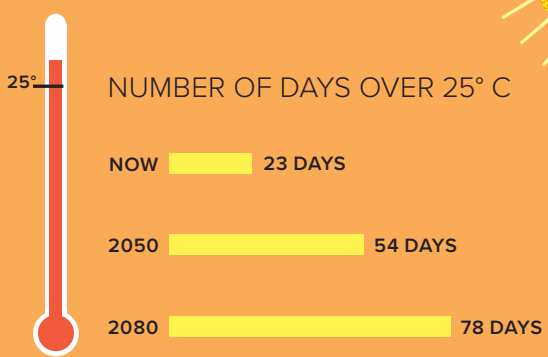


Design with nature to consider raingardens and native plants, reducing water use and creating absorbent landscapes to help manage heavy rains.

Green features retain up to 70 to 90% rain



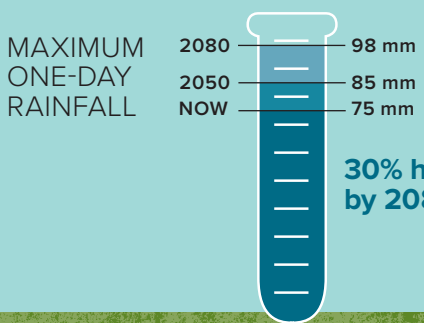
Summers will get hotter.



Use your landscaping and building design to cool your home and reduce fire risk.

Cool roofs absorb 70% less sunlight and reduce summer air temperatures by 2–3° C

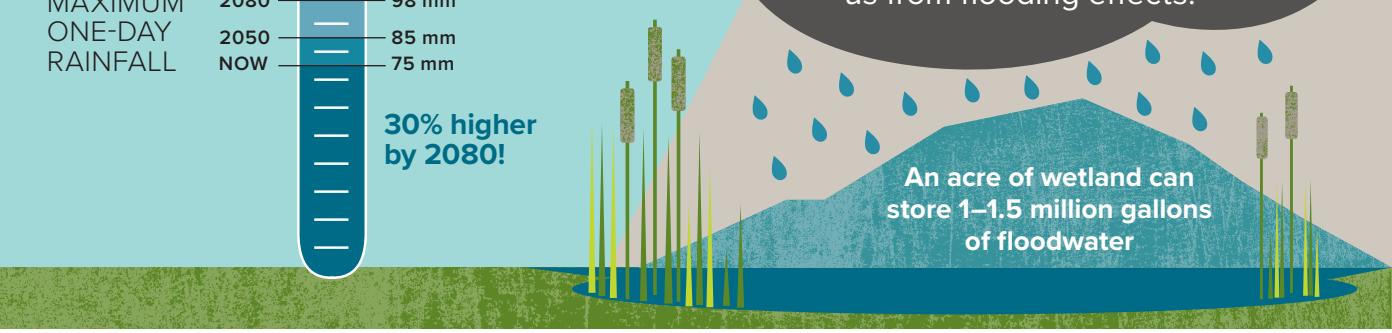
Rainstorms will grow more intense.



30% higher by 2080!

Protecting and restoring wetlands and river banks will help protect us from flooding effects.

An acre of wetland can store 1–1.5 million gallons of floodwater

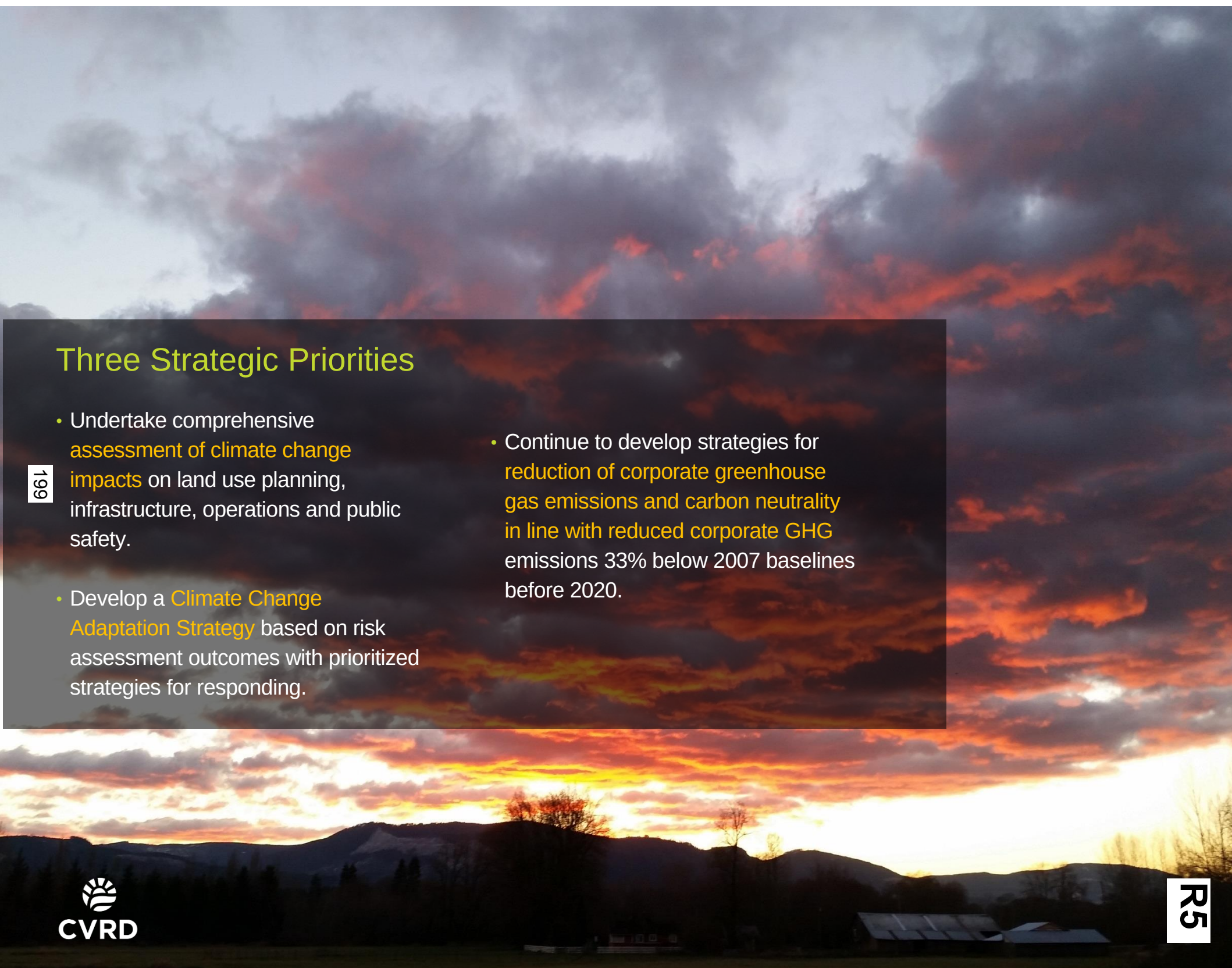


Working together, we can prepare for climate change. Find out more at **CVRD.BC.CA/CLIMATE**

Achieving our goals begins with seeing the future in focus

CVRD

R5



Three Strategic Priorities

- Undertake comprehensive assessment of climate change impacts on land use planning, infrastructure, operations and public safety.

- Develop a Climate Change Adaptation Strategy based on risk assessment outcomes with prioritized strategies for responding.

- Continue to develop strategies for reduction of corporate greenhouse gas emissions and carbon neutrality in line with reduced corporate GHG emissions 33% below 2007 baselines before 2020.

CVRD

R5

200

Role of Strategy

- Assist - local governments in developing and implementing climate adaptation policies, plans and programs.
- Provide - relevant scientific information, data and indicators related to local and regional projected impacts
- Increase public awareness issues to catalyze action through partnerships with public and private sectors, non governmental and community organizations and First Nations
- Leverage - external funding and working with services across the organization and local governments to lead and support a number of regional adaptation activities
- Liaise - with senior levels of government on climate related programs, policies and legislation that impact the region
- Support - the CVRD in fulfilling its corporate objectives and strategic priorities.

CVRD

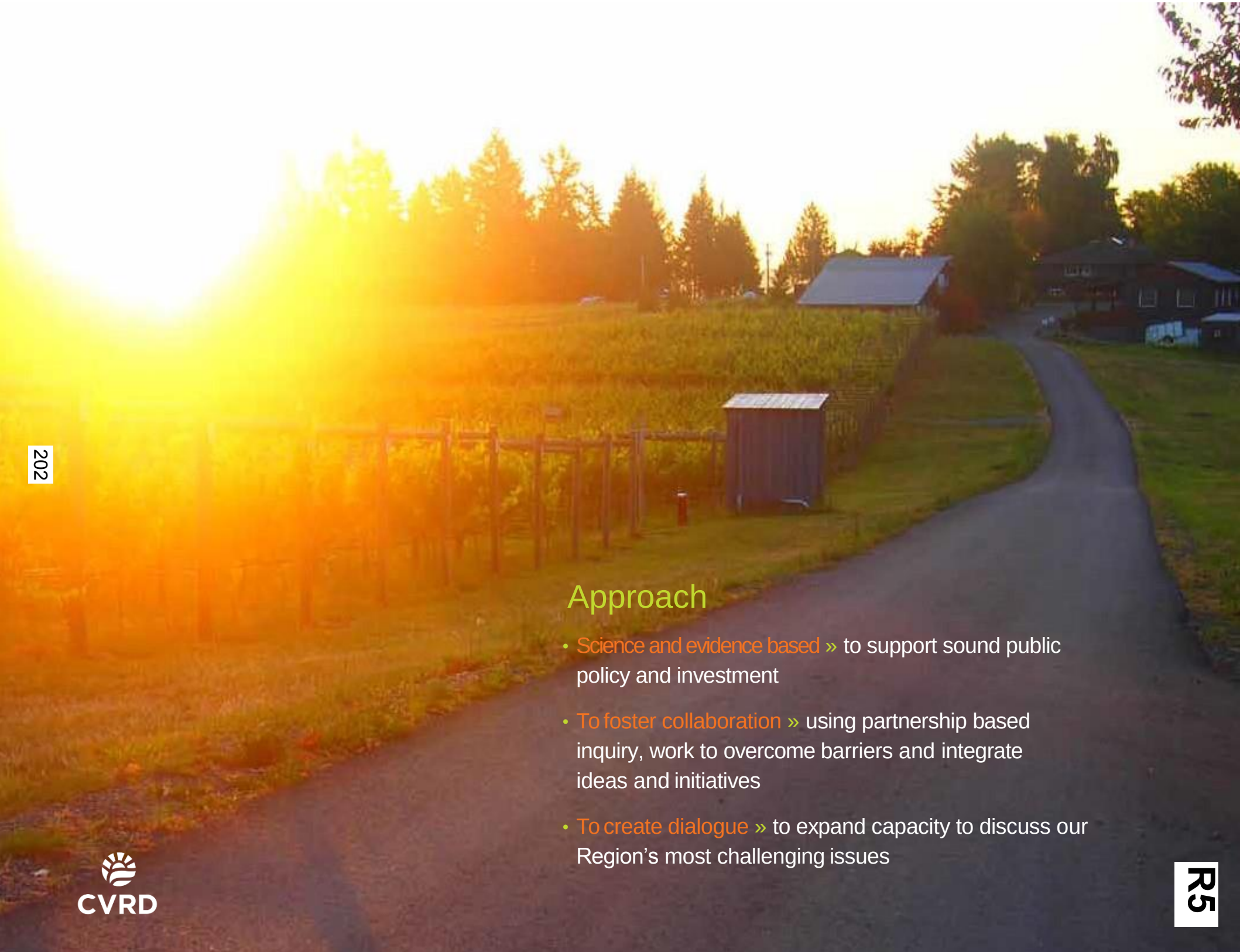
R5

Goals

- Regional vulnerabilities are understood
- Communities are prepared and resilient
- Natural assets continue to be resilient

CVRD

R5



Approach

- Science and evidence based » to support sound public policy and investment
- To foster collaboration » using partnership based inquiry, work to overcome barriers and integrate ideas and initiatives
- To create dialogue » to expand capacity to discuss our Region's most challenging issues

CVRD

R5

Process

1. Knowledge gathering » Climate Projections and Impacts Analysis
2. Assessment » Vulnerability and Risk Assessments
3. Master Planning » Adaptation and Mitigation Strategy
4. Action and Adaptation» Implementation of the Strategy

CVRD

R5

Technical Working Group

Over the past year, the following people and organizations of the Cowichan Region contributed to the development of the projections report, ensuring its relevance, multiple perspectives and inputs.

- Hamid Hatami, CVRD Engineering
- Mike Tippett, CVRD Long Range Planning
- Kate Miller, CVRD Environmental Service
- Conrad Cowan, CVRD Public Safety
- Amy Melmock, CVRD Economic Development
- Keith Lawrence, CVRD Environmental Services
- Jeff Moore, CVRD Environmental Services
- Sybille Sanderson, CVRD Public Safety
- Craig Sutherland, Kerr Wood Leidal
- Tom Rutherford, Cowichan Watershed Board
- Ken Epps, Island Timberlands
- Dominico Iannidinardo, TimberWest
- Chris Cole, TimberWest
- Lisa Brinkman, Town of Ladysmith
- Sharon Horsburgh, Regional District of Nanaimo
- Amanda Broad, Capital Regional District
- Lillian Zaremba, Metro Vancouver
- Natalie Anderson, Cowichan Tribes
- Summer Goulden, Social Planning Cowichan
- Michelle Staples, Social Planning Cowichan
- Lynne Magee, Vancouver island Health Authority
- Jade Yehia, Vancouver island Health Authority
- Stacey Sowa, Vancouver island Health Authority
- Ian Foss, Emergency Management BC
- Cathy LeBlanc, Ministry of Community, Sport and Cultural Development
- Pat Lapcevic, Ministry of Forest Lands and Natural Resources
- Derek Masselink, Ministry of Agriculture
- Trevor Murdock, Pacific Climate Impacts Consortium
- Brian Branting, School District 79
- Bruce Fraser, Shawnigan Basin Society
- Bruce Sampson, at large
- Scott Aikenhead at large
- Jane Kilthei Climate Action Collaborative
- Goetz Schuerholz, Cowichan Estuary and Conservation Association
- Emily MacNair, Agriculture Climate Action Initiative
- Brian Epps, Ministry of Forest Lands and Natural Resources
- Ralph Mohrmann, Ministry of Transportation and Infrastructure

Climate 101

Adaptation

The process of adjustment to actual or expected climate and its effects.

Mitigation

Intervention to reduce the sources of enhance the sinks of greenhouse gasses.

Weather and Climate

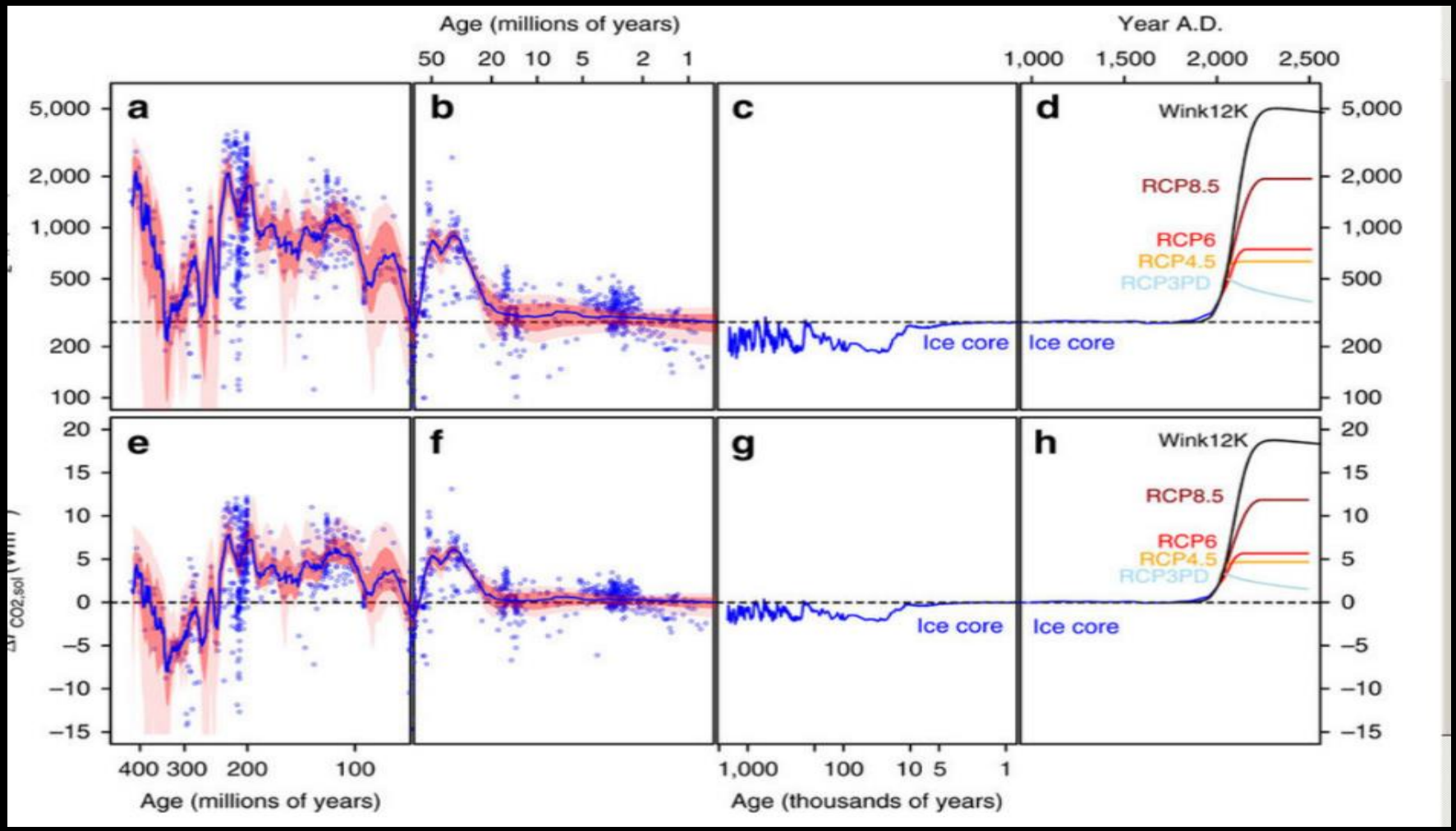
Weather is what conditions are at one place at one point in time rather than how it behaves over a relatively long period

Rate of Change

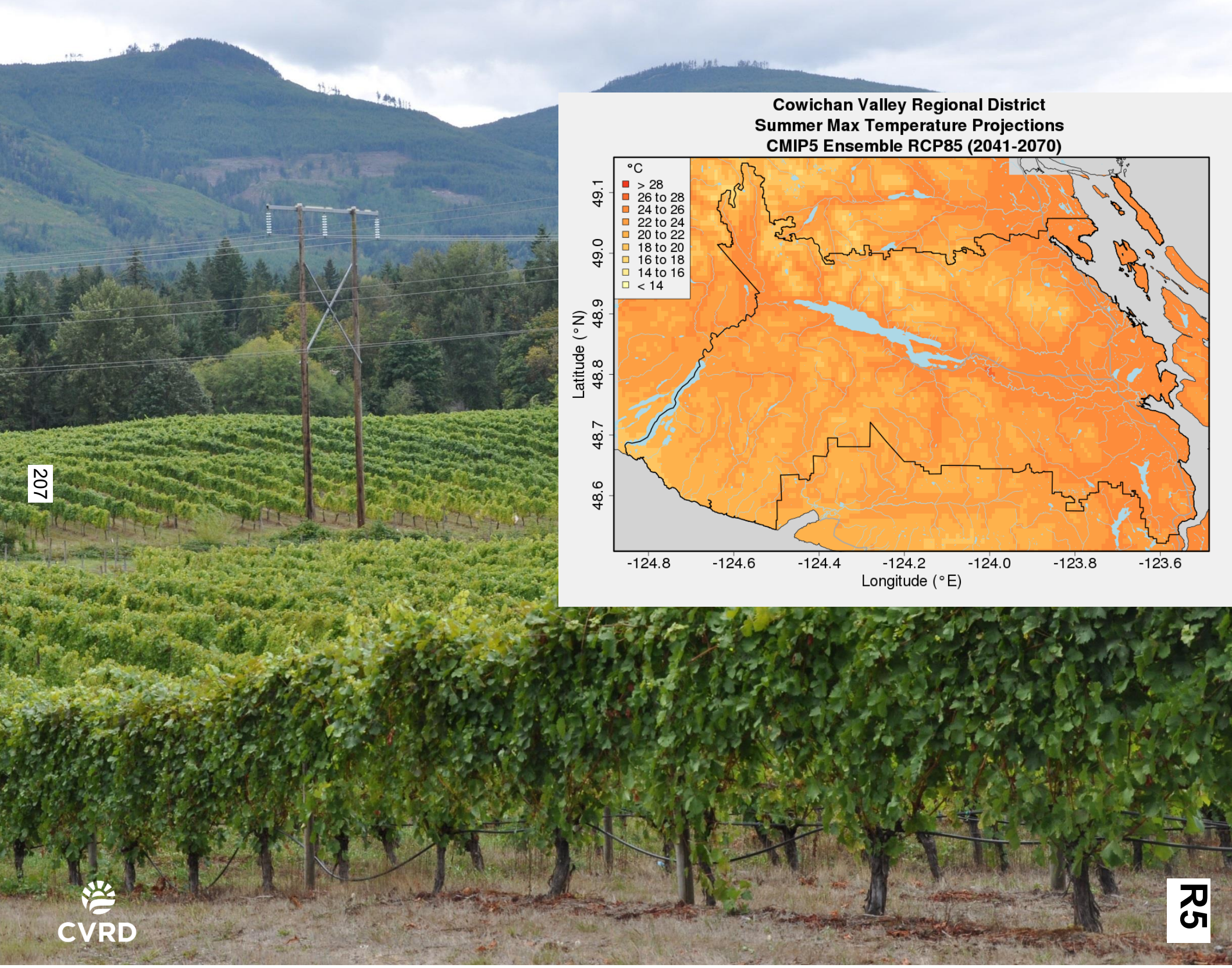
Conservative IPPC projections used but many other effects becoming apparent and are compounding

CVRD

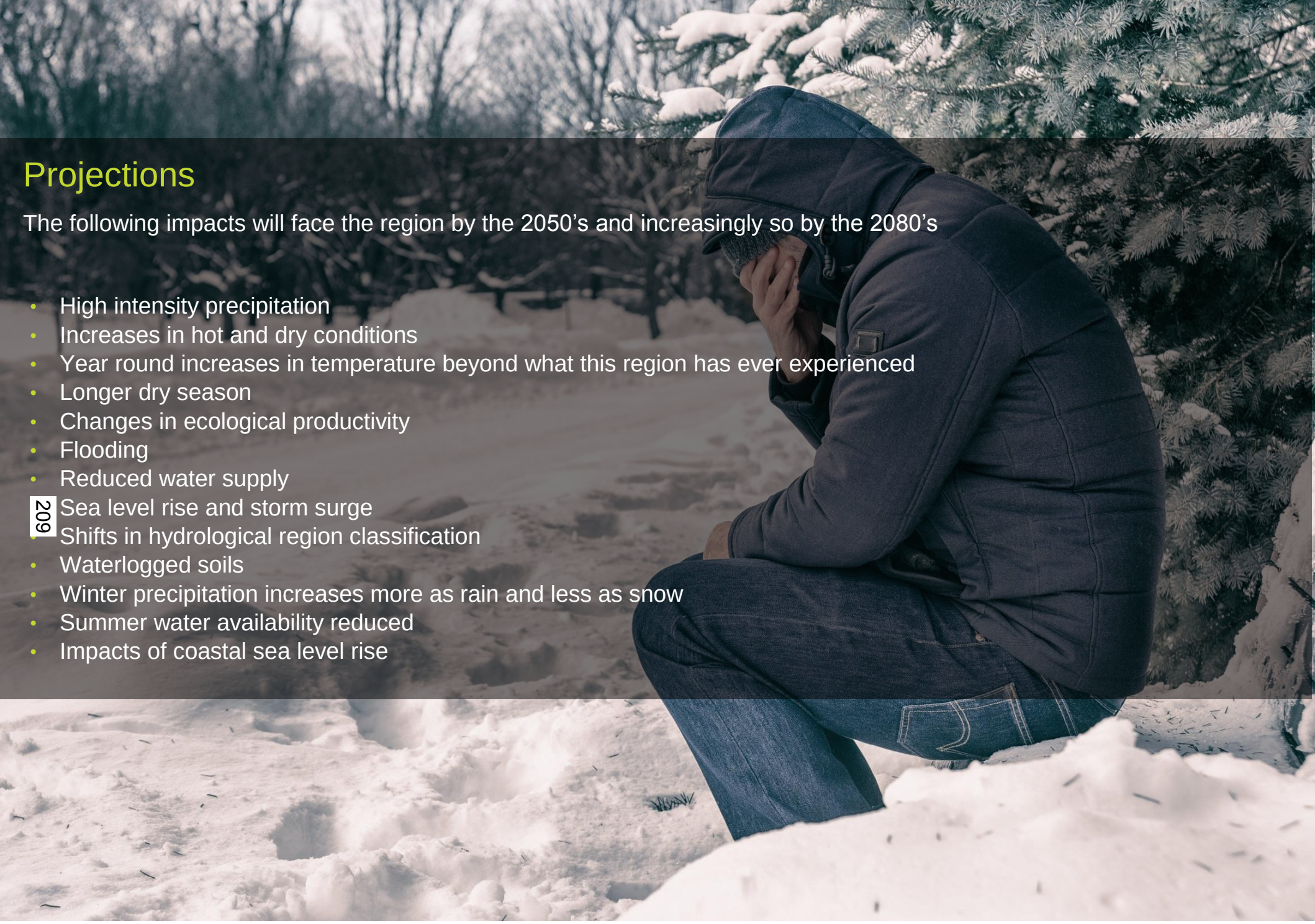
R5



Future climate forcing potentially without precedent in last 420 M years (Nature Communications ISSN 2041-1723)


Cowichan Valley Regional District
Summer Max Temperature Projections
CMIP5 Ensemble RCP85 (2041-2070)
°C
> 28
26 to 28
24 to 26
22 to 24
20 to 22
18 to 20
16 to 18
14 to 16
< 14
Latitude (°N)
49.1
49.0
48.9
48.8
48.7
48.6
-124.8
-124.6
-124.4
-124.2
-124.0
-123.8
-123.6
Longitude (°E)
207
CVRD
R5

	Developed Area			Water Supply Watersheds			West Coast Watersheds		
	Past (days)	2050s Change (days)	2080s Change (days)	Past (days)	2050s Change (days)	2080s Change (days)	Past (days)	2050s Change (days)	2080s Change (days)
Summer days (# of days >25°C)	23	31 (19 to 42)	55 (35 to 78)	16	21 (13 to 30)	40 (27 to 57)	10	18 (11 to 26)	36 (25 to 48)
	Past (°C)	2050s (°C)	2080s (°C)	Past (°C)	2050s (°C)	2080s (°C)	Past (°C)	2050s (°C)	2080s (°C)
Hottest daytime high (°C)	31	3.5 (2.2 to 4.4)	5.7 (3.9 to 7.7)	30	3.3 (2.0 to 4.0)	5.5 (3.9 to 7.3)	29	3.1 (1.9 to 3.6)	5.2 (3.8 to 6.7)
1-in-20 hottest daytime high (°C)	34	4.3 (2.6 to 5.8)	6.3 (4.3 to 8.6)	33	4.2 (2.8 to 5.3)	6.0 (4.3 to 8.1)	33	3.8 (2.5 to 4.7)	5.6 (3.8 to 7.0)



Projections

The following impacts will face the region by the 2050's and increasingly so by the 2080's

- High intensity precipitation
- Increases in hot and dry conditions
- Year round increases in temperature beyond what this region has ever experienced
- Longer dry season
- Changes in ecological productivity
- Flooding
- Reduced water supply
- Sea level rise and storm surge
- Shifts in hydrological region classification
- Waterlogged soils
- Winter precipitation increases more as rain and less as snow
- Summer water availability reduced
- Impacts of coastal sea level rise

Key messages – Regional Impacts

Impacts to the region are substantial and will affect many interrelated systems

- Ecosystems and biodiversity
  Increasing stress and species loss, disruption to biological cycles.
- Watershed and Groundwater Health Impacts on water quality and quantity affecting both communities and natural systems carrying capacity
- Health and Wellbeing
  Impacts on both physical and mental health, likely increasing in migration and disproportionate impacts to disadvantaged communities. Increased pressure on emergency management systems and programs.
- Infrastructure
  Grey and green infrastructure under increasing pressure to provide services and at risk of failure
- Economic Development. Potential opportunities as well as increased uncertainty in investment. In particular this will impact resource industries and agriculture as well as health services.
- Bioregional Carrying Capacity
  Will be under increasing pressures due to rate of change and increasing populations.
- Regional collaboration
  Growing focus on collaboration

Issues and opportunities

- Growth and infrastructure investment - The current mix of urban, suburban, rural and resource communities in the region contributes to both high emissions from transportation and land conversion as well as challenges to existing infrastructure. As the region prepares to welcome conservatively an additional 21% more people by 2041 (83,739 to 101,518) we have an opportunity to decouple growth from our use of energy to ensure we create opportunities for innovation to reduce the risk of climate change and maximize potential opportunities.

- Using a precautionary approach and based on the currently available information there is compelling support for the protection and enhanced stewardship of the regions natural resources and their ecological function to support the communities and their own intrinsic value.

- Co-benefits - taking an integrated approach by aligning climate action with other regional initiatives will ensure opportunities are leveraged to maximize community benefits and improving the quality of life in the region.

Next Steps

- Structured risk assessment and impact analysis
  - CVRD Assets
  - Policy framework
  - Integration to Watershed planning
- Support to external organizations in application of framework

CVRD

R5

Recommendations

- A list of recommendations is included in the Phase 1 report which reflect a understanding of the current issues and a precautionary approach.

- These are items that can immediately begin to be undertaken without the conclusion of the process

STAFF REPORT TO COMMITTEE

DATE OF REPORT	April 18, 2017
MEETING TYPE & DATE	Regional Services Committee Meeting of April 26, 2017
FROM:	Environmental Services Division Engineering Services Department
SUBJECT:	Watershed Management
FILE:	

PURPOSE/INTRODUCTION

To seek direction of the Board on next steps in the potential development of a watershed management function.

RECOMMENDED RESOLUTION

That it be recommended to the Board:

1. That a facilitated process to review and determine various roles and responsibilities of water governance in the region be developed.

2. That an analysis of the various options to support a watershed function for the CVRD (watershed specific, sub-regional or regional) for the committee's review and further public input be developed.

BACKGROUND

Protection of Water Resources, Response to Climate Change and Engaging our Communities have been identified as Strategic Focus Areas for the Board.

Over the past few years a number of public engagement activities have taken place focused on the theme of water in watersheds throughout the region. Currently the Cowichan Valley Regional District (CVRD) has a number of functions and programs that support these activities across the region. They are however not connected or coordinated in an efficient and strategic manner that allows for long term programs to be developed.

The most recent public engagement, at the direction of the Board, was focused on hearing from perceptions from the public of water management issues, the roles and responsibilities they believe appropriate to support watershed health, and the support for the Cowichan Watershed Board and other stewardship programs. This report summarizes the feedback from the community at open houses, through PlaceSpeak and email correspondence.

ANALYSIS

A number of themes emerged from the most recent community consultation process. Overall, there was a lot of confusion about what this stage of community engagement was about and alternative motives. Many thought it was a way of sneaking through the CVRD buying and operating the weir. Others thought it was a way to get more tax money to fund unknown watershed activities. There were only a few residents who understood this was the beginning of discussions about the future of the Cowichan watershed. The following four themes clearly emerged.

1. **Clarity on roles needed - local government, province, industry and community stakeholder groups**

There was no clear consensus on what role each group should play. But what was agreed upon is that the current system is not working. Some feel the provincial and federal governments should be responsible for watershed, and need to fulfill existing requirements. Others feel these levels of government have done little to protect watersheds, therefore local government and community groups need to step up to fill in the gap.

The topic of roles and responsibility was common throughout all the discussions, with people very passionate on either no CVRD involvement or CVRD taking a leading role. Many feel an overall watershed management plan and community-wide OCP are needed to plan for the future. Regardless of who is responsible, there was consensus the Cowichan watershed is in a crisis and needs clear management. It's just a matter of who pays and who leads.

There are a number of passionate and dedicated community members who feel the community needs to play a strong role. Many supported the Cowichan Watershed Board, Cowichan Lake and River Stewards, and other local stakeholders being involved in watershed management.

2. **Regional, sub regional vs watershed specific mandates**

It was clear that many residents see this issue about being more than the Cowichan watershed, but rather looking at a regional watershed approach. There were many references to what other regional districts are doing. There is recognition and appreciation for the fact water is our most valued asset and needs to be protected.

There was also some confusion about what is included in the Cowichan watershed, or any watershed, and its relationship to other initiatives.

3. **Education/outreach**

It was clear throughout the discussions that there is a lack of information and understanding of many of the issues. While there are some individuals who are well versed on the topics, there are many more who do not understand the full picture and feel it is the CVRD's role to educate the public on watersheds and watershed management. Some recommended a working group approach to developing water management plans.

4. **Water storage/Cowichan Weir**

Water storage was an issue with a wide range of opinions and recommendations. There was also much discussion about lakefront property owners not being consulted and being the ones who will be impacted the most by changes to the weir and water storage. Some feel these residents are deliberately being excluded, while others feel the CVRD should hold a special meeting with these owners.

There was much discussion on the role of logging on impacting water storage. Many of the discussions were about selective logging vs clear cutting, as well as protection of old growth forests. A number of participants feel logging is a major cause of water storage problems and forestry companies need to be better managed.

Another common theme is the lack of bylaw enforcement on existing bylaws that impact water storage, such as protection of riparian areas. Many residents cited examples of shoreline being destroyed with no consequences. Some feel having better enforced bylaws (recognizing the need to hire more staff), better education of existing bylaws and introduction of new bylaws would positively impact water storage.

A few residents feel only North Cowichan benefits from water storage. As such no action should be taken as residents around the lake have enough water to meet their needs.

Weir
The weir was a dominant topic of conversation, with a number of residents believing the community engagement process was specifically about the CVRD purchasing and operating the weir. Of these residents, a majority felt this was a done deal, and were greatly opposed to CVRD's ownership, rather wanting the Province and Catalyst to be responsible. For residents who looked at the weir as a question about ownership and management vs being a predetermined outcome, many feel the weir is being mismanaged as storage levels are low in the summer. Of this group, the majority also feel the management should be a Provincial and/or industry responsibility, but a number of individuals also feel the CVRD should be involved in its management as it relates to water storage during summer months.

There were also comments about making Catalyst more accountable for how they operate the weir. Some feel pumping is a viable long-term solution, others feel Catalyst should shut down its operations when the lake is very low, and others strongly believe Catalyst is responsible for low river levels. Overall there is much confusion and an admitted lack of education on the management of the weir, particularly on how and when water is held back and released.

FINANCIAL CONSIDERATIONS

N/A

COMMUNICATION CONSIDERATIONS

A link to a copy of this report will be posted on PlaceSpeak and our website so those who participated can review the report as well as see the summary of the survey.

STRATEGIC/BUSINESS PLAN CONSIDERATIONS

Protection of Water Resources, Response to Climate Change and Engaging our Communities are Strategic Focus Areas that relate to this community engagement.

Referred to (upon completion):

- ☐ Community Services *(Island Savings Centre, Cowichan Lake Recreation, South Cowichan Recreation, Arts & Culture, Public Safety, Facilities & Transit)*
- ☐ Corporate Services *(Finance, Human Resources, Legislative Services, Information Technology)*
- ☐ Engineering Services *(Environmental Services, Recycling & Waste Management, Water Management)*
- ☐ Planning & Development Services *(Community & Regional Planning, Development Services, Inspection & Enforcement, Economic Development, Parks & Trails)*
- ☒ Strategic Services

Prepared by:

Kate Miller, MCIP, RPP, LEED AP
Manager

Reviewed by:

Not Applicable
Not Applicable

Hamid Hatami, P. Eng.

General Manager

ATTACHMENTS:
Attachment A – Cowichan Watershed Survey – Final Results
Attachment A -

Cowichan watershed survey – final results

123 respondents

Ongoing concerns with decreased water levels in the Cowichan River during the summer months and a desire for more local involvement in watershed management has resulted in the CVRD Board considering the establishment of a function that would authorize the CVRD to engage in a range of water-related management activities in the Cowichan watershed.

What activities should the CVRD be undertaking to assist in managing impacts on water resources in the Cowichan Watershed? (Ranked in order of preference)

1. Support efforts to increase water storage on Cowichan Lake (37.82%)
2. Provide support to stewardship groups and entities involved in watershed management (25.71%)
3. Enhanced land use and environmental protection policies (24%)
4. Develop water sustainability plans (26.88%)
5. Monitor and report on water quality and quantity (26.83%)
6. Advocate for Provincial and Federal management (34.78)
7. None of the above (75.86%)

If you selected any of the above activities, what level of annual taxation would be reasonable to support those activities? ($ per $100,000 of assessed value)

- $0 (25.2%)
- $5 - $10 (15.45%)
- More than $15 (15.45%)
- $2.50 - $5 (14.63%)
- $10 - $15 (12.2%)
- $0 to $2.50 (12.2%)

In terms of the scope of a potential function, should the CVRD be considering water related management activities in the Cowichan watershed as a:

- Regional issue that affects residents throughout the entire Regional District (56.1%)
- Sub-regional issue affecting areas within and adjacent to the Cowichan watershed (18.7%)
- Local issue affecting only the Cowichan watershed (13.1%)
- No answer (12.2%)

Our communities rely heavily on the health of our watersheds. What are your top five concerns in relation to the Cowichan Watershed? (Ranked in order of preference)

1. Water quality and pollution prevention (30.17%)
2. Fish populations and habitat (24.11%)
3. Drinking water supply (18.1%)
4. Low water flows in summer months (24.49%)
5. Economic activities (industry, tourism, agriculture) (33.33%)
- Impact on recreation opportunities
- Cultural and heritage uses

Where does your household water come from?

- Water system operated by a municipality, the CVRD, Improvement District or private development (66.67%)
- Private well (29.27%)
- Private surface water (3.25%)

Where does your household wastewater go?

- Private septic system (61.79%)

- Sewer system operated by a municipality, the CVRD, Improvement District or private development (35.77%)
- Don’t know (0.81%)

How well informed do you think you are about water issues in the Cowichan watershed?
Well informed (56.91%)
Somewhat informed (39.84%)
Not at all informed (3.25%)

How did you hear about our survey?
PlaceSpeak (30.89%)
Other (30.08%)
In person meeting or event (25.2%)
Newspaper (10%)
CVRD website (5.69%)

STAFF REPORT TO COMMITTEE

DATE OF REPORT	April 11, 2017
MEETING TYPE & DATE	Regional Services Committee Meeting of April 26, 2017
FROM:	Recycling & Waste Management Division Engineering Services Department
SUBJECT:	Tipping Fee Exemptions - Solid Waste Management Charges and Regulations Amendment Bylaw No. 4110
FILE:	0520-20-RS/05

PURPOSE/INTRODUCTION

The purpose of this report is to introduce Solid Waste Management Charges and Regulations Amendment Bylaw No. 4110 which will amend Schedule B of Solid Waste Management Charges and Regulations Bylaw No. 2108 to provide for the exemption of tipping fees under specific conditions.

RECOMMENDED RESOLUTION

That it be recommended to the Board:

1. That Solid Waste Management Charges and Regulations Amendment Bylaw No. 4110 be forwarded to the Board for consideration of first three readings and adoption.

2. That the Free Tipping Policy dated April 8, 1998 be rescinded effective upon the adoption of Solid Waste Management Charges and Regulations Amendment Bylaw No. 4110.

BACKGROUND

To increase the efficiency of the Recycling and Solid Waste Management budget (Function 520), the current Free Tipping Policy (Policy) was reviewed as part of the Priority-Based Budgeting process in 2016.

The Cowichan Valley Regional District (CVRD) adopted the Policy at its April 8, 1998 meeting. The purpose of the Policy was to support community cleanup of public lands and waterways within the CVRD. See Attachment C for the current Policy.

Under the Policy, funding is available to a maximum of $1,000 per cleanup project; however, there is no annual dollar limit that determines how many applications can be approved, leaving Function 520 vulnerable. In addition, the current Policy is not formally associated with a CVRD bylaw, nor does it have a specific funding source associated to it.

ANALYSIS

Since 2013, the CVRD has incurred $55,644 in expenses from approximately 100 applications under the Policy. (A Free Tipping Account analysis report is provided as Attachment B). The CVRD generally receives free tipping requests from two types of applicants:

1. Applicants with specific cleanup projects on public lands (e.g., non-profit organizations cleaning up illegally dumped material); and,

2. Applicants with continuous disposal needs/projects (i.e., non-profit thrift stores and charity organizations disposing of non-reusable items on a number of occasions per year).

In 2016, the CVRD approved ten (10) applicat

under the first category and seven (7) under

second category, incurring a total cost of $4,556 and $9,218, respectively.

Going forward, the intent of bylaw amendment is to support the first category of applicants. While, the second category also provides a community service, these applicants do not participate directly in the clean-up of public lands, including over which the CVRD has jurisdiction, and therefore they do not fully meet the intent of the current policy and the proposed bylaw amendment.

Upon adoption of Bylaw No. 4110, the current Free Tipping Policy will be redundant and needs to be rescinded. The intent is to:

- ensure continued support for the first category of applicants;
- clearly define the available annual and project funding; and,
- clearly define the application requirements.

FINANCIAL CONSIDERATIONS

As set out in the amending bylaw (Attachment A), $5,000 from Function 520 will be allocated per calendar year towards the Tipping Free Exemptions.

COMMUNICATION CONSIDERATIONS

Communication with applicants will be required as well as updating of the CVRD website.

STRATEGIC/BUSINESS PLAN CONSIDERATIONS

The recommendations support the Corporate Regional Strategic Focus Area #3 – Sound Fiscal Management.

Referred to (upon completion):

- ☐ Community Services *(Island Savings Centre, Cowichan Lake Recreation, South Cowichan Recreation, Arts & Culture, Public Safety, Facilities & Transit)*
- ☒ Corporate Services *(Finance, Human Resources, Legislative Services, Information Technology)*
- ☐ Engineering Services *(Environmental Services, Recycling & Waste Management, Water Management)*
- ☐ Planning & Development Services *(Community & Regional Planning, Development Services, Inspection & Enforcement, Economic Development, Parks & Trails)*
- ☐ Strategic Services

Prepared by:

Tauseef Waraich
Manager

Reviewed by:

Not Applicable
Not Applicable

Hamid Hatami, P. Eng.
General Manager

ATTACHMENTS:
Attachment A –Solid Waste Management Charges and Regulations Amendment Bylaw No. 4110
Attachment B – Free Tipping Policy Analysis
Attachment C – Free Tipping Policy

COWICHAN VALLEY REGIONAL DISTRICT

BYLAW NO. 4110

A Bylaw to Amend Solid Waste Management Charges and Regulations Bylaw No. 2108

WHEREAS the Board of Directors of the Cowichan Valley Regional District established a scale of charges for its solid waste disposal facilities under the provisions of Bylaw No. 2108, cited as "CVRD Bylaw No. 2108 – Solid Waste Management Charges and Regulations Bylaw, 2000";

AND WHEREAS the Board of Directors wishes to amend Schedule B of Bylaw No. 2108 to provide for the exemption of tipping fees under specific conditions;

NOW THEREFORE the Board of Directors of the Cowichan Valley Regional District, in open meeting assembled, enacts as follows:

1. **CITATION**

This Bylaw may be cited for all purposes as **"CVRD Bylaw No. 4110 – Solid Waste Management Charges and Regulations Amendment Bylaw, 2017".**

2. **AMENDMENT**

That the following new section be added to Schedule B of Bylaw No. 2108:

6. **Tipping Fee Exemption**

Upon application, tipping fees will be waived subject to the following conditions:

a) The applicant must be a non-profit or non-government organization that undertakes clean-up, rehabilitation, or enhancement of public lands and waterways within the CVRD's jurisdiction.

b) The materials that will be disposed of must directly derive from the clean-up, rehabilitation, or enhancement of the public lands and waterways within the CVRD's jurisdiction.

c) Garbage and recyclable items must be pre-sorted before disposed at Disposal Facilities, and the disposal of all materials must comply with the conditions set by Bylaw No. 2108.

d) The maximum tipping fee waiver amount is $500 per clean-up project.

e) If the total tipping fee charges exceed the maximum waiver amount of $500 per clean-up project, the applicant must pay the excess amount.

f) The total value of all approved Tipping Fee Exemption applications must not exceed $5,000 per calendar year.

g) Clean-up cannot involve projects that displace work carried out by local government staff or contractors or private sector companies.

h) Clean-up projects must be completed within a short period of time (maximum 2 months).

i) The applicant will be required to present an approved Tipping Fee Exemption application form issued by the Engineering Services Department upon arrival at a Disposal Facility. Failure to provide this will lead to the applicant being denied the waiving of tipping fees.

READ A FIRST TIME this _____ day of _____ , 2017.

READ A SECOND TIME this _____ day of _____ , 2017.

READ A THIRD TIME this _____ day of _____ , 2017.

ADOPTED this _____ day of _____ , 2017.

Chairperson

Corporate Secretary

Regional Engineering Services Committee
April 26, 2017
Tipping Fee Exemption Analysis

Table 1: Summary of Tipping Fee Exemptions Provided (2013 - 2016)

		Met the Policy	Did Not Fully Meet the Policy		
		Community Clean Up Events	**Non-Profit Organizations Ongoing Disposal***	**Other (Individuals collecting litter and special event clean-up)**	**Totals**
2013	**Number of Applicants**	8	9	3	20
	Total Tonnage	22.43	67.23	2.12	92
	Total Cost to CVRD	**$3,140**	**$9,412**	**$296**	**$12,848**
2014	**Number of Applicants**	12	9	5	26
	Total Tonnage	20.42	71.78	3.64	96
	Total Cost to CVRD	**$2,858**	**$10,049**	**$510**	**$13,416**
2015	**Number of Applicants**	13	6	5	24
	Total Tonnage	34.51	72.77	2.31	110
	Total Cost to CVRD	**$4,831**	**$10,188**	**$323**	**$15,343**
2016**	**Number of Applicants**	10	7	5	22
	Total Tonnage	32.55	65.85	1.88	100
	Total Cost to CVRD	**$4,556**	**$9,218**	**$263**	**$14,038**
	Total Spent On Each Category 2013-2016	**$15,385**	**$38,867**	**$1,392**	**$55,644**

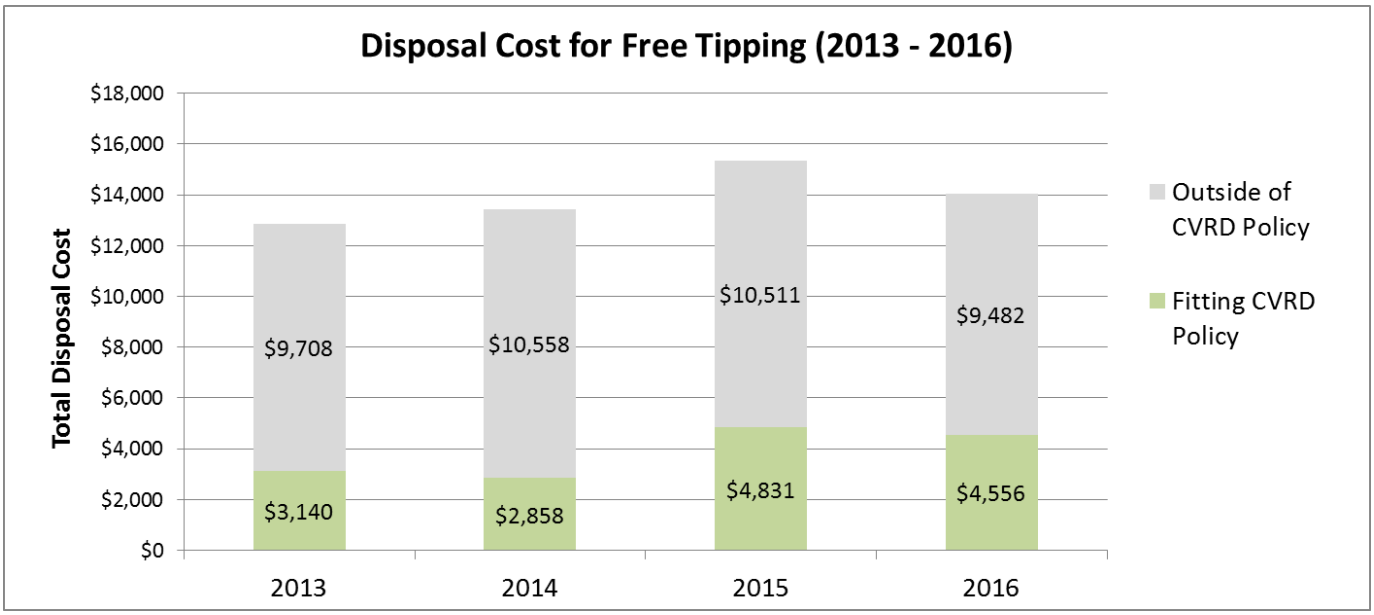
*Includes thrift stores and social welfare organizations

**Data up to December 19, 2016

Table 2: Percent of Total Cost from Each Application Category (2013 – 2016)

	2013	2014	2015	2016
Community Clean Up Events	24.4%	21.3%	31.5%	32.5%
Non-Profit Organizations for Ongoing Disposal (i.e. thrift stores, social welfare organizations)	73.3%	74.9%	66.4%	65.7%
Other (Individuals collecting litter and special event clean-up)	2.3%	3.8%	2.1%	1.9%

Figure 1: Summary of Disposal Costs Associated with Applications That Did Not Fully Meet the Policy (2013 – 2016)



CVRD

AUTHORIZATION NUMBER:

APPLICATION FORM - FREE TIPPING/SOLID WASTE DISPOSAL

(Please Review Free Tipping/Disposal Policy on Reverse Side)

Return to CVRD Engineering Services Department:
Mail or drop off application to 175 Ingram Street, Duncan, BC, V9L 1N8
Phone: 250-746-2530 Fax: 250-746-2543

Applicant's Name: _____
(Please print surname, given name, initial - applicant must be an adult)

Organization/Group: _____
(Must be non-profit or non-government organization or group that cannot benefit financially from project)

Registration Number: _____
(Society number/non-profit cooperative CP Number if applicable)

Mailing Address: _____ ***Phone:*** _____
(Full mailing address including postal code and daytime phone number)

Name of Event: _____

Date(s) of Event: _____
(Must be a project-specific activity that is completed within a short period of time – three months maximum)

Location of Event: _____
(Must include the clean-up, rehabilitation or enhancement of public lands/waterways within CVRD boundaries)

Preferred Disposal Facility and Day: _____
(CVRD Bings Creek Solid Waste Management Complex, 3900 Drinkwater Road, Duncan, open 8:00 am – 5:00 pm, 7 days a week except statutory holidays)

Vehicle Licence Plate #(s): _____
(Must list licence plate number(s) of all vehicle(s) dropping-off waste – only listed vehicles will be permitted)

Types of Waste to be Collected: _____
(For example: vehicle parts, recyclables, camping refuse, litter, residential garbage, building materials, etc.)

Quantity of Waste to be Disposed: _____
(Estimated weight in metric tonnes, or volume e.g. number of garbage bags or pick-up truckloads)

NOTE TO APPLICANT:
Any recyclable materials collected must be separated from waste going to disposal. Some charges apply for certain recyclable materials such as gypsum/drywall board at $200.00 per tonne. Such charges will be included within the total free tipping/disposal calculations and should be considered when estimating the value limit request. Recyclable materials and costs are most easily determined by contacting the CVRD Recycling Hotline during office hours at 250-746-2540 or toll free 1-800-665-3955.

Value of Free Disposal: _____
(Estimated weight of materials x current tipping fees e.g. $140.00 per tonne for general waste = $ value of request)

I have read and understood the conditions upon which this free tipping/disposal application is based, as stated above and on the reverse side of this application:

Signature of Applicant: _____
Signature **Date**

For Office Use Only:
☐ ***Request Approved:***
☐ ***Request Denied:*** _____

(Manager, Recycling & Waste Management, Engineering Services) Date

Approval Conditions: $1,000.00 maximum Manager approval.

CVRD FREE TIPPING/SOLID WASTE DISPOSAL POLICY

The Cowichan Valley Regional District adopted the following 'Free Tipping' policy at its April 8, 1998 meeting.

The following CVRD policy concerning free tipping will be the basis for review of all applications, and the conditions upon which any approval may be awarded:

Free Tipping:

1. *Must include the clean-up, rehabilitation or enhancement of public lands/ waterways within CVRD boundaries.*

2. *Is limited to non-profit or non-government organizations or groups that cannot benefit financially from such a privilege.*

3. *Is based on a maximum tipping fee limit of $1,000.00 (amended August 25, 2004) per project that will be tracked and reconciled at the CVRD's Solid Waste Management Complex (SWMC) weigh scale. In the event that the $1,000.00 (amended August 25, 2004) limit is exceeded, the billed amount will automatically be referred to the governing committee for review.*

4. *Must not include any recyclable materials that are currently managed under the CVRD Solid Waste Reduction Program.*

5. *Cannot involve projects that displace work previously carried out by municipal staff or contractors, or private sector companies.*

6. *Cannot apply to continuous projects, and only apply to project specific activities that are completed within a short period of time (three months maximum).*

7. *Is further defined in a "Free Tipping Application Form" that must be completed by the applicant.*

8. *Will require the presentation of a Letter of Authorization issued by the CVRD upon arrival at the SWMC.*

9. *Is administered by the Engineering & Environmental Services Department and does not require referral to (a) governing CVRD committee(s) unless deemed appropriate by the Engineering & Environmental Services Department.*

10. *Applications will be responded to by the Engineering Services Department within 20 working days.*

11. *Requires that an adult sign the application form – thereby being responsible for ensuring that all conditions set out by the CVRD are adhered to.*

12. *Requires that all projects are subject to random audits and that, if any of the application conditions set out by the CVRD are compromised, collected materials may be refused or double-tipping fees may be applied.*

13. *Applications recognize that the CVRD will not be held legally responsible for any injury or damage that may occur as a result of the project.*

14. *Applicants requesting Free Tipping privileges for large indoor or outdoor special events must implement a Zero Waste theme for the event with appropriate signage and recycling/waste diversion options.*