REGIONAL DISTRICT OF NANAIMO

REGIONAL DISTRICT OF NANAIMO
DRINKING WATER AND WATERSHED PROTECTION TECHNICAL ADVISORY COMMITTEE
AGENDA

Thursday, April 19, 2018

12:30 P.M.

RDN Board Chambers

Pages

1. CALL TO ORDER

2. APPROVAL OF THE AGENDA

3. ADOPTION OF MINUTES

3.1 Drinking Water and Watershed Protection Technical Advisory Committee Meeting - October 18, 2017 3

That the minutes of the Drinking Water and Watershed Protection Technical Advisory Committee meeting held October 18, 2017, be adopted.

4. INVITED PRESENTATIONS

4.1 Update on Water Data Management
Staff will provide presentation.

4.2 Surface Water Quality Trend Analysis - Upcoming Project
Staff will provide presentation.

4.3 DWWP Action Plan Review and Update - Upcoming Project
Staff will provide presentation.

4.4 Cowichan Valley RD's Proposed DWWP Referendum
Committee member will provide presentation.

4.5 VIU Wetland Research Update
Delegate will provide presentation.

4.6 Update on Team WaterSmart Activities
Staff will provide presentation.

4.7 Update on Rebate Programs
Staff will provide presentation.

4.8 **Provincial Groundwater Quality Data Consolidation Pilot**
Delegate will provide presentation.

4.9 **Englishman River Watershed Recharge Study**
Delegate will provide presentation.

5. UNFINISHED BUSINESS

6. REPORTS

6.1 **Irrigation Check-Up Evaluation Report** 6

6.2 **RDN Water Conservation Evaluation Report - Draft for Comment**
A copy of this draft report will be circulated separately to Committee Members prior to the meeting.

7. NEW BUSINESS

8. ADJOURNMENT

REGIONAL DISTRICT OF NANAIMO

REGIONAL DISTRICT OF NANAIMO

MINUTES OF THE DRINKING WATER AND WATERSHED PROTECTION TECHINCAL ADVISORY COMMITTEE MEETING

Wednesday, October 18, 2017
12:30 P.M.
RDN Board Chambers

In Attendance:	S. De Pol	Chair, Regional District of Nanaimo
	K. Epps	Forest Industry Representative
	L. Magee	Island Health
	H. Rueggeberg	General Public Representative (South)
	B. Sims	Municipal Representative (City of Nanaimo)
	G. Wendling	Hydrogeologist Representative
	P. Lapcevic	BC Ministry of Forests, Lands & Natural Resource Operations
	A. Fiddick	Environment Community Representative
	P. Law	General Public Representative (North)
	B. Weir	Municipal Representative (Town of Qualicum Beach)
	L. Cake	Water Purveyors (Coastal Water Suppliers)
	P. Jorgenson	Forest Industry Representative
	N. Leone	Department of Fisheries and Oceans
Regrets:	K. Miller	Cowichan Valley Regional District
	F. Spears	Municipal Representative (District of Lantzville)
	M. Squire	Municipal Representative (City of Parksville)
	A. Gilchrist	Academic Community Representative (VIU)
	O. Brandes	Academic Community Representative (POLIS)
	P. Shaw	Mt Arrowsmith Biosphere Region
	W. Shulba	Islands Trust Representative
Also in Attendance:	J. McCallum	Regional District of Nanaimo
	J. Pisani	Regional District of Nanaimo
	G. St.Pierre	Regional District of Nanaimo
	J. Holm	Regional District of Nanaimo
	R. Alexander	Regional District of Nanaimo

CALL TO ORDER

The Chair called the meeting to order and respectfully acknowledged the Coast Salish Nations on whose traditional territory the meeting took place.

APPROVAL OF THE AGENDA

It was moved and seconded that the agenda be approved as presented.

CARRIED UNANIMOUSLY

ADOPTION OF MINUTES

Drinking Water and Watershed Protection Technical Advisory Committee Meeting - March 21, 2017

It was moved and seconded that the minutes of the Drinking Water and Watershed Protection Technical Advisory Committee meeting held March 21, 2017 be adopted.

CARRIED UNANIMOUSLY

INVITED PRESENTATIONS

Roundtable Updates

Committee members provided roundtable updates on current activities.

Update on Policy B1.21 Review

J. Pisani updated the committee on the work done so far to review and update this policy for groundwater assessment requirements for rezoning applications. One key addition is a comprehensive checklist with requirements of the professional report. Comments from the committee included that it was a major improvement over the current policy in terms of clarity.

Update on Hydrometric Monitoring

J. Pisani updated the committee that two lake level gauges are to be installed in November. One on Holden Lake and one on Quennell Lake, as part of the expanded water monitoring in the Cedar-Yellowpoint area, a priority area for Phase 2 of the Water Budget study. Streamflow and level monitoring on Holden Creek will also be implemented as part of this expansion.

Update on Volunteer Monitoring Well Network Expansion

J. Pisani updated that 15 new volunteer observation wells were added to the DWWP network this August in three priority areas: 4 in Nanoose; 5 in French Creek and 6 in Cedar. The expansion focused on stressed aquifers. Comments from the committee included that 5-10 years of records are needed to draw conclusions on groundwater level data collected.

State of our Aquifers - Reports & Newsletter

J. Pisani requested feedback on the draft newsletter circulated before the meeting. Feedback on images and content was given by committee members. The main challenge noted was to balance having the newsletter be easily understood by an average reader with no subject matter expertise, while still reporting some technical information of interest. A mail-out is planned for early November.

DWWP Data Management Framework

J. Pisani requested feedback on the draft Data Management Framework report circulated before the meeting. Comments included suggestions to work closely with the Province to ensure compatibility and learn what has worked well for them with managing similar data. The Provincial representative noted that their agency is struggling with implementing something similar. Suggestions to move away from an Excel based format to a more integrative software or database program were well-taken, to integrate with GIS is important and to consider real-time measurements. It is Important to know what data you need for what end purpose.

GIS Water Map

J. Pisani presented the newly updated internal GIS Water Map. The aim is to launch before December 1st. Comments from committee included that this will be an important resource for the Groundwater Assessment policy (B1.21).

Upcoming GSC Workshop at VIU

J. Pisani requested committee members to 'save-the-date' for an upcoming workshop at VIU which would be a knowledge transfer from the Geological Survey of Canada based on their study of the Nanaimo Lowlands Aquifers.

CORRESPONDENCE

Letter Dated July 17, 2017 re A. Fiddick

A. Fiddick brought forward a letter included on the agenda, but the Chair reflected that it was not an appropriate topic for discussion at the Technical Advisory Committee meeting as it pertains to land use regulations on an individual parcel. The group that wrote the letter is planning to make a delegation to the Board, and that is the more appropriate venue.

ADJOURNMENT

It was moved and seconded that the meeting be adjourned.

CARRIED UNANIMOUSLY

TIME: 2:50 PM

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CHAIR

Team WaterSmart Free Irrigation Check-up Service: Conservation Program Impact Evaluation

Prepared for Team WaterSmart, Drinking Water & Watershed Protection Program

Regional District of Nanaimo

By Hannah McSorley

March 2018

CONTENTS

OVERVIEW

Since 2011, the Regional District of Nanaimo's Team WaterSmart has provided a free irrigation check-up service to residents. This service is designed to identify water waste associated with automated irrigation systems, to educate the participants about efficient residential irrigation, and to positively disrupt high water consumption habits by facilitating outdoor water conservation. In 2011, the service was open to all interested residents in the RDN; and from 2012 to 2017, the service was targeted toward residents who were flagged for high summer water use. For each participating residential address, water meter data from RDN water service areas and each municipal water service area were collated and analyzed to quantify changes in summer water consumption following participation in this conservation program. Results of this analysis show that the Team WaterSmart Irrigation Check-up service coincided with reduced water consumption habits across the RDN for the majority of participants. Based on available data, sixty-five percent of participants across the RDN reduced their summer water-use after taking part in the Team WaterSmart Irrigation Check-up Service. Significant reductions in water use across the region averaged a net conservation of 5452 m^3 (almost 5.5 million liters of water) from 2011 to 2016.

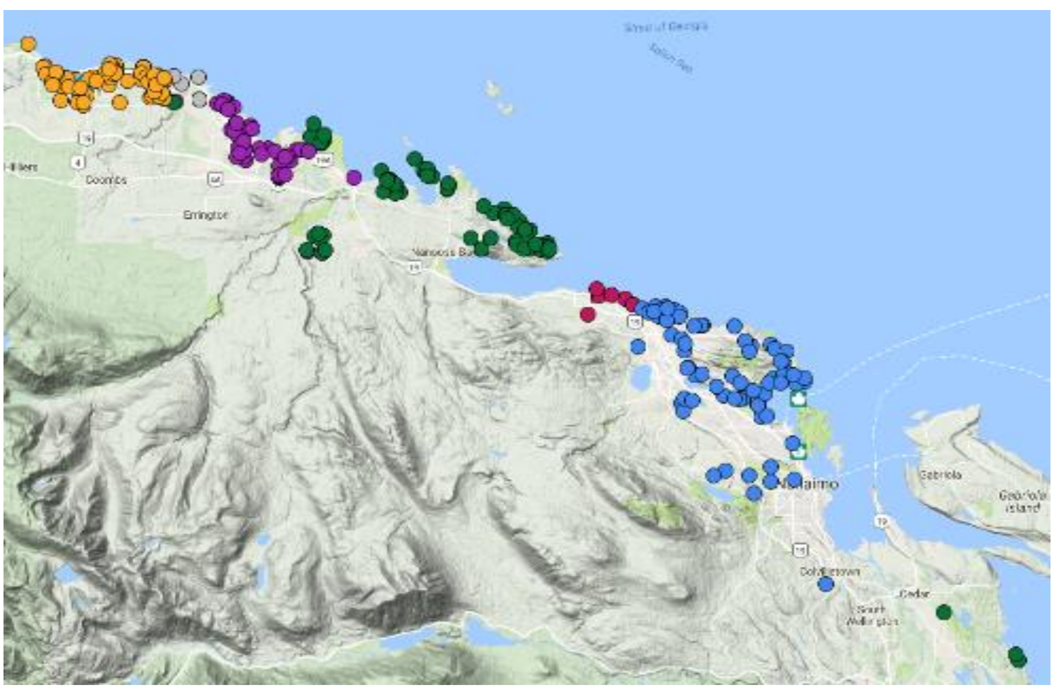

Figure 1: Team WaterSmart completed 299 free Irrigation Check-ups for high water-users across the region from 2011 - 2017. To access an interactive map use this link: [Interactive Map Link]

QUALITY ASSURANCE AND DATA HANDLING

Summer water-meter readings (May to September) were collated for all Irrigation Check-up participants in each water service area.[1] Data were checked for quality and accuracy to ensure that homeownership was consistent with the participant(s) through the period of record. The goal of this analysis was to evaluate the impact of Team WaterSmart Irrigation Check-up Service (TWS-ICS) on participant's water-use habits. As such, if home-ownership changed from the participant(s), the corresponding data was removed from analysis; and if a major leak was reported the corresponding summer data was removed as an outlier. Similarly, if insufficient data were available for a participant address they were not included in the analysis (for example, as of January 2018 there is no *after* data available for participants from 2017, so that group was excluded from this analysis). Table 1 summarizes the total number of irrigation check-ups performed (299) in each water service area and the portion (231) of data that was analyzed for each area.

Table 1: Number of TWS-IC Completed and Portion of Data Analyzed

Water Service Area	TWS-IC Completed	Insufficient Data	analyzed	Data Analyzed
Qualicum Beach	69	10	59	86%
Parksville	45	17	28	62%
Lantzville	10	2	8	80%
Nanaimo	81	20	61	75%
RDN	88	14	75	85%
EPCOR	6	6	0	0%
Regional Totals	299	69	231	77%

CALCULATIONS AND STATISTICS

Summer water consumption varies from year to year due to myriad unmeasured variables. To evaluate whether TWS-ICS helped participants to reduce summer water consumption, it was important to determine if a change in water consumption was observable above the variation in average summer water-use. Variation in each participant's water-use was calculated as the standard deviation from their average summer meter readings.[2] To measure changes in water consumption relative to participation in TWS-ICS, average summer water-use for the periods *before* and *after* participation were compared. A change in water consumption was considered significant if the absolute change was greater than the standard deviation; that is, a change was deemed significant if it was measurable outside of the annual variation in water use.[3]

[1] Data from the six participating residences in EPCOR water service area were not obtained

[2] Standard deviation is the statistical distribution of measurements around the average (results are often expressed as an average "plus or minus" the standard deviation).

[3] Statistical significance was not calculated using *p values, z-test, t-test or matched-pairs.* In this report, "Significant" indicates that the absolute change in water-use was greater than the standard deviation of average water use.

RESULTS

This report includes several approaches to quantifying the impact of the Team WaterSmart Irrigation Check-up Service (TWS-ICS) program. Discussions of each approach follow, including evaluations by number of participants, year of participation, volumes of water, and notes on relationships between precipitation and summer water-use.

OVERALL CHANGES IN PARTICIPANT WATER USE

After taking part in TWS-ICS, sixty-five percent of participants across the Regional District of Nanaimo reduced their summer water use (Figure 2). Thirty-nine percent of participants reduced their consumption dramatically enough that it was measurable above their average fluctuation in use ("significant decrease"), and twenty-six percent reduced their overall water use by an amount that fell within the distribution of annual fluctuations ("minor decrease"). While the majority of participants in this program reduced their overall summer water-use following TWS-ICS, a minority (thirty-five percent), of participants increased their water use following participation, with fifteen percent increasing use significantly.

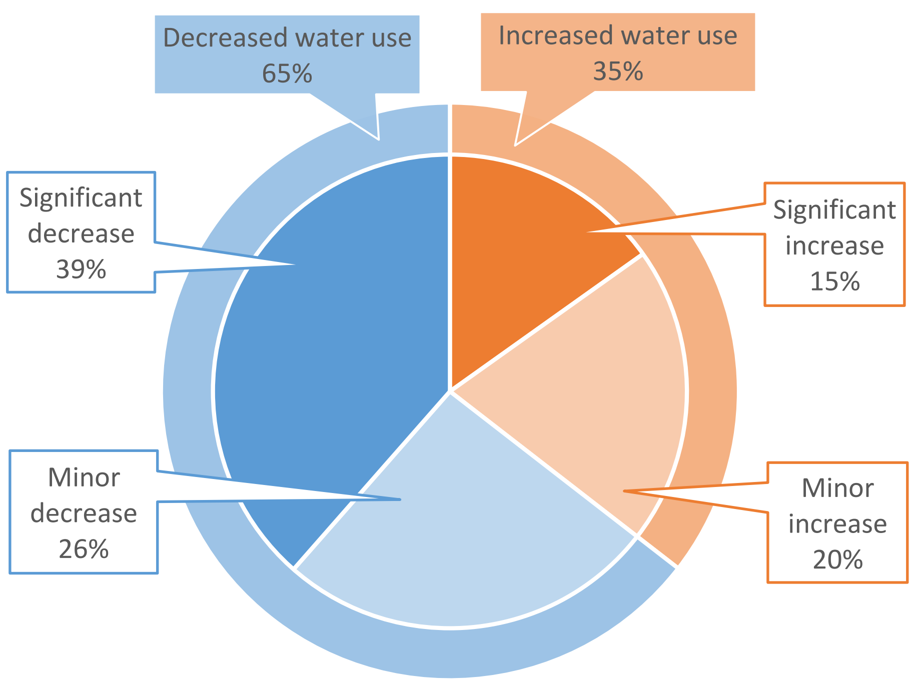

Figure 2: Summary of water-use changes for residents who participated in TWS Irrigation Check-up Service from 2011 to 2016 across all water service areas in the RDN. These results represent 75% of all participants from 2011-2017, based on available and adequate data. Of the data analyzed, 65% of participants reduced water use following TWS-ICS.

The overview shown in Figure 2 illustrates that over the lifetime of the Team WaterSmart Irrigation Check-up Service program (TWS-ICS), the majority of participants reduced their water use in a measurable way following participation and a minority of residents increased their water use following participation. As with any public service or program, not all participants will reap the benefits. Unfortunately, there is not enough information available to explain *why* some participant's water consumption increased. However, the significant increase in water use is elaborated on in the section *Quantifying Conservation by Water Volume*.

EVALUATION BY YEAR

For each year of TWS-ICS, the resulting changes in water-use were dominated by reductions compared to increases. Figure 3 shows each year of TWS-ICS participants grouped into the four categories of water-use changes (significant and minor decreases and increases).

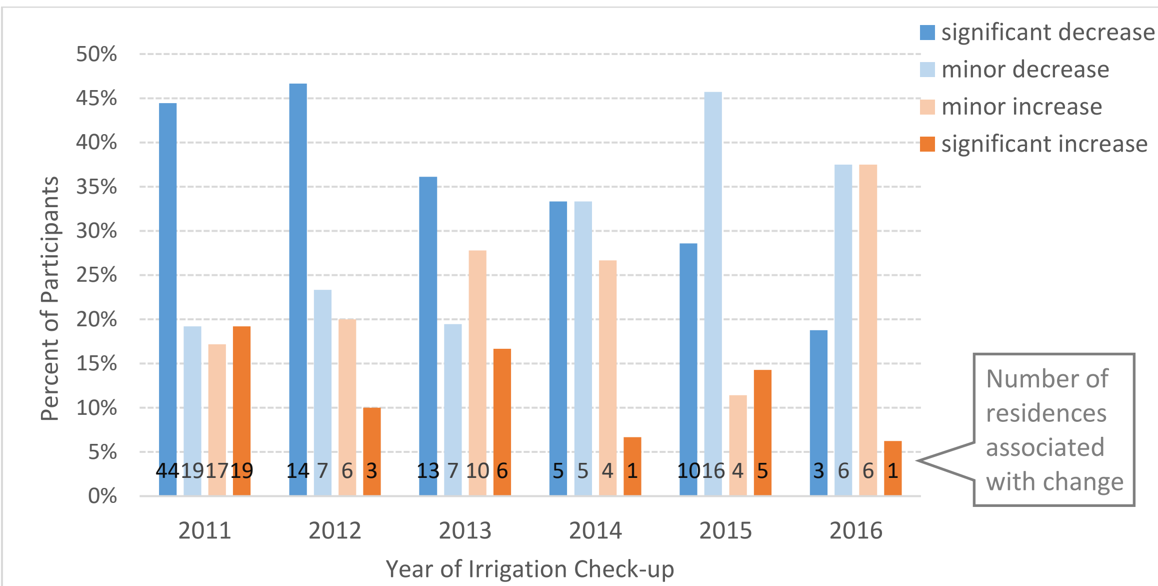

Figure 3: Impact of TWS-ICS by year of program offering, showing percent change in water-use (broken out by category of change) following participation and the number of participants associated with each change.

It is interesting to note that significant decreases in water use appear to decline with progressing years of the program, with a shift towards more minor decreases. For check-ups in 2016, only one year of summer water-use data was available to reference for the period after participation, which likely reduced the number of significant changes relative to minor changes. Similarly, participants from earlier years of the program had a longer follow-up period with a greater number of meter-readings to contribute to their water-use average, likely resulting in a greater proportion of significant decreases relative to minor decreases. If a similar analysis was completed in the future (when longer periods of water-meter records were available), it is very possible that the proportion of significant to minor decreases would shift to favor significant changes.

Each year of TWS-ICS had a different number of participants with a different distribution across regional water service areas. Table 2 summarizes the number of participants in each water service area for each year of TWS-ICS, as well as the total number of participants from each year.

Table 2: Number of participants by year of Team WaterSmart Irrigation Check-up in each area

Water Service Area	Number of Participants	2011	2012	2013	2014	2015	2016
Qualicum Beach	59	35	1	9	3	8	3
Parksville	28	9	7	5	3	4	0
Lantzville	8	0	1	2	4	0	1
Nanaimo	61	28	12	6	1	13	1
RDN	75	27	9	14	4	10	11
Total participants	231	99	30	36	15	35	16

EVALUATION BY SERVICE AREA

The number of participants in each water service area and the number of participants associated with each category of change are summarized in Table 3. The percentages of participants associated with each water-use change category are organized by water service area in Figure 4.

Table 3: Participants in each area and the number associated with each water-use change category

Water Service Area	Number of Participants	Significant decrease	Minor decrease	Minor increase	Significant increase
Qualicum Beach	59	29	16	11	3
Parksville	28	17	4	4	3
Lantzville	8	4	2	1	1
Nanaimo	61	14	13	14	20
RDN	75	25	25	17	8
Total Participants	231	89	60	47	35

The proportion of check-ups completed in each water service area (Table 3) does not indicate the overall changes seen in each area (Figure 4). For example, Nanaimo and Qualicum Beach had nearly the same number of participants (61 and 59, respectively) but changes in water use by number of participants in these area are very different.

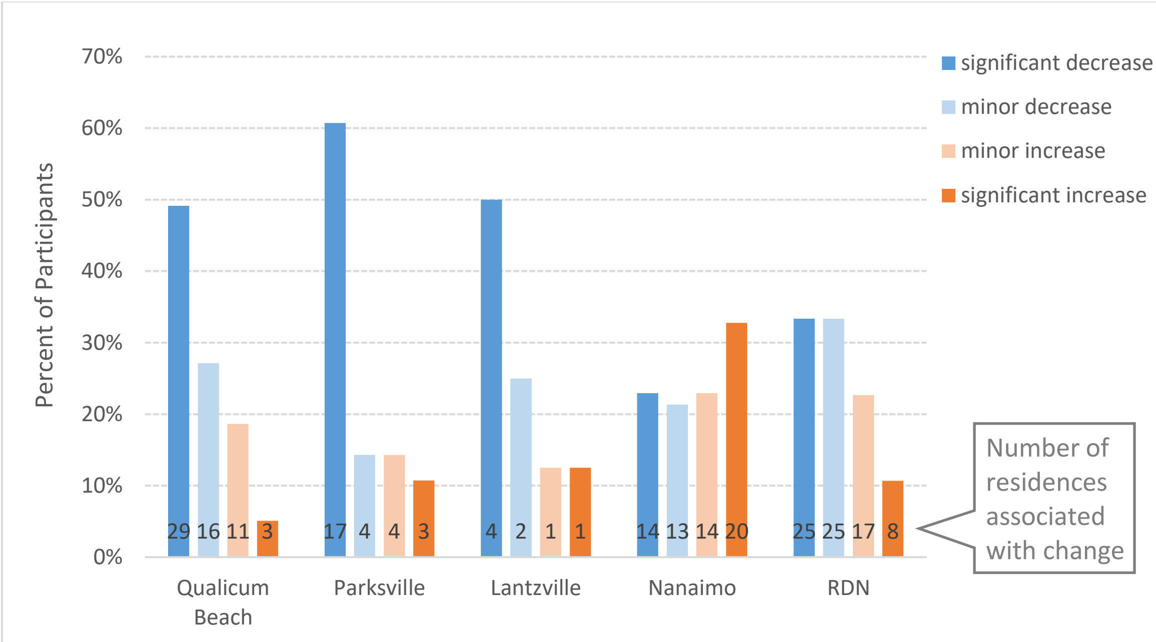

Figure 4: Changes in water-use by water service area, showing the percentage and number of participants associated with each category of change in water-use habits.

The majority of participants in each of the water service areas, except for the City of Nanaimo, reduced their water-use following participation in TWS-ICS. The results shown in Figure 4 reflect the number of participants associated with each category of change, but not necessarily their magnitude of influence on overall conservation. The available data offers no explanation as to why a majority of participants in the City of Nanaimo increased their water use in years following participation. However, some insight may be gained by evaluating the volumes of water associated with each water service area and each category of water-use change (next section).

QUANTIFYING CONSERVATION BY WATER VOLUME

The volumes associated with significant changes in water-use were used to quantify the magnitude of TWS-ICS impact on water conservation. Volumes associated with measurable significant change in water-use (volume changes greater than average variation in summer use) for participants in each water service area were compared. Figure 5 shows the cumulative volumes associated with significant increases and decreases in each area, including the net effect of these changes (i.e., how the volumes of significant increases and decreases balanced out).

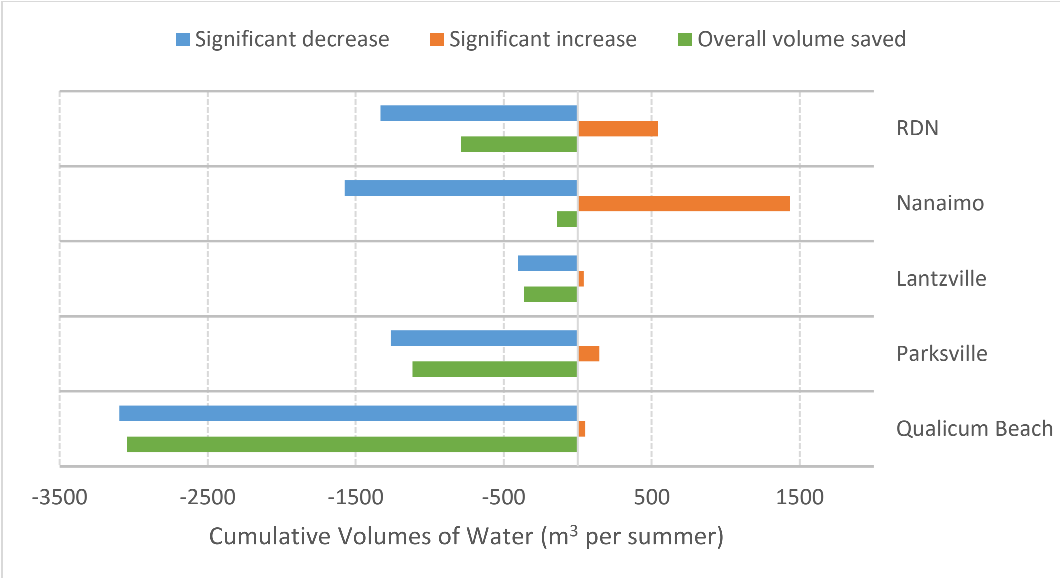

Figure 5: Cumulative volumes of water by area for all participants from 2011-2016 who significantly changed their water-use habits following participation in TWS-ICS. Negative volumes indicate significant water-use reductions and positive volumes indicate significant water-use increases. The green bars show the difference between increases and reductions, illustrating a net conservation in all water service areas over the lifetime of the TWS-ICS program.

Although a minority of participants increased their water use following participation in TWS-ICS, the cumulative volumes associated with significant decreases in water-use were much greater than the volumes associated with increased consumption (Figure 5). The balance between significant increases and decreases in volume resulted in net conservation of water in each area. So, although a majority of participants in Nanaimo increased their water-use, the associated volumes resulted in net conservation. From 2011 to 2016, participants across the region saved almost 5.5 million liters (5,452 m^3) of water through significant reductions. These results, as well as the number of participants associated with each change, are summarized in Table 4.

Table 4: Cumulative Average Summer Volumes Associated with Significant Changes in Each Area

Water Service Area	**Significant Decrease**		**Significant Increase**		**Total Volume Saved per Service Area (m^3)**
	Volume (m^3)	Number of Participants	**Volume (m^3)**	Number of Participants	
Qualicum Beach	**3096.3**	29	**52.5**	3	**3043.8**
Parksville	**1262.1**	17	**146.0**	3	**1116.1**
Lantzville	**403.2**	4	**41.3**	1	**361.9**
Nanaimo *	**1575.0**	14	**1434.2**	20	**140.9**
RDN	**1332.2**	25	**542.8**	8	**789.3**
Region-wide total	**7668.7**	89	**2216.7**	35	**5452.0**

* converted from imperial gallons per day to cubic meters per summer, assuming 112 days in billing period

The net conservation by water service area (5452 m^3) represents the cumulative average volume of summer water saved in all areas over the lifetime of TWS-ICS data analyzed.[4] For six years (2011-2016) of TWS-ICS, the net conservation averaged to 908.7 m^3 saved per summer. These region-wide conservation values are summarized in Table 5, which also shows the cumulative volumes associated with significant decreases and significant increases. [5]

Table 5: Net Conservation by Water Service Area: Outcomes Following TWS-ICS

Observed Change	Total Volume Associated (m^3)	Average Volume per Summer (m^3)
Significant decrease	7668.7	1278.1
Significant increase	2216.7	369.5
Overall volume saved	**5452.0**	**908.7**

Table 6 shows participant's average summer water-use for each area, with a region-wide average of 1334 m^3 across all water service areas. Comparing the regional average water conservation (908.7 m^3 /summer) and average summer water-use, participants across the region have conserved an average of sixty-eight percent of their average summer water use.

Table 6: Average Participant Water Use each Summer over the Years of TWS-ICS

Water Service Area	Average Summer Use per Participant by Year (m^3)						Average Summer Use (m^3)
	2011	2012	2013	2014	2015	2016	
Qualicum Beach	307	329	332	339	347	319	329
Parksville	249	252	239	254	229	240	244
Lantzville	263	233	325	194	135	222	229
Nanaimo *	250	267	288	313	262	275	276
RDN	255	248	248	302	229	258	257
Region-wide total	1325	1329	1432	1402	1200	1314	1334

* converted from imperial gallons per day to cubic meters per summer, assuming 112 days in billing period

Overall, participants from Qualicum Beach reduced their water use most dramatically and contributed most to the regional conservation total (Figure 5, Table 4). Participants from Qualicum Beach also used the greatest amount of water per summer on average. Conversely, the area with the lowest average summer use (Lantzville) did not contribute the least to overall conservation.

[4] The net conservation is based on the volume difference between significant changes only, as minor changes do not have a measureable volume outside of inter-annual variation.

[5] Volumes from Nanaimo were converted from Imperial Gallons per day to cubic meters per summer, assuming 112 days per summer billing period. If the summer billing period was longer, the net volume conserved would be greater than what is shown here (e.g. for 124 day billing period in Nanaimo, net conservation would be 5,467 m^3).

PRECIPITATION AND WATER-USE PATTERNS

Summer water-use is predominantly outdoor irrigation; hypothetically, when it rains more, less water should be required for outdoor irrigation. To test this hypothesis, average summer precipitation was compared to average summer water-use in each area. Total precipitation data from Environment Canada were obtained from Little Qualicum Hatchery, Qualicum Beach Airport, Nanaimo City Yard, and Nanaimo Airport weather stations. The location of each weather station relative to the locations of TWS-IC is shown in Figure 6. Total precipitation data from each weather station were averaged for the summer period of May to September for each year of TWS-ICS. From 2011 to 2016, there were differences between precipitation measurements made at each weather station, but there were similar rainfall trends (Figure 7). Because local rainfall patterns vary, amounts of precipitation received at each participating TWS-ICS property would not necessarily be represented accurately by measurements made at any one weather station. Therefore, a "regional rainfall" was calculated by averaging the total precipitation at each of the four weather stations. Figure 7 shows the average rainfall measured at each weather station, as well as the average regional rainfall (with error bars expressing the range between each station's measurements). To search for an observable relationship between summer water use (outdoor irrigation) and precipitation, regional rainfall was graphed with average summer water use from each area (Figure 8). In addition to Figure 8, individual graphs of each water service area and regional precipitation are appended to this report to better illustrate the unique relationships between high water-users summer consumption and precipitation in each water service area.[6]

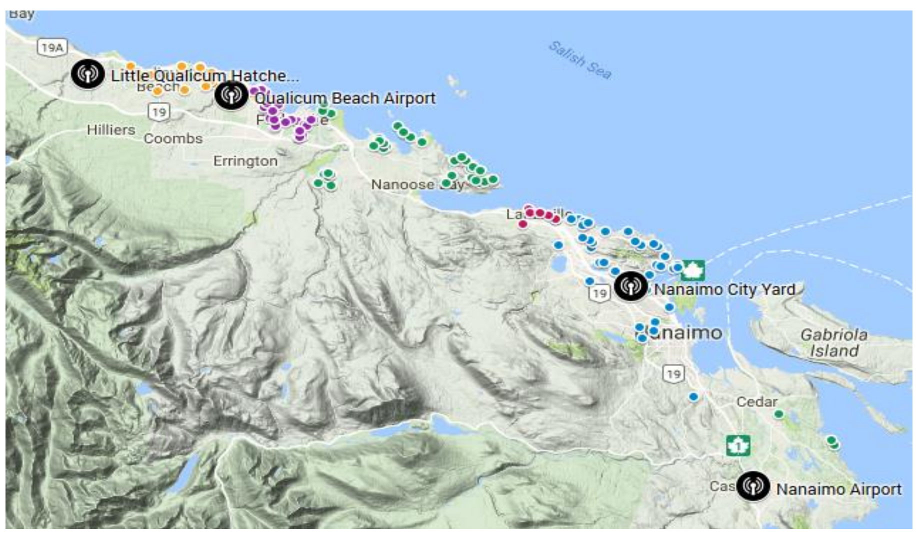

Figure 6: locations of each Environment Canada Weather Station in the RDN (black icons), and their relative position to Irrigation Check-up locations. Access an interactive via this link: [Interactive Map Link]

[6] Recall that this data represents the *high-water-users* who participated in TWS-ICS and the relationships between water-use and precipitation may or may not be representative of water-use patterns across each water service area for *all* residents.

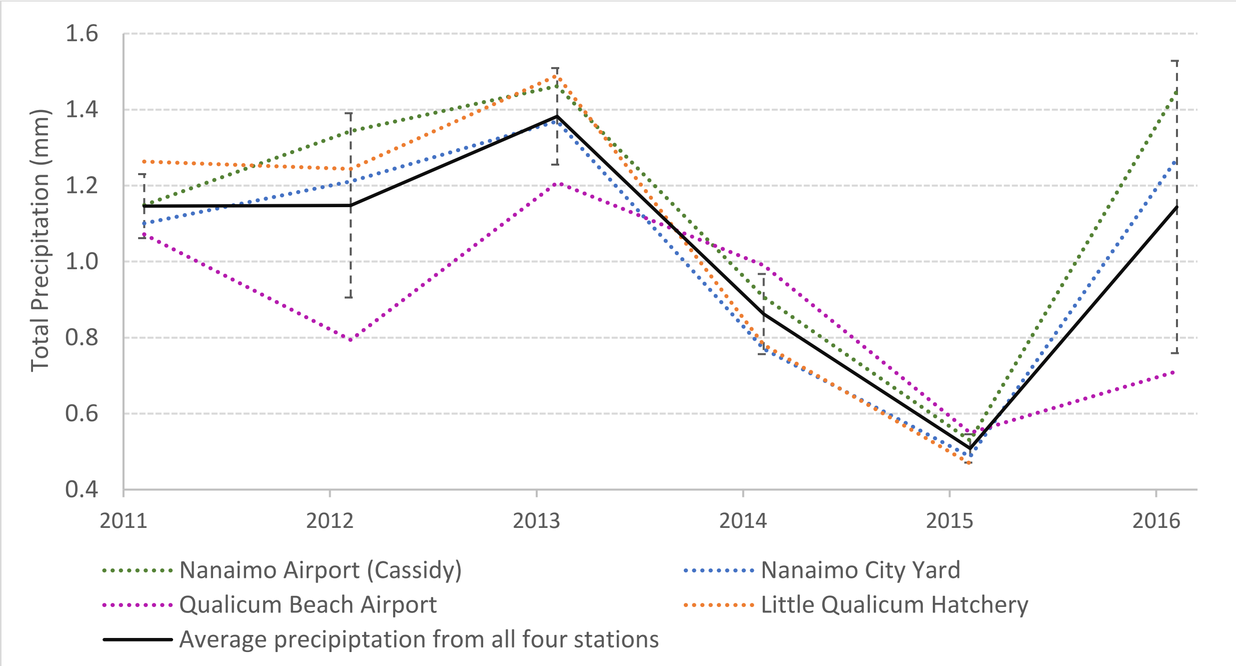

Figure 7: Total precipitation data from each of four weather stations operated by Environment Canada that are within the Regional District of Nanaimo, with regional precipitation average based on each station. Error bars on the average precipitation express the variation in measurements between the four stations.

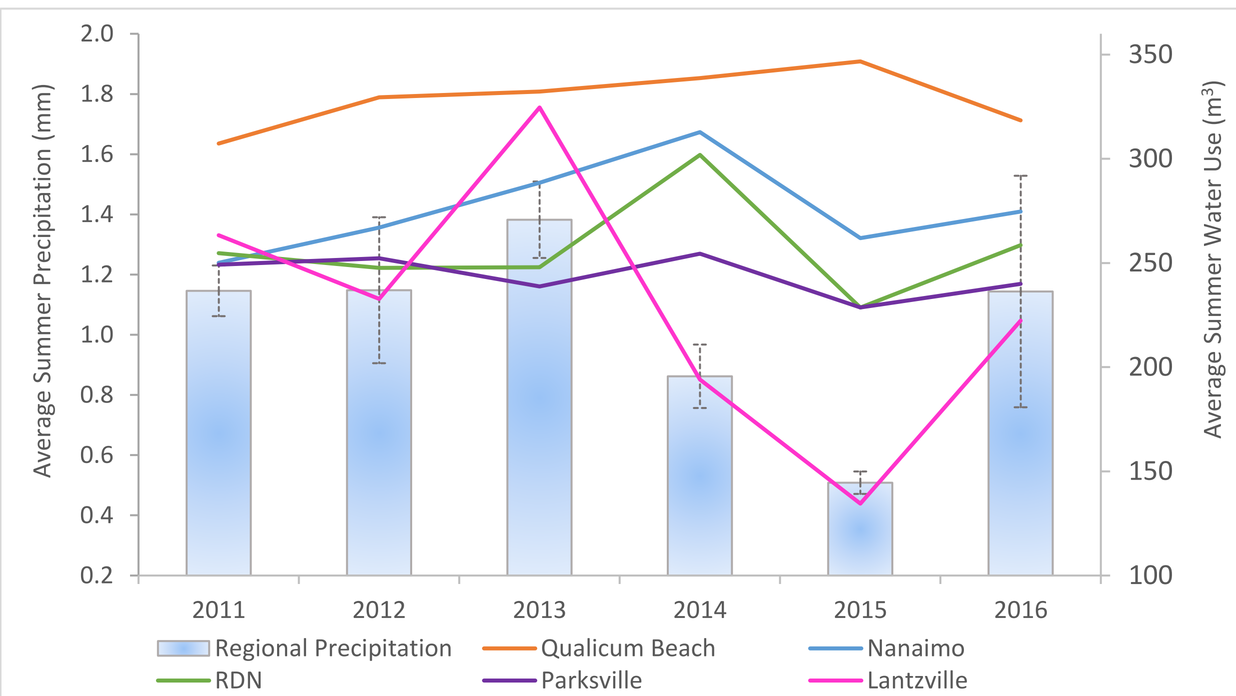

Figure 8: Plot showing the relationships between average regional summer precipitation (columns) and average water use in each water service area (lines). See appendix for more detail.

During the period of 2012 to 2016, a consistent region-wide relationship was not observed between summer precipitation and water-use for all TWS-ICS participants. However, there are unique patterns to this relationship in each water service area (Figures A1 to A5, appended).

In Qualicum Beach, participant water-use did show an inverse relationship to precipitation. A similar inverse relationship was observed for Parksville participants, except that in Parksville, participants reduced water-use during the drought of 2015 while Qualicum Beach water-users increased consumption during that summer. In Lantzville, there appears to have been a positive relationship between water-use and rainfall – they follow the same trend, which is contrary the expected pattern. In the RDN water service areas, there was an inconsistent pattern of water-use relative to precipitation. There was evidence of an inverse relationship between water-use and rainfall in 2013 and 2014 in RDN water service areas but that relationship changed for 2015 and 2016. Nanaimo water-use showed little visible dependence on rainfall from 2011 to 2014 but did decrease during the drought of 2015.

Rainfall is likely a variable to influence water-use, but there are other factors at play in that relationship. Local patterns in precipitation can vary dramatically from one neighborhood to the next, and in the case of drought, watering restrictions influence water-use habits. However, each water service area shows unique water-use responses to precipitation which may speak to differences in local geology and topography as well as neighborhood influences (for example, socio-economic differences, aesthetic values, local landscaping preferences). It is encouraging to see that in the summer of 2015 when regional drought conditions were extreme, there was a predominant decrease in water-use in each area, with the exception of Qualicum Beach.

CONCLUSIONS

Outdoor irrigation is the primary use of residential water during summer months. Rainfall is one variable that likely effect water-use habits, but a relationship between water use and precipitation was not defined in a way that could explain trends in water-use across the RDN. An interesting observation was made, that each water service area displayed a unique water-use response to precipitation.

Team WaterSmart's free Irrigation Check-up service (TWS-ICS) aims to promote water conservation through education about water efficient irrigation. The majority (65%) of TWS-ICS participants reduced their summer water-use in the years following participation. Water use fluctuates from year-to-year at any given property, and sixty percent of the participants who reduced their water-use (39% of total participants) did so at volumes that were greater than their normal fluctuations, that is the reduction in water use stood out beyond annual variations.

Participants from each Check-up year demonstrated an overall reduction in water-use. The majority of participants from Qualicum Beach, Parksville, Lantzville and the RDN Water Service Areas demonstrated significant decreases in water-use following participation. A slight majority of participants in the City of Nanaimo increased water consumption, but the volume of water associated with significant decreases was much greater than the volume associated with increases, and overall water conservation was observed in Nanaimo (as in all other areas).

Participants in each water service area generated a net conservation by water volume. Despite fifteen percent of participants, region-wide, having some measureable increase in water-use following participation, the associated volumes resulted in net conservation of water. Based on significant changes in volumes used, participants from 2011 to 2016 conserved an aggregate volume of 5,452 m^3, which is equivalent to an average reduction of 908.7 m^3 per summer. The total volume of water conserved was equivalent to sixty-eight percent of average summer water-use for participants across the region.

Results of this analysis indicate that the Team WaterSmart Irrigation Check-up service had a positive impact on summer water-use patterns for the majority of participants, and resulted in net conservation of water across the region. Participation in this program coincided with significant shifts toward water conservation, and considerable volumes of water were saved during summer months following participation.

APPENDIX

PROGRAM SUGGESTIONS

1. Implement a more formal registration process, possibly an online form, which collects the following information:

- Length of tenancy at address
- Water-use highlights: aside from irrigation, is there a pool / hot-tub / fountain / water-feature
- Plans to sell the property (when)
- Water service provider
- Disclosure agreement for permission to access water-usage data for statistical analysis
- Information on who installed the irrigation system and when, or if it was inherited with the house

2. Take a pressure gauge to each check-up and record on-site water pressure at a hose faucet. While this will not indicate the exact pressure in the irrigation system, it will indicate the overall water pressure on the property, which could speak to the need for pressure adjustment in the irrigation system.

GRAPHS OF PRECIPITATION AND WATER USE IN EACH WATER SERVICE AREA

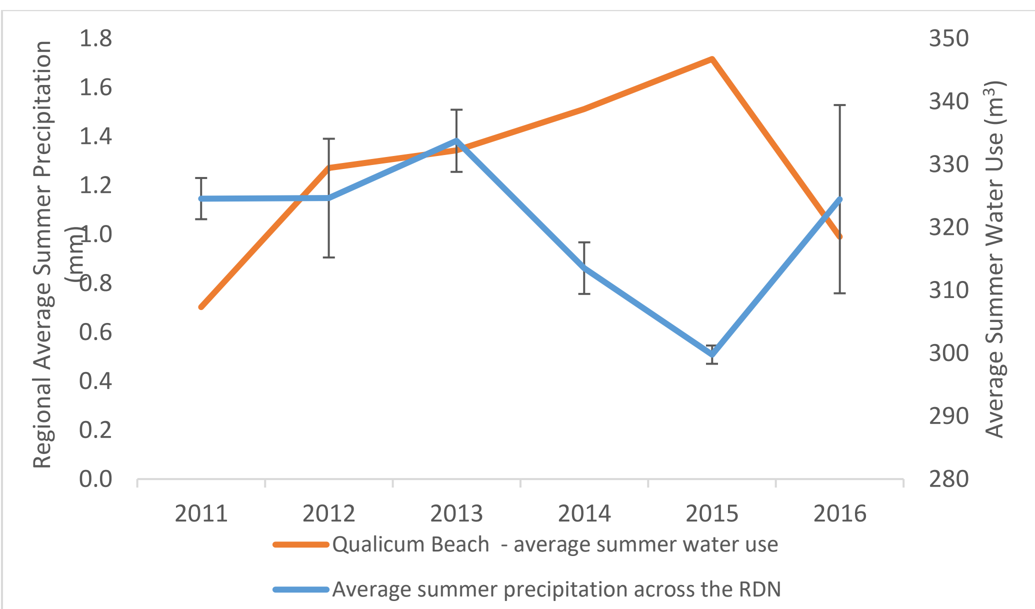

Figure A1: Relationship between average summer precipitation and water-use in the Qualicum Beach water service area. There is evidence of an inverse relationship between water-use and precipitation, even during the drought of 2015.

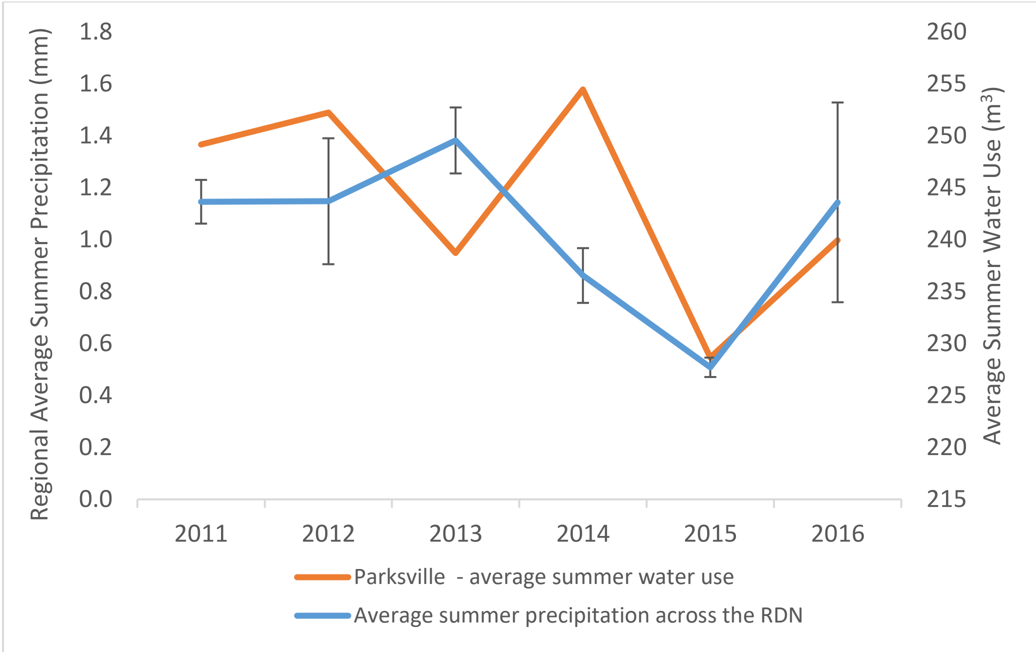

Figure A2: Relationship between average summer precipitation and water-use in the Parksville water service area. There is evidence of an inverse relationship between water-use and precipitation, except in 2015 during an extreme drought.

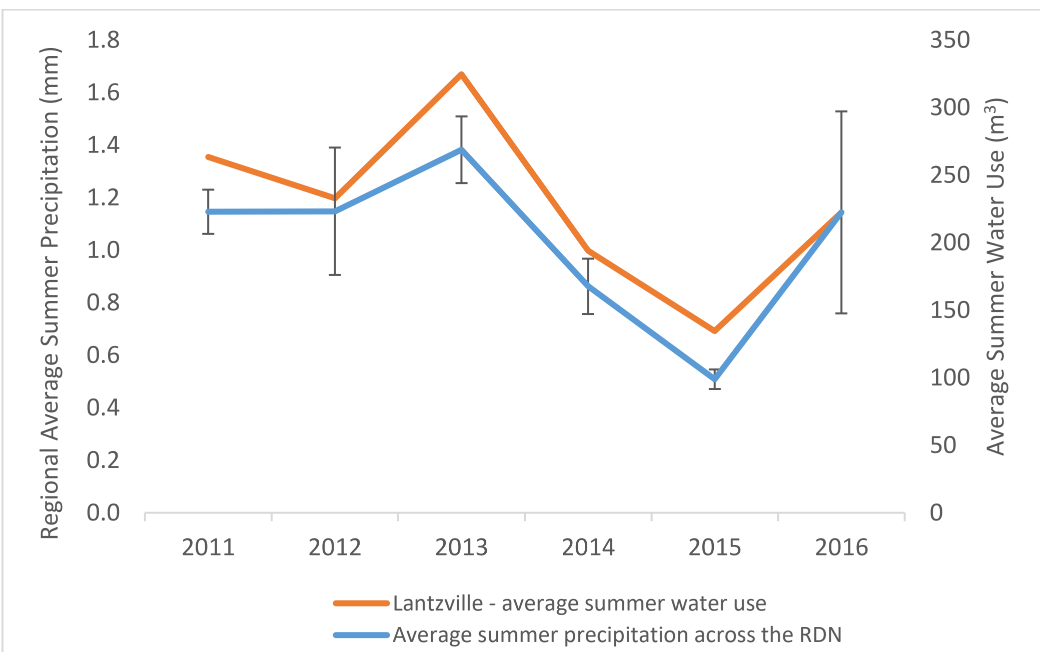

Figure A3: Relationship between average summer precipitation and water-use in the Lantzville water service area. There is evidence of a direct relationship between water-use and precipitation, which is contrary to the expected inverse relationship.

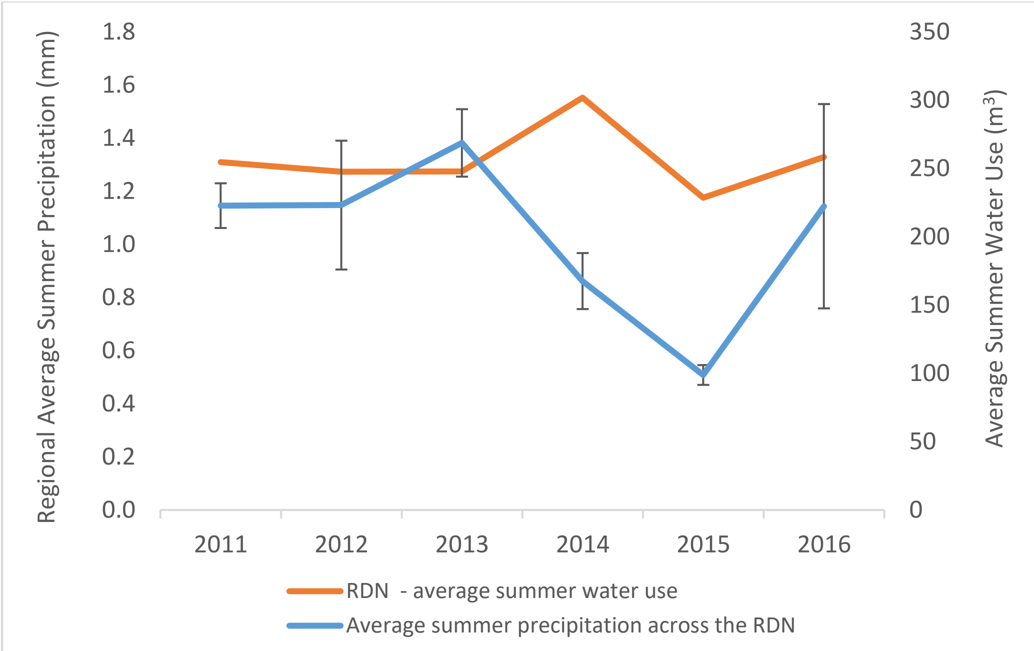

Figure A4: Relationship between average summer precipitation and water-use in the RDN water service areas. There is no clear pattern of a direct or inverse relationship between water-use and precipitation, but water use did decline during the drought of 2015.

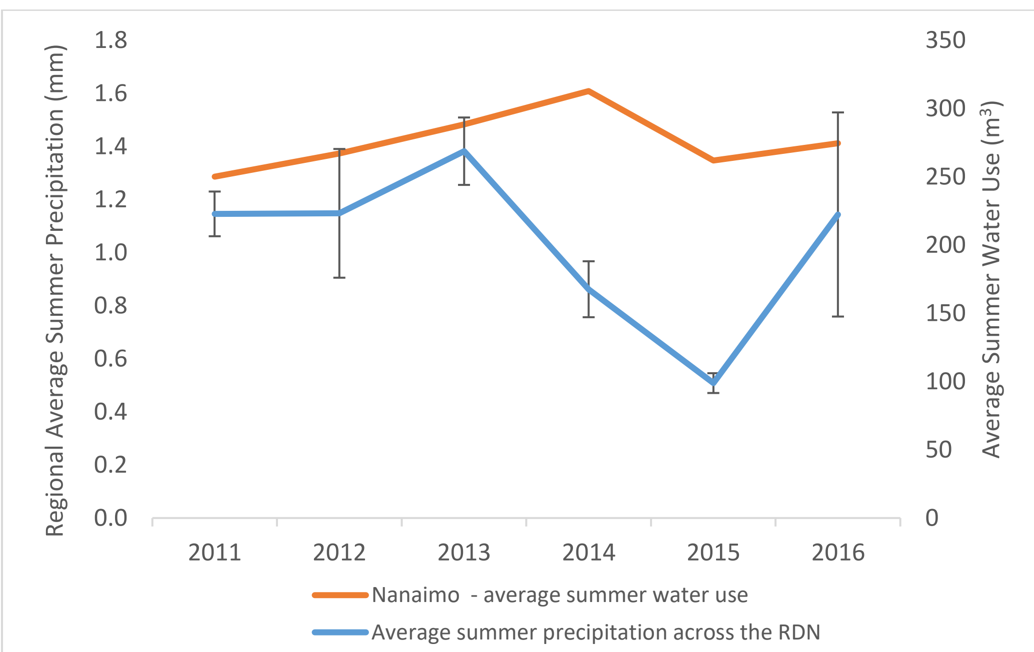

Figure A5: Relationship between average summer precipitation and water-use in the Nanaimo water service area. There is no clear pattern of a direct or inverse relationship between water-use and precipitation, but water use did decline during the drought of 2015.