

Salt Spring Island Water System Survey 2020

FINAL

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Updated Table 3 added December 2022

A report prepared for Salt Spring Island Watershed Protection Alliance

By

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This report was prepared from data and interview responses provided by Salt Spring Island Water System managers as well as North Salt Spring Waterworks District and CRD Water Service Area public reports.

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There is an opportunity for other Salt Spring Island water systems to participate in updates for this report by contacting the SSIWPA Coordinator, ssiwpa@islandstrust.bc.ca. The SSIWPA website contains a significant number of reports, published articles and documents related to watersheds, freshwater resources and their protection on Salt Spring Island – www.ssiwpa.org.

Executive Summary

The SSIWPA surveyed private and public waterworks which serve as potable water purveyors to all Salt Spring Island residences that are not on private groundwater wells, including the North Salt Spring Water District, and the CRD Water Service Areas. This is a single point-in-time survey and is NOT intended as a primary dataset for the changing costs, production and usage data for each of the systems surveyed. Of the 16 water systems surveyed, twelve are sourced from groundwater and 4 are sourced from surface water. The survey aimed to collect data about system operation, production and usage volumes, and rate structures, as well as to document any changes in system data collection and management since 2017 as a single point-in-time comparison. For the first time, a comparative analysis of typical Salt Spring Island daily average residential water usage volumes by connection were presented, as well as the range of water delivery costs and the non-revenue water component of annual system water production. Lower actual and estimated average consumption volumes on Salt Spring Island were reported from groundwater-sourced potable residential system users. The comparable water sales fee per cubic meter ranged from \$2.23 (North Salt Spring Water District) to \$35.05 (Cedars of Tuam). Users on groundwater-sourced potable water systems on Salt Spring Island reportedly consumed only 44% of the average volume consumed by those on Salt Spring's surface-sourced systems; Yet, the average surface-system user on Salt Spring Island consumes only 67% of the provincial municipal average (2016). No significant changes or improvements in data collection and management were reported in comparison with the previous water systems data survey that was conducted by SSIWPA partnering with the Ministries of Environment and Climate Change Strategy, as well as Forests, Lands, Natural Resource Operations and Rural Development in 2016, and as reported in Gorski and Sacré, 2019. The current survey results may inform SSIWPA efforts to coordinate integrated freshwater planning, and management across Salt Spring Island and they provide a basis on which water system purveyors may assess and achieve greater system efficiencies and other collaborative benefits.

Introduction

Freshwater resources in the Gulf Islands are essential for the maintenance of ecological services and ecosystem sustainability without which human activities would not be possible. An updated inventory of water sources and operational aspects of water supply systems is important to understand the sources of water utilized, for the purposes of planning and ecosystem protection.

At its work planning session in January, 2020, SSIWPA steering committee agreed to direct the coordinator to undertake (and to project manage) a survey of the water system data being collected by as many residential water purveyors as possible in the Salt Spring Island Local Trust Area. SSIWPA surveyed Water System managers (private and public waterworks on Salt Spring Island serving the residential community), the North Salt Spring Water District, and a representative of each of the Capital Regional District System Water Commissions. Of the 16 water systems surveyed, twelve utilize a groundwater source and 4 utilize a surface water source.

The purpose of the survey was to determine whether any significant changes or improvements in data collection, data storage, analysis or use had occurred since the groundwater systems data survey conducted by SSIWPA partnering with FLNRORD in 2016 and as reported in Gorski and Sacré, 2019. Understanding water system changes over time may allow identification of potential risks in changing island water supplies and subsequent collaborative action to ensure sustainability and availability for ecosystem and human needs into the future. A secondary purpose was for SSIWPA to access potable water rate structure information for each of the water systems (not retrieved in Gorski and Sacré, 2019), and to compare usage data for surface water systems, as well as groundwater systems (not done in Gorski and Sacré, 2019).

During the preparation of this report, an initiative to convene representatives from each of the 16 water systems that replied to the SSIWPA survey (and others) was begun. It was acknowledged that one of the purposes for convening such a group was information sharing about annual water system consumption rates and licence volumes in each area of the island. A subsequent goal of this current survey was to inform and share information among water system purveyors/managers/operators.

The provincial [Water Sustainability Act](#) came into effect in 2016. With the new legislation, groundwater licensing became a requirement of the [Water Sustainability Regulation](#). As such, non-domestic (ie. water system) groundwater systems are required to obtain a groundwater licence. The water licensing system establishes rights to groundwater use based on a first-in-time first-in-right system that currently governs the rights to surface water, and which aims to reduce conflicts between users, as well as to protect environmental flow rates in all recorded streams. Concurrently, the [Groundwater Protection Regulation](#) includes provisions related to well construction, maintenance, alteration and decommissioning.

Methods

The survey questions were developed with the assistance of the SSIWPA Technical Working Group. Please see Appendix 1 – Water Systems Survey 2020 Questions.

For the purpose of this study, survey results were collected through email interviews, telephone interviews, and from publicly available websites, where noted here below. Some of the systems are privately operated, but the majority are public water improvement districts or water utilities under Capital Regional District management.

Data presented in this report for water systems other than Capital Regional District (CRD)-operated systems, and North Salt Spring Waterworks District were anonymized. Four of the groundwater systems did not respond to the survey, but were included in the total number surveyed for this report (15) because some data were retrievable (2016) (as reported by Gorski and Sacré, 2019).

Potable Water Rates and Tariffs - Method

The data for potable water rates and tariffs for each of the following systems were procured from the publicly available website reports compiled by the system operators:

Capital Regional District Water Systems

- Beddis Water Service Area Annual Report 2019
- Cedar Lane Water Service Area Annual Report 2019
- Cedars of Tuam Water Service Area Annual Report 2019
- Fernwood Water Service Area Annual Report 2019
- Fulford Water Service Area Annual Report 2019
- Highland Water Service Area Annual Report 2019 (combined system with Fernwood)

North Salt Spring Waterworks District

- Rates available at: <https://northsaltspringwaterworks.ca/billing-rates/regular-charges/>

The data for potable water rates and tariffs for the remaining small water systems, as reported in Table 1 “Salt Spring Island Potable Water Rates, by System, and by Consumption Tier”, and Table 3 “Salt Spring Island Water System Annual Production and Non-Revenue Water Comparison” were procured from the public improvement district water manager or society director.

Water Use Comparison - Method

A total of 16 water systems were surveyed for data on consumption or “water use”. The data for water use volumes was procured from publicly available Annual Reports (2019) for the following water service commissions:

Capital Regional District:

- Beddis Water Service Area
- Cedar Lane Water Service Area
- Cedars of Tuam Water Service Area
- Fulford Water Service Area
- Fernwood Water Service Area
- Highland Water Service Area (combined with Fernwood)

The North Salt Spring Waterworks District water use volumes were procured from the 2018 Water Audit (NSSWD, 2018).

Consumption data were procured from the water system managers for groundwater systems 1 through 5 during the period October 2020 to March 2021 and for groundwater system 6 in July, 2021. Consumption data were procured from Gorski and Sacré (2019) for the groundwater systems 7, 8 and 9. All consumption data were based on averages by connection from measured total system demand except for systems 6, 7, 8 and 9.

Non-revenue water is defined as the volume that makes up the difference between the volume for system production at the source, and the volume for all consumption on that system (also known as total demand) (ie. non-revenue water includes water lost as leakage, water lost in processing, system flushing or cleaning). It was unclear from Gorski and Sacré (2019) whether leakage or non-revenue water may have been included in the consumption rates those authors reported for systems 7, 8 or 9. System 6 consumption data as reported here were based on total well production not total demand (delivered to each connection), so GW6 consumption data in this report includes non-revenue water. All other per connection consumption data in the current report exclude non-revenue water volumes.

Water licences for all nine major Salt Spring Island lakes, including lakes with water licences for other water use purposes apart from waterworks, were searched by using the [iMap BC](#) spatial layers and the provincial [Water Licence Query](#) which is a database providing data on licence types, number and volumes on a single stream or lake, for example.

Results and Discussion

Thirteen of the sixteen surveyed systems provided responses to some or all of the questions and data requests (81%).

The potable water rate structure information for 13 of the 16 Salt Spring Island community drinking water systems was presented for the first time as a comparison in Table 1.

A comparison of average water usage information (also known as 'demand' by various data years from 2016 through to 2020) was reported here for the first time for 16 Salt Spring Island

community drinking water systems (Table 2). The per capita rates (Litres/day) do not necessarily reflect actual data – they were calculated from the “winter, non-peak” or “wet” daily per connection usage assuming 2.1 persons per connection for each of the water systems serving residential dwellings. The 2.1 persons per single family dwelling was reported by NSSWD (2018) and by Gorski & Sacré (2019).

Average (wet or non-peak) daily use volumes per residential connection ranged between 93 L/connection/day (Groundwater System 2) and 630 L/connection/day (Fulford Water Service Area) (Table 2). It is important to note that three of the per connection daily use consumption volumes reported here may include non-revenue water which inflates the consumption values for those systems. In one case, GW system 6, non-revenue water is included in the estimated daily consumption data presented here but data for metered water sales (actual demand data) was not yet in a format to share at the time of writing and it will hopefully be provided for the next report update.

A comparison of non-revenue water and total water production for ten of the water systems was also reported here for the first time. Non-revenue water produced by the water systems ranged from 7% to 52% (Table 3).

The number and type of surface water licenses at the time of writing were reported for nine of the major Salt Spring Island lakes to provide SSIWPA and Water System representatives a better understanding of the number and type of potential annual licensed withdrawals, including water bodies that do not currently contain any waterworks systems. For the purpose of this report, license volumes and non-domestic groundwater system license volumes or status was not reported as both were out of scope for the current water system survey.

Survey data were used to compare the differences in water sales charges among potable water systems on Salt Spring Island. Data accounted for user fees, parcel tax costs, and where applicable capital surcharge fees, as well as the cost per unit of water for the lowest pricing tier for a theoretical annual average consumption volume (Tables 5 and 6). Per unit water sales charges were calculated for six groundwater systems; three groundwater systems did not provide rate data, and one groundwater system was commercial, so was not included in this comparison. The capital fees or operational costs were embedded in some user fees, but in other systems they are charged on top. This makes it impossible to compare all 16 systems as “apples to apples”, so please consider Tables 5 and 6 as approximate. Results demonstrated a range of per unit water sales charges from \$5.55/m³ (Groundwater System 5) to \$21.91/m³ (Cedars of Tuam) (Table 5). The cost per unit of water at the lowest pricing tier for a theoretical annual average consumption volume was also calculated for six surface water systems. Results showed that surface water theoretical per unit water sales charges ranged from \$4.71/m³ (North Salt Spring Waterworks District) to \$16.94/m³ (Fulford Water Service Area) (Table 6).

When querying the data for the question “Does more stringent tier pricing structure correlate to lower annual water demand (consumption)?”, the results were inconclusive. Where flat rate pricing (no tiers) exists, the highest (Fulford) and lowest (GW system 2) consumption,

respectively, was recorded. However, there are limits to the interpretation of Fulford system consumption as comparable to the other residential system data since that system has commercial connections that are not metered separately and the average per connection consumption therefore includes these higher usage volumes. Fulford system average per connection consumption value was excluded from the surface system average consumption calculation for this reason (Table 1).

The average residential daily use consumption for groundwater systems on Salt Spring Island was 93 Litres per capita, per day. The average residential daily use consumption for surface water systems on Salt Spring Island was 208 Litres per capita, per day. On Salt Spring Island, on average, groundwater users appear to be consuming 44% of the average volume consumed by surface water users on the same island (Table 2).

Limits: There are margins of error in the interpretation of these data that should be considered, including but not limited to: estimated and metered data included in the same calculation, capital fees only for some systems included in average cost (Tables 5 and 6), assumptions for residential occupancy (2.1) may skew per capita rates of consumption, and data collection inconsistencies for reporting of leakage and other non-revenue water. Despite these limits, lower actual and estimated average consumption volumes on Salt Spring Island are reported from groundwater system users (Figure 1, and Table 2).

Tables

Footnotes for Table 1

- 1) 2021 - Fees: Residential 1 (Single family dwelling, duplex, or farm up to one acre) and Residential 2 (Single family dwelling or farm up to 1 acre with suite or cabin).
 - 2) Capital charges are included here. Capital Construction Fund (CCF) Surcharge to every parcel in user fee. Not shown: a per unit additional annual surcharge exists for certain classes: ranging from \$14.50 to \$227.
- *Per SFE – single family equivalent, residential connection (2.1 persons). Cost per cubic meter reflects economies of scale (ie. systems with fewer connections have higher per connection costs).
- ** Fulford. No toll charged for annual consumption 95 cu. m or less. Greater than 96 cu m = 3.27 per cu.m
- *** Capital charges are included here. Toll is flat monthly rate per connection of \$125.00/monthly indicated as "User fee". Flat rate covers up to 36.3 cu.m (8,000 lgal) October to May; up to 22.73 cu.m. (5,000 lgal) June to September; Overage penalty \$100 per 4.54 cu.m (1,000 lgal) above amount covered by flat fee. Block structure encourages conservation (tiered pricing). Capital improvements: \$150 per quarter in the Parcel Tax column.
- **** Capital charges are not included. Meter reading charge of \$5.00/monthly is reflected in user fee column. Upgrades are funded through general operating funds.
- ^^ Capital charges are included here - funded through parcel taxes (or debt serviced by increased parcel taxes in subsequent years) wherever feasible. Sometimes (but not in 2019 - 2021)
- ^^* If consumption is less than 5.45 cu.m. in any 30 day period between April 1 and November 1, water toll is waived. As well, no water toll fee is charged if water use does not exceed 66.8 cu.m annually but also these conditions must be met: not to exceed 5.45 cu.m in any 30-day period between April 1 - Oct 31; and, must not exceed total 39 cu.m. over that entire 7-month period. Regular toll applies for usage between 39 cu.m and 72.7 cu.m in 7-month peak period.
- ^^ Capital charges are not included. Upgrades are funded through general operating funds. Overage: first 22.7 m³ over 72.7 m³ in the peak period April 1 - October 31 the rate is \$44/ m³ (or \$0.20/lgal); next 22.7 m³ over the rate is \$88/ m³ ; next rate for 45.4 m³ over the "regular" usage of 72.7 m³ in the same peak period costs \$220/ m³ (2 tiers not shown here).
- Nr – no reply; no rates provided from Groundwater Systems 7,8,9. All fees rounded to nearest full dollar figure.

Table 1. Salt Spring Island Potable Water Rates, by System and by Consumption Tier

User Fee		Parcel Tax	Tier and Rate		
Units	\$/SFE*/yr	\$/parcel/yr	\$ per cu.m	\$ per cu.m	\$ per cu.m
CRD System Tier Structure - Monthly consumption; quarterly billing			Tier 1	Tier 2	Tier 3
Tiers in place year round			0 - 38	39 - 105	>105
Cedar Lane	\$988	\$0	\$3	\$9	\$25
Beddis	\$640	\$555	\$3	\$6	\$9
Cedars of Tuam	\$1,951	\$0	\$1	\$8	n/a
Fernwood	\$858	\$253	\$1	\$2	\$5
Fulford**	\$1,256	\$772	\$0	\$0	\$3
Highland	\$882	\$153	\$1	\$2	\$5
			0 - 31.82	31.83 - 68.19	68.20 - 113.65
			year round		
NSSWD ^{1,2}	\$291	\$687	\$2	\$2	\$3
			0 - 22.7	0 - 36.3	each 4.5 cu.m
			June - Sept	Oct - May	Overage
GW System 1***	\$1,500	\$600	\$0	\$0	\$100
GW System 2	\$875	\$0	n/a	n/a	n/a
			0 - 4.54	4.541 - 13.64	> 13.64
			year round		
GW System 3****	\$60	\$0	\$4	\$9	\$18
			0 - 22.7	22.71 - 45.46	> 45.46
			year round		
GW System 4^^	\$0	\$500	\$6	\$14	\$220
7 month consumption; billed monthly			0 - 39	39 - 72.7	72.7 - 95.4
			Apr - Nov*^^	Apr - Nov	Apr - Nov
GW System 5*^	\$312	\$0	\$0	\$2	\$44
			0 - 27.28	27.29 - 54.55	> 54.55 cu.m
			year round		
GW System 6	\$750	\$0	\$6	\$9	\$13
GW System 7	nr	nr	nr	nr	nr
GW System 8	nr	nr	nr	nr	nr
GW System 9	nr	nr	nr	nr	nr

Table 2. Salt Spring Island Water Use Comparison, by System

System name	# connections	Avg Daily Use L/connection	Avg Use Per Capita ^a (litres)	Data Year Collected
Fulford ^b	95	630	300	2019
North Salt Spring ^a SFD	1533 ^a	483	230	2018
Highland/Fernwood	320	427	199	2019
Beddis	127	402	192	2019
GW System 7 (g)	9	399	190	2016
North Salt Spring ^a MFD	16 ^a	363	173	2018
GW System 6 (g)	52	311	148	2020
GW System 8 (g)	76	305	145	2016
Cedars of Tuam ^d	16	259	123	2019
GW System 1	36	251	120	2020
Cedar Lane	37	241	115	2019
GW System 9 (g)	50	208	99	2016
GW System 5	24	113	54	2020
GW System 4	60	109	45	2019
GW System 2 (g)	21	93	45	2019
GW System 3 Commercial	24	36	n/a	2020

a) Per capita = 2.1 per household (NSSWD, 2018). Consumption data were available for single family dwellings (SFD) and multifamily dwellings (MFD), but were not reported for institutional and farm type connections in the Water Audit (2018). The NSSWD number of connections by type breakdown in 2018: Active Residential Single Family 1533, Active Residential Multi-family 16, Commercial (type 1, 2, 3) 92, Institutional 52, Farm 17, Inactive Customers 94. (cont'd, next)

- b) Fulford Connections are not individually metered. Calculation of per connection average includes commercial and residential connections. For this reason, Fulford System was excluded from residential surface system average.
- c) Capital Regional District. (2019) Fulford Water Service Report 2019.
At: <https://www.crd.bc.ca/about/board-committees/board-committees-and-commissions/ssi---fulford-water-service-commission>
- d) 2019 report on this system (CRD, 2019) states that total production and total non-revenue water were not calculable since the well production meter was not functioning as a result of turbidity (sand) in well water.
- e) Average of three residential surface system average daily connection volumes. Excludes multi-family dwelling consumption reported by NSSWD. Excludes Fulford which does not parse out the approximately 10 commercial connections on the system from residential ones.
- f) Average of five residential groundwater systems. Excludes four systems that reported non-revenue water within usage value, and GW3 (commercial).
- g) Non revenue water/leakage is included in reported value.

Gorski & Sacré. 2019. Aquifer mapping and monthly groundwater budget analysis for aquifers on Salt Spring Island. Available at:
http://a100.gov.bc.ca/appsdata/acat/documents/r56660/WSS2019SSIMapng_1558652646765_8651482202.pdf

Average Use Comparison:

Provincial Average Residential Daily Per Capita Water Use (2016) = 312 L/c/d
 Salt Spring I. groundwater systems average residential daily use volume (2019-2020) = 93 L/c/d (see f)
 Salt Spring I. surface systems average residential daily use volume (2018-2020) = 208 L/c/d (see b,e)
 Based on these usage data, the average daily Salt Spring Island residential groundwater user (2019-2020) consumes only 44% of the average daily surface water user on Salt Spring Island.
 Based on usage in water systems, the average daily Salt Spring Island residential groundwater use (2019-2020) is 70% lower than the 2016 provincial average (or stated another way, Salt Spring groundwater users consume less than one third of the average municipal water consumer according to 2016 data).

Table 3. Annual Water System Production, Demand (metered consumption) and Non-Revenue Production

Total System Water Use and Non-Revenue Water Produced

in order of system annual production total

System	Year	Annual Production	Annual Demand	Non-Revenue Water	Non-Revenue %
Units		cu.m	cu.m	cu.m	%
GW System 3 *	2019	315	285	30	10
GW System 5 (b)	2020	1,070	1,059	11	22
GW System 2	2019	1,518	1,518	0	0
Cedar Lane	2019	3,478	3,251	227	7
GW System 1	2020	5,346	3,778	1,568	29
GW System 6	2020	5,910	nr	nr	nr
GW System 4	2019	8,946	4,367	4,579	51
Beddis	2019	26,280	18,643	7,637	29
Fulford	2019	27,302	21,842	5,460	20
Highland/Fernwood	2019	73,670	48,804	24,866	34
North Salt Spring - Maxwell**	2018	214,035	176,665	18,685	9
North Salt Spring - St. Mary**	2018	337,453	162,136	87,658	26
Cedars of Tuam ^a	2019	nr	1,511	nr	nr
GW System 8	2016	nr	23,180	nr	nr
GW System 7	2016	nr	nr	nr	nr
GW System 9	2016	nr	nr	nr	nr

nr - no reply, data not available

a - Has a non-functional meter at the well since 2018. Total demand is accurate by residential meters at the 16 connections.

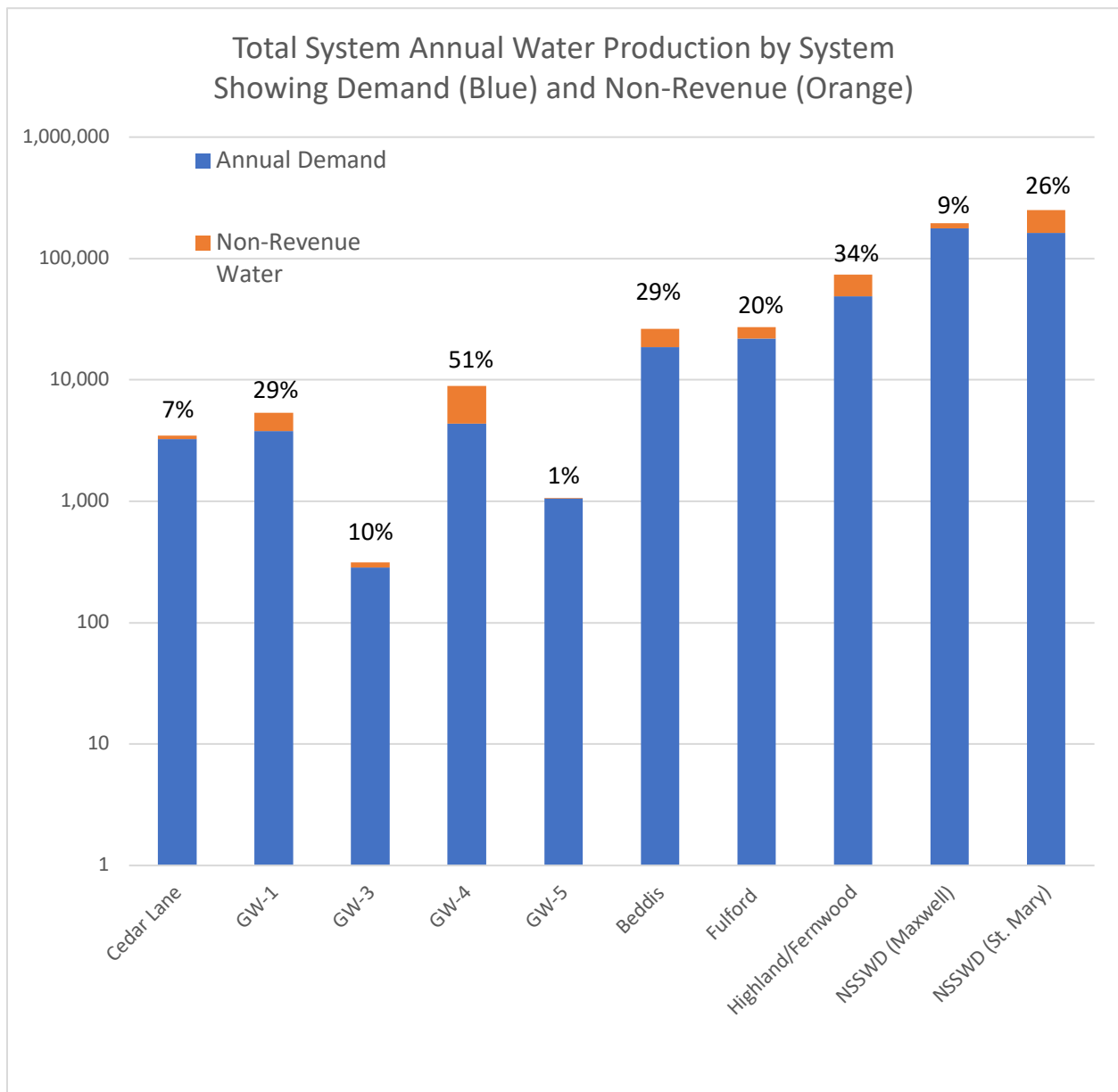
(b) GW5 Total Production is from data at all four wellheads. Total Annual Demand is based on average daily demand in 2020 multiplied by # days over 9 months and peak average daily demand in 2020 multiplied by # days over 3 months (representing dry day demand).

GW System 4 seeks new technology to reduce waste from reverse osmosis required

* GW System 3 is non-residential and most water usage is toilet flushing at studios or offices.

** New this version of report. Re-calculated non-revenue column December 6, 2022 when calculation error reported by NSSWD Board member to author.

Figure 1. Water Production by System (Annual Consumer Demand and Non-Revenue)



Please refer to Appendices for those systems not included in the figure. Reasons varied from inaccuracy in total production for the data year to non-metering of losses to flushing or leaks (GW-2).

Table 4. Surface Water Licenses for Water Systems on Salt Spring Island

By Lake & District	Total #	Waterworks Systems	Domestic	Agricultural/ Livestock	Commercial	Irrigation: Private	Other (Fire, Stream Storage)
St. Mary Lake - NSSWD, Fernwood-Highland CRD	88	4, 6	37	9	8	16	8
Cusheon Lake - Beddis CRD	54	2	46	0	1	5	n/a
Maxwell Lake - NSSWD	8	7	1	0	0	0	0
Weston Lake - Fulford CRD	35	6	18	0	1	5	5
Stowel Lake - ND	8	0	2	0	0	4	2
Blackburn Lake - ND	5	0	1	0	1	2	1
Bullock Lake - ND	15	0	0	0	0	9	6
Roberts Lake - ND	2	0	0	0	0	1	1
Ford Lake* - ND	0	0	0	0	0	0	0
Rosemurgie Lake - ND	1	n/a	n/a	n/a	n/a	n/a	1

ND - No Water District

St. Mary Lake Waterworks licences are reported separately for NSSWD (4) and CRD (6)

* The single licence on this lake was abandoned (domestic type).

The licences reported here do not include those with status "abandoned" or "superseded"

Table 5. Cost for Island-Average Groundwater-Source Domestic (Residential) Annual Consumption Volume, by Groundwater System on Salt Spring Island

System	Cost for Average Annual Usage Volume (92.8 cubic metres)	Cost \$/cu.m.
GW 5*	\$513.48	\$5.58
GW 2**	\$875.00	\$9.51
GW 4	\$1,090.73	\$11.86
Cedar Lane	\$1,217.84	\$13.24
GW 6	\$1,256.00	\$13.65
GW 1	\$1,500.00	\$16.30
Cedars of Tuam	\$2,033.56	\$22.10

Method and Assumptions:
Cost per cubic meter reflects economies of scale (ie. systems with fewer connections have higher per connection costs).
Not included here were three private groundwater systems that did not provide rate data (GW 7,8,9), and one groundwater system that is not residential.
The island-wide average volume is 92 cu.m.(per connection, per year) for domestic groundwater consumption. This average takes into account data collected for typical wet season daily demand at each of nine groundwater systems. It is not intended to represent an actual average for any one system, but for the purpose of comparing pricing variation.
To calculate the cost for consumption of the island-wide Average Annual Usage Volume for residential groundwater systems (92 cu.m. per connection), the Average Annual Usage Volume was multiplied by the tier one rate in that particular system, and any fixed costs such as a parcel tax or flat user fee (or both) were added.
The cost \$/cubic metre was calculated by dividing the annual cost (\$ cost of 92 cu.m.) by the average annual volume (cu.m.) as reported in that particular system (Table 2).
* Based on "regular" water rate \$2.19/cu.m. for those connections that consumed between 39 - 72.7 cu.m. total over the 7-month dry season.
** Based on flat fee (annual) charged on this system

Table 6. Cost for Island-Average Surface-Source Domestic (Residential) Annual Consumption Volume, by Surface System on Salt Spring Island

System	Annual Cost for Average Annual Volume Consumed	Cost \$/cu.m.
NSSWD residential	\$564.16	\$4.71
Fernwood	\$1,187.65	\$9.92
Highland	\$1,111.76	\$9.29
Beddis	\$1,566.03	\$13.08
Fulford*	\$2,027.62	\$16.94

<p>Method and Assumptions:</p> <p>Cost per cubic meter reflects economies of scale (ie. systems with fewer connections have higher per connection costs).</p> <p>Island wide surface water domestic consumption average volume is 208 cu.m.(per connection, per year). This average accounts for data collected for typical wet season daily demand at each of four surface water systems. Fulford was excluded from the Average Annual Usage Volume calculation itself, because those data include some non-residential connections.</p> <p>To calculate the cost that a user on each system would pay to use the Average Annual Usage Volume for residential surface water systems (208 cu.m per connection), that volume was multiplied by the tier one or level one rate in that particular system, and any fixed costs such as a parcel tax or flat user fee (or both) were added. These are presented in the left column. The right column table shows a comparable cost per cubic metre which was calculated by dividing the cost for the average island-wide consumption volume divided by the "system" average annual consumption volume reported on that particular system for the data collection year (see Table 2).</p> <p>* Includes user fee, parcel tax, and was based on a flat, water toll fee of \$0 for consumption up to 105 cu.m per year. Any consumption exceeding that annual allowance would cost \$3.27/cu.m. For the calculation, we assumed the average user consumed less than 105 cu.m.</p>

Shared Concerns and Trends:

1. Aging infrastructure, rising capital and operational costs and need for major upgrades were reported as the most significant issues facing 69% of respondents (9 of 13): GW1, GW4, GW5, GW6, Beddis – CRD, Cedar Lane – CRD, Cedars of Tuam – CRD, NSSWD, Fulford – CRD. Three groundwater systems did not reply to the survey.
2. Challenges associated retaining volunteers as well managers, board members/commissioners were cited by four respondents (31%), including one improvement district, two small private systems, and was reported by the CRD in the annual meeting minutes for a water commission.
3. Significant quality concerns were expressed about the state of the water resource by four respondents (31%): GW1, Beddis – CRD, Cedars of Tuam – CRD, Cedar Lane – CRD. Two groundwater and three surface water respondents did not address the question directly.
4. Lack of Government grants/ cost of inflation was cited as a significant barrier by 54% (7 of 13) respondents: GW2, GW4, Cedars of Tuam – CRD, Cedar Lane – CRD, NSSWD, Fulford – CRD, Beddis – CRD. One responding groundwater and two surface water systems did not address the question directly.
5. Three non-CRD groundwater respondents (33% of all non-CRD groundwater systems surveyed) cited access to qualified operational support and maintenance on island as a significant concern (in terms of cost, availability): GW3, GW4, GW6.
6. Four smaller systems contract their operations to NSSWD: they are GW1, GW4, GW6, and Cedar Lane – CRD.
7. Two groundwater systems of 11 surveyed (18%) cited limited groundwater availability as a suspected concern based on groundwater level change and/or well performance (quality, quantity produced); and, limited ability to meet current and any potential future buildout demand, especially during drought: Cedar Lane – CRD, Cedars of Tuam – CRD. Three groundwater systems did not reply to the survey.
8. Two surface water systems out of 5 surveyed (40%) cited concerns with limited surface water availability and ability to meet current and potential future buildout demand, especially during drought: NSSWD, Fulford – CRD.
9. At least three respondents expressed the need to be able to communicate and cooperate with other water district managers/trustees across all island water utilities. This was not an explicit question, so data may be incomplete.

10. Twelve of thirteen respondents (92%) reported that each connection is metered. The following systems read household meters at regular intervals for billing: GW1, GW3, GW4, GW5, GW6, Beddis, Cedars of Tuam – CRD, Cedar Lane – CRD, Fernwood – CRD, Highland – CRD, and NSSWD. Three systems did not respond to the survey.
 - i. One system reported that household meters are not used for billing (GW2), instead the annual water bill is one flat rate that is identical for each user regardless of metered variation between connections. GW2 also does not have a tiered pricing for conservation (Table 1).
11. Ninety-two percent (92%) of respondents use tiered rate pricing among their practices as water conservation incentives.
12. Five of thirteen respondents (38%) reported that monthly usage data is made available to each ratepayer: GW1, GW3, GW4, Cedar Lane – CRD, Cedars of Tuam – CRD. This is likely higher, but not every respondent answered the question and three groundwater systems did not reply to the survey.
13. Three of 8 groundwater system respondents (37%) observed that neighbourhood awareness of the fragility of the resource, regular communications and person-to-person trust form part of their approach for water conservation results on their system, especially during peak season (May through October): GW1, GW2, GW4.
14. North Salt Spring Water District did report more sites added to their data acquisition (SCADA) system but it was not made clear where those new sites were added; this was not a significant change to data management since the 2016 baseline Salt Spring Island water system survey (Gorski and Sacré, 2019).
15. NSSWD has the greatest diversity in user types; it has the lowest starting point for residential tiered rate structure and the least economic penalty for high residential usage rates.
16. Two small groundwater systems reported that no commercial usage was permitted on their system: GW1, GW2.
17. One in 8 groundwater system respondents reported that connection meters were not monitored for usage data, but for leaks only: GW2. Three groundwater systems did not reply to the survey, so these data may not be complete.
18. One in 8 groundwater system respondents reported digital monitoring at main production meters (whole system, not household): GW5. It was not explicitly a survey question, and so data may be incomplete.

Conclusions

This is a point-in-time survey and data are expected to fluctuate annually. Lower actual and estimated average consumption volumes on Salt Spring Island appear to be correlated to potable water source: groundwater or surface (Table 2). Salt Spring water users on groundwater-sourced systems reportedly consumed an average of 56% less than those on surface-sourced systems; Yet, **the average Salt Spring surface-source system user consumes only 67% of the provincial municipal average (2016)**. The average Salt Spring **groundwater system user consumes 30%** of the provincial municipal average.

The comparable water sales fee per unit (cubic meter) for a theoretical annual average consumption volume ranged from \$3.68 (North Salt Spring Water District) to \$22.10 (Cedars of Tuam). Fees took into account variability in tier pricing (or none), user fees, parcel taxes (or none) and where possible, included fees assessed for capital upgrades. Cost per cubic meter reflects economies of scale (ie. systems with fewer connections have higher per connection costs).

From the findings, there have not been any significant changes or improvements in data collection, data storage, analysis or use since the previous water systems data survey that was conducted by SSIWPA partnering with FLNRORD in 2016 and as reported in Gorski and Sacré (2019). Efficiencies and benefits may be realized in the economic reality for water delivery on Salt Spring Island through collaboration, monitoring and information sharing among potable water system managers. Realizing water conservation and efficiencies is clearly an emerging priority for freshwater sustainability in response to a changing climate.

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Appendix 1 - Survey Data – Groundwater Systems

Water Survey Responses – GW System 1

System name	# connections	Avg Daily Use Volume - Per Capita	Avg Daily Use Volume - Per Connection (2.1 persons)	Peak Daily Use Volume - Per Connection
Units		L/c/d	Average Day L/connection/d	Summer Drought L/connection/d
GW System 1	36	120	251	296

1. What challenges are you facing? What do you think the priorities are for SSIWPA as related to your group’s challenges?
 - a. **Aging infrastructure, concern about diminishing availability during dry season, and increasing demand as vacant lots are slowly built out.**
2. What has changed over the past three years in terms of operations or data management?
 - a. **Recently the wells were inspected and new well pumps were installed. Plans to upgrade water quality management to address concerns about turbidity (currently chlorine injection at one of two wells) with a new filtration system, in 2021.**
3. Does every connection on your system have a water meter? a. **Yes**
4. Is usage data tracked by connection and made available to the ratepayer? a. **Yes, monthly.**
 - a. Does any other entity have access to usage data? a. **No**
5. What was peak day average usage volume per connection or per capita (2.4 residents per single family dwelling) in 2019?
 - a. **The 2020 peak day average was 296 L/connection/peak day in the “Dry” Months (June-Sept incl.): 10,652 L/dry day/whole system (2,343 lgal.). And, in 2019: 10,842 L/dry day/whole system (2385 lgal.).**
6. What was non-peak day average usage volume per connection (or per capita) in 2019/2020?
 - a. **The non-peak or “average” daily use volume in 2020 was 251 L/connection/day. This was equivalent to 105 L per capita per day on a typical wet season day in 2020: 9.051 L/day/whole system (1,991 lgal.). And, in 2019: 8,573 L/day/whole system (1886 lgal.).**
7. Other than a graduated fee structure by volume, do you have any other measures by which to distinguish bulk users/commercial scale connection types?
 - a. **No. Our tariff does not allow commercial usage.**

8. Has your Board considered usage thresholds and multiple connection types with associated limits to daily withdrawals to address the need for water conservation? Please explain.
 - a. **Yes, in part. Each connection is allowed up to 8,000 lgal. (36.3 cu.m.) per month Oct - May, and up to 5,000 lgal. (22.7 cu.m) per month from June to September, inclusive. The penalty for exceeding the monthly allowance is \$100 per 1,000 lgal. or part thereof over the limit. We do not have a practical method of monitoring daily usage.**
9. Is there other information about your water system/district that might be of value to SSIWPA and the island's water conservation practices? a. **None comes to mind . . .**
E.g. measures of success for Level 1, 2, 3, 4 water restrictions or other methods.
10. Who is the regular operator who checks the system and does the measurements? Do you have any paid staff and if yes, how many?
 - a. **No paid staff but have contract operator (NSSWD).**
11. Are you willing to share your potable water service fee structure for a) SSIWPA only, or b) public information for our SSIWPA website? If yes, please indicate a) or b) and please send the fee structure documentation to Shannon.
 - a. **Yes, see Table 1; without restriction.**

Other responses provided:

Well Construction Records: **Well records provided. No hydrogeological reports available.**

GW Level Data Collection Interval: **Weekly**

Total System Demand (2020): **3,777,801 L (831,000 igal.)**

Total Production (2020): **5,346,202 L (1,176,000 igal.)***

Total Non-Revenue Water (2020): **1,568 cu.m. (344,912 igal.)**

***The cause of a large discrepancy between annual production and demand is under investigation.**

Water Survey Responses – GW System 2

System name	# connections	Avg Daily Use Volume Per Capita	Avg Daily Use Volume (2.1 persons)	Peak Daily Use Volume
Units		L/c/d	L/connection/day	L/connection/day
GW System 2	21	45	93	261

1. What challenges are you facing? What do you think the priorities are for SSIWPA as related to your group’s challenges?
 - a. **Lack of government grants was a barrier that the users are facing at this system.**
2. What has changed over the past three years in terms of operations or data management?
 - a. **Continues to collect data in the same manner as it has historically done.**
3. Does every connection on your system have a water meter?
 - a. **Yes, but meters are not used to track usage on a regular basis. The fact that the ratepayer is aware of the meter serves to encourage water conservation. The meters are used to locate leaks on the system and no other entity normally has access to usage data.**
4. Is usage data tracked by connection and made available to the ratepayer?
 - a. **Yes. However, since the system is very small, meter reading is infrequent. Each connection pays a flat rate annual fee and the understanding is that usage will be at or below 130 imperial gallons/day/connection. Connection meters are read on occasion for the purposes of checking production versus consumption, if there is a new resident owner, or if the whole system production rises suddenly. System usage data and individual meter usage data are available to the ratepayer at that metered connection, by request.**
5. What was peak day average usage volume per connection or per capita (2.1 residents per single family dwelling) in 2019/2020?
 - a. **The peak average usage volume per connection in 2019 was 261 L/connection/peak day.**
6. What was non-peak day average usage volume per connection (or per capita) in 2019/2020?
 - a. **The average (rainy) daily usage volume per connection in 2019 was 93.4 L/connection/average off-peak day.**
7. Other than a graduated fee structure by volume, do you have any other measures by which to distinguish bulk users/commercial scale connection types? A. **No.**
8. Has your Board considered usage thresholds and multiple connection types with associated limits to daily withdrawals to address the need for water conservation? Please explain.

- a. **There are no bulk or commercial uses of this system. There are no bulk or commercial uses of this system. For fees, please see table 1. There is a suggested upper daily consumption limit to which ratepayers voluntarily adhere, and the district, as a whole is advised if any daily consumption values are excessive for any one user – voluntary conservation measures work in this small water system.**
9. Is there other information about your water system/district that might be of value to SSIWPA and the island's water conservation practices? a. **Not answered.**
 - a. E.g. measures of success for Level 1, 2, 3, 4 water restrictions or other methods.
10. Who is the regular operator who checks the system and does the measurements? Do you have any paid staff and if yes, how many? A. **There is one manager who is the single employee for the system.**
11. Are you willing to share your potable water service fee structure for a) SSIWPA only, or b) public information for our SSIWPA website?
 - a. **Yes, see Table 1. Our annual and only fee for water is presently \$875.00 and has remained unchanged for a few years now. That may be shared on the SSIWPA website. Our billing is a flat annual rate for all ratepayers; a single fee based on our projected budget that also accounts for [capital projects] i.e. a contingency fund. Ours is a closed district, that is, we will not expand our district boundaries to include more ratepayers and so do not need to even contemplate the variable and potential costs involved with the possible system expansion required to include more customers. In the 40 odd years since the improvement district was incorporated we have learned how much water we have to work with and encourage --through persuasion and bylaw-- how much ratepayers use. Our budget is aimed toward and based on how we may best maintain and improve the continuity, security and delivery of that supply.**

Water Survey Responses – GW System 3

System name	# connections	Avg Daily Use Volume Per Capita	Avg Daily Use Volume (2.1 persons)	Peak Daily Use Volume
Units		L/c/d	L/connection/day	L/connection/day
GW System 3	24	n/a ¹	36	41

1. What challenges are you facing? What do you think the priorities are for SSIWPA as related to your group’s challenges?
 - a. **Finding qualified, reliable, responsive on-island resources for ongoing maintenance and operation of our water system.**
2. What has changed over the past three years in terms of operations or data management? A. **Nothing.**
3. Does every connection on your system have a water meter? a. **Yes. Monthly billing. Weekly readings (started May 2014).**
4. Is usage data tracked by connection and made available to the ratepayer? a. **Yes**
 - a. Does any other entity have access to usage data? a. **No.**
5. What was peak day average usage volume per connection or per capita (2.1 residents per single family dwelling) in 2019/2020? A. **The average peak day was 41 L/connection/peak day in 2020**
6. What was non-peak day average usage volume per connection (or per capita) in 2019/2020? A. **The average off-peak day was 36 L/connection/off-peak day in 2020. The reason that peak and off-peak or average days do not vary significantly is that the main use is toilet flushing in businesses which does not change throughout the year.**
7. Other than a graduated fee structure by volume, do you have any other measures by which to distinguish bulk users/commercial scale connection types? A. **No.**
8. Has your Board considered usage thresholds and multiple connection types with associated limits to daily withdrawals to address the need for water conservation? Please explain. A. **Thresholds yes, otherwise no.**
9. Is there other information about your water system/district that might be of value to SSIWPA and the island’s water conservation practices? a. **No reply.**
10. Who is the regular operator who checks the system and does the measurements? Do you have any paid staff and if yes, how many?
 - a. **For 2018-2020 we engaged a facilities maintenance company to do the weekly readings, check levels and manage plumbers etc. for maintenance. This**

¹ As this system does not have residential connections, the per capita value is inappropriate.

company is no longer available to us effective 2021 so council president will take on the weekly processes until a new company can be engaged.

- 11. Are you willing to share your potable water service fee structure? A. Yes, see Table 1. Capital upgrades or water system infrastructure levies not necessarily included in Table 1*.**

*This system covers capital / infrastructure costs related to water system repair, upgrades from its General Operating Funds (e.g. annual strata fees or other such levies to members).

Other Notes:

There are two connections in this system that are food producers but their usage is averaged with all the other connections in the peak and non-peak day averages noted here above. Only one of the 24 connections is residential. Toilet-flushing is the main water usage on the system as a whole. For this year we have built into our billing program a \$50 surcharge if average use exceeds 200 litres per day for the month.

Water Survey Responses – GW System 4

System name	# connections	Avg Daily Use Volume Per Capita	Avg Daily Use Volume (2.1 persons)	Peak Daily Use Volume
Units		L/c/d	L/per connection/day	L/connection/day
GW System 4	60	45	109	282

1. What challenges are you facing? What do you think the priorities are for SSIWPA as related to your group’s challenges?
 - a. **cost inflation, aging infrastructure, access to human resources**
2. What has changed over the past three years in terms of operations or data management? A. **Nothing.**
3. Does every connection on your system have a water meter? a. **Yes.**
4. Is usage data tracked by connection and made available to the ratepayer? a. **Yes**
 - a. Does any other entity have access to usage data? a. **No.**
5. What was peak day average usage volume per connection or per capita (2.1 residents per single family dwelling) in 2019/2020?
 - a. **In 2019, the “dry” peak day average usage per connection was 282 L/connection/day and the per capita was 134 L/c/d.**
6. What was non-peak day average usage volume per connection (or per capita) in 2019/2020? A. **The average rainy day usage was 45 L/c/d in 2019.**
7. Other than a graduated fee structure by volume, do you have any other measures by which to distinguish bulk users/commercial scale connection types?
 - a. **Direct observation of property use – only 61 properties. Treat two commercial connections as they were residential connections.**
8. Has your Board considered usage thresholds and multiple connection types with associated limits to daily withdrawals to address the need for water conservation? Please explain.
 - a. **An increasing trailing block rate structure encourages conservation. Residents using more than an arbitrary threshold are directly contacted by trustees.**
9. Is there other information about your water system/district that might be of value to SSIWPA and the island’s water conservation practices?
 - a. **Regular communication on matters of conservation and direct contact of heavy users is much more effective than non-monitored water restrictions. We do not believe that depending on “finking on neighbours” is a good strategy for regulatory enforcement of conservation.**
10. Who is the regular operator who checks the system and does the measurements? Do you have any paid staff and if yes, how many?

- a. **NSSWD is contract operator. One trustee is a qualified operator and provides oversight and does data tracking and supplemental testing.**
11. Are you willing to share your potable water service fee structure for a) SSIWPA only, or b) public information for our SSIWPA website? A. **Yes this is public info:**
<http://www.scottpointwaterworks.com>. **Routine capital upgrades are funded through annual parcel taxes. Larger capital upgrades can be funded from: a) reserves built up from previous annual parcel taxes; b) special levy parcel taxes; c) debt which is amortized over a number of years and paid through annual parcel taxes. The last special levy was in 2012.**

Water Survey Responses – GW System 5

System name	# connections	Avg Daily Use Volume Per Capita	Avg Daily Use Volume (2.1 persons)	Peak Daily Use Volume
Units		L/c/day	L/connection/day	L/connection/day
GW System 5	24	54	113	148

1. What challenges are you facing? What do you think the priorities are for SSIWPA as related to your group's challenges?
 - a. **We are considering major upgrades that could include chlorination. We have added monitors to the primary meters leading out of the pumphouses to catch leaks or large usage as early as possible.**
2. What has changed over the past three years in terms of operations or data management? A. **Nothing.**
3. Does every connection on your system have a water meter? a. **Yes.**
4. Is usage data tracked by connection and made available to the ratepayer? a. **Not answered.** Does any other entity have access to usage data? a. **Not answered.**
5. What was peak day average usage volume per connection or per capita (2.1 residents per single family dwelling) in 2019/2020?
 - a. **For the 24 connections the peak average was ~ 3,500 L/d which is 148 L/connection/peak day. Although, there are many seasonal houses on this system so there are several houses/ lots that did not withdraw in the month of August at all. Max usage: For one individual connection the 2020 peak usage was 457 L/d (100.6 lgal/d) which is significantly higher than most residences in the month of August.**
6. What was non-peak day average usage volume per connection (or per capita) in 2019 or 2020 if you have it?
 - a. **The non-peak daily average demand in 2020 for the system (24 connections) was 2,720 L/day.**
7. Other than tiered rates, do you have other means to distinguish commercial users?
 - a. **No response.**
8. Has your Board considered usage thresholds and multiple connection types with associated limits to daily withdrawals to address the need for water conservation? Please explain.
 - a. **We have not implemented usage thresholds other than to create tier level pricing for thresholds over certain usage limits (see below number 9). We also communicate with homeowners that seem to be using larger amounts of**

water. We also monitor system for leaks using digital monitors on the pumphouse meters.

9. Is there other information about your water system/district that might be of value to SSIWPA and the island's water conservation practices? **a. Total Production (2020) was 1,070 cubic meters (Wells 1, 3 and 4 were operated, but well 2 was not in operation during the year 2020)**
10. Who is the regular operator who checks the system and does the measurements? Do you have any paid staff and if yes, how many?
 - a. We have no paid staff. We ask each homeowner/resident to report monthly readings during the April to October time frame when rains are scarce. There are two to three members that assist in tracking the well levels and reporting them. One volunteer council member records all the readings and contacts the plumbers when maintenance is needed. They are provided a nominal amount (500/year) for assisting in that.**
9. Are you willing to share your water service fee structure?
 - A. Yes. With SSIWPA only.**
 - a. Residents who conserve water are given an incentive as follows: if their water consumption does not exceed 5.45 cu.m (1200 igal) in a 30-day period between 1 April and 31 October, and 39 cu.m (8600 igal) for the same 7-month period and their annual consumption does not exceed 66.8 cu.m (14,700 igal) their annual water toll is waived (that is because that level of use is not having an evident impact on the quality of the groundwater source).**
 - b. Residents who exceed the rate in (a) but have lower use than in (c) pay the regular water rate, which is \$0.01/igal (\$10/1000 igal).**
 - c. Residents who use excessive amounts of water have a surcharge applied to their water bills. The surcharge applies to households exceeding 16,000 gallons between 1 April and 31 October (or 75 igal a day). This surcharge rate is \$0.20/igal for the first 5000 over 16,000 lgal, \$0.40/igal for the next 5000 over and \$1.00/igal for usage beyond that.**
 - d. User Fee. Each connection user pays a proportion of \$7,000-\$8,000 for yearly operating maintenance and testing etc. So, on average for the 24 connections this annual user fee is \$291-\$333 or a median of \$312.**

Water Survey Responses – GW System 6

System name	# connections	Avg Daily Use Volume Per Capita	Avg Daily Use Volume (2.1 persons)	Peak Daily Use Volume
Units		L/c/day	L/connection/day	L/connection/day
GW System 6	52	148	311	700

1. What challenges are you facing? What do you think the priorities are for SSIWPA as related to your group's challenges?
 - a. **Our first and greatest challenge is frankly the age of our infrastructure. It has been in operation for more than 40 years and is beginning to show significant signs of wear and tear.**
Our second challenge is a constant one of finding volunteers from among our 52 households to serve as trustees and shoulder some of the work. In the end it invariably falls on the shoulders of the same people. Without three trustees this water system cannot exist as an improvement district and would be subsumed by the CRD or some other larger authority.
2. What has changed over the past three years in terms of operations or data management?
 - a. **In recent years because of a lack of volunteers or at least the general attrition of those who did volunteer we have had to hand much of the day-to-day running of the system to North Salt Spring Water District at a cost of approximately \$2,000 a month.**
Similarly, we felt it necessary to employ a qualified bookkeeper when our previous treasurers (all qualified accountants) were no longer available.
3. Does every connection on your system have a water meter? y/n. a. **Yes**
4. Is usage data tracked by connection and made available to the ratepayer? y/n. **Yes**
 - a. Does any other entity have access to usage data? **No**
5. What was peak day average usage volume per connection or per capita (2.1 residents per single family dwelling) in 2019 or 2020?
 - a. **2020: 700 litres/day (per connection, estimated during leakage scenario)**
6. What was non-peak day average usage volume per connection (or per capita) in 2019 or 2020? A. **2020: 311 litres/day (per connection)**
7. Other than a graduated fee structure by volume, do you have any other measures by which to distinguish bulk users/commercial scale connection types?

- a. **No commercial or bulk connections**
8. Has your Board considered usage thresholds and multiple connection types with associated limits to daily withdrawals to address the need for water conservation?
 - a. Not answered.
9. Is there other information about your water system/district that might be of value to SSIWPA and the island's water conservation practices?
 - a. **Our summer conservation measures have invariably been complied with successfully - with excellent cooperation within the district.**
10. Who is the regular operator who checks the system and does the measurements? Do you have any paid staff and if yes, how many?
 - a. **North Salt Spring Water Works, no paid staff. One occasional bookkeeper on pro rata basis.**
11. Are you willing to share your potable water service fee structure? A. **NO**

Part B: Groundwater Small Water System – Data per groundwater well

1. Well Tag Number WTN# in provincial database, GWELLS: **42208, 85279**
2. Name of well by system operator: **Well #1, Well # 4**
3. Number of connections in system: **52**
4. Aquifer number: **722**
5. Water level monitoring method: **Bubbler**
6. Depth to water (tape measure method from top of casing)(m). **41m, 54m**
7. Well elevation (ft asl)(m asl). **810ftasl, 866ftasl**
8. Elevation at wellhead/ground from 2m Digital Elevation Map to compare with above
9. Well depth (ft asl)(masl) from driller's record. **146ftasl, 350ftasl**
10. Casing stickup (m) **.6m, .6m**
11. Groundwater level monitoring period covered in your historical dataset (date xxxx-xxxx). **2007-2021**
12. Groundwater level monitoring interval (daily, weekly, monthly) **monthly**
13. Minimum groundwater level (masl) **224masl, 206masl**
14. Maximum groundwater level (masl). **247masl, 213masl**
15. Groundwater level range over period of record (m) (this is min. and max. over that period) **23m, 7m**
16. Yield of each well (US gallons per minute and Litres per second). **12gpm/3gpm and .75Lps, .2Lps**
17. Production of each well (gpm, lps) **1.8gpm/1.2gpm and .11Lps/.07Lps**
18. Is usage data recorded and archived? y/n. **Yes**
 - a. Interval (daily, monthly, seasonally, annually). **monthly**
19. Lithology/driller's notes or pumping test notes – willing to share with SSIWPA? Public? **No response.**
20. Date of any recent service and type of service rendered on the well. Reply: **2013: Wellhouse #1 upgrade with industrial chlorination and UV treatment.**

Water Survey Responses – Cedar Lane Water Service Area (CRD)

System name	# connections	Avg Daily Use Volume Per Capita	Avg Daily Use Volume (2.1 persons)	Peak Daily Use Volume
Units		L/c/day	L/ connection/day	L/connection/day
Cedar Lane Water Service Area	37	115	241	n/a

The SSIWPA coordinator was directed by CRD Electoral Area staff to compile responses to survey questions from the AGM reports 2019 (operating summaries). For each CRD-operated system, the AGM report provided a description of the service, summary of the water supply, demand and production, drinking water quality, operations highlights, capital project updates and financial report.

The following SSIWPA survey questions were answered with the use of data taken from publicly-available Cedar Lane Water Service Area AGM report (2019):

3. Does every connection on your system have a water meter? a. **Yes.**
4. Is usage data tracked by connection and made available to the ratepayer? a. **Yes, but not publicly available.**
 - a. Does any other entity have access to usage data? a. **Not answered.**
5. What was peak day average usage volume per connection or per capita (2.4 residents per single family dwelling) in 2019/2020? A. **Not available - from annual report.**
6. What was non-peak day average usage volume per connection (or per capita) in 2019/2020? A. **The average rainy day usage was 241 L/connection/d and 100 L/c/d in 2019.**
7. Other than tiered rates, do you have other means to distinguish commercial users? A. **No response.**
8. Has your Board considered usage thresholds and multiple connection types with associated limits to daily withdrawals to address the need for water conservation? Please explain.
 - a. **We have tiered rates that increase for higher volume users, but no other limits. All connections are to residential properties that are similar in demand profile, so there is no need for different connection types.**
9. 9. Is there other information about your water system/district that might be of value to SSIWPA and the island’s water conservation practices?
 - a. **Other information: Our system is aging, and we have significant improvement costs on the horizon (including replacement of all the existing in-ground pipe,**

which is asbestos-cement). Along with numerous other upgrades needed, and ongoing repairs, we will be facing financial challenges.

10. Who is the regular operator who checks the system and does the measurements? Do you have any paid staff and if yes, how many? A. **North Salt Spring Waterworks District.**
11. Are you willing to share your potable water service fee structure for a) SSIWPA only, or b) public information for our SSIWPA website? A. **Yes this is public info: See Appendix: Table 1.**
 - a. **<https://www.crd.bc.ca/service/drinking-water/billing-accounts/information-by-area>**
 - b. See also **<https://www.crd.bc.ca/about/data/drinking-water-quality-reports/>**

The Cedar Lane Water Service Commission provided the following survey responses in 2019 when SSIWPA conducted a brief non-data survey of water districts and systems (ref. SSIWPA Agenda Package 2019-10-22). The SSIWPA representative from this Commission confirmed the response below is applicable as of the date of writing:

1. What challenges are you facing? What do you think the priorities are for SSIWPA as related to your group's challenges?
 - a. **Top challenge = Capacity / availability of supply to meet demands in Cedar Lane area**
 - **Charter or memorandum of agreement for how CRD, FLNR and Islands Trust will work together to predict aquifer maximum capacity, and assessment of proof of water for future demand/development within the service area; Outline how the Commission will be kept informed and involved.**
 - **e.g. Develop a Cedar Lane Service Area water availability model or maximum capacity for current groundwater supply that includes alternative source requirements for developments/future buildout beyond capacity.**
 - **Alternate sources: Water Storage Bylaw for New Builds**
 - **SSIWPA could advocate for a bylaw requirement for all new builds in the Service Area to have water storage (enforced by CRD during building permit process - see *Saturna example*).**
 - **The Service Area faces ongoing issues with the current resource quality (above max. allowable limit of manganese and required extra water treatment, which is costly but is working).**

Water Survey Responses – Cedars of Tuam Water Service Area (CRD)

System name	# connections	Avg Daily Use Volume Per Capita	Avg Daily Use Volume (2.1 persons)	Peak Daily Use Volume
Units		L/c/day	L/connection/day	L/connection/day
Cedars of Tuam Water Service Area	16	123	259	n/a

The following SSIWPA survey questions were answered with the use of data taken from publicly-available Cedars of Tuam Water Service Area AGM report (2019):

3. Does every connection on your system have a water meter? a. **Yes.**
4. Is usage data tracked by connection and made available to the ratepayer? a. **Yes, but not publicly available.**
5. What was peak day average usage volume per connection or per capita (2.1 residents per single family dwelling) in 2019/2020? A. **Not shown in annual report.**
6. What was non-peak day average usage volume per connection (or per capita) in 2019/2020?
 - a. **The average rainy day usage was 259 L/connection/d and 123 L/capita/d in 2019.**
10. Are you willing to share your potable water service fee structure for a) SSIWPA only, or b) public information for our SSIWPA website?
 - a. **Yes this is public info: See Appendix: Table 1.**
 - <https://www.crd.bc.ca/service/drinking-water/billing-accounts/information-by-area>
 - See also https://www.crd.bc.ca/docs/default-source/crd-document-library/committeedocuments/cedarsoftuamwaterservicecommissionssi/20201105/staffreport_cedarsoftuam_2019agm.pdf?sfvrsn=5b51fbcc_8

The Cedars of Tuam Water Service Commission provided the following survey responses in 2019 when SSIWPA conducted a brief non-data survey of water districts and systems (ref. SSIWPA Agenda Package 2019-10-22):

- 1) What challenges are you facing? What do you think the priorities are for SSIWPA as related to your group's challenges?
 - a. Answer:
 - **very low availability of water in July to Oct time frame (groundwater)**
 - **crumbling infrastructure (well, distribution pipes)**
 - **high maintenance, replacement costs (a new well has been identified but hook up will be in the hundreds of thousands of dollars)**

- **absentee owners**
- **SSIWPA could help identify low cost financing**

Other Notes – Cedars of Tuam System:

During the 2019 year, there were significant errors in raw water production, as metered, and no data were reported. Usage meters were functional. The total water demand in 2019 was 1,511 m³ which represented a 10% increase from the previous year and a 27% increase from the 5-year average (CRD 2019 System Report, page 6). This signifies that water usage patterns are changing in this water system. Individual connection usage data are available by request only. There had been turbidity measures exceeding the Guidelines for Canadian Drinking Water Quality limit of 1NTU between September and December, when groundwater levels are at their lowest during the year, reported both in 2018 and 2019. The 2019 exceedance periods were reported to be lower and shorter than in 2018. Reservoir draining, cleaning and inspection was put off from 2019 to 2020.

Appendix 2 - Survey Data – Surface Water Systems

Water Survey Responses – North Salt Spring Waterworks District

System name	# connections	Avg Daily Use Volume Per Capita	Avg Daily Use Volume (2.1 persons)	Peak Daily Use Volume
Units		L/c/d	L/connection/day	L/connection/day
NSSWD residential*	1816	230	483	n/a

*based on 2018 Water Audit Report available at: northsaltspringwaterworks.ca

1. What challenges are you facing? A. **Limited water supply and funding for infrastructure.** What do you think the priorities are for SSIWPA as related to your group's challenges? A. **Education and outreach**
2. What has changed over the past three years in terms of operations or data management?
 - a. **More sites have been added to the Supervisory Control and Data Acquisition (SCADA) system**
3. Does every connection on your system have a water meter? a. **Yes**
4. Is usage data tracked by connection and made available to the ratepayer? y/n **Yes**
 - a. Does any other entity have access to usage data? Not for data on individual connections. A. **System wide data is made public in the annual water audit.**
5. What was peak day average usage volume per connection or per capita (2.1 residents per single family dwelling was the figure used in the Water Audit 2018)?
 - a. **The 2019 water audit has not been done due to staff shortages so that information is not available. The 2018 audit is available on the NSSWD website.**
 - b. What was non-peak day average usage volume per connection (or per capita) in 2019? **Same answer as above.**
6. Other than a graduated fee structure by volume, do you have any other measures by which to distinguish bulk users/commercial scale connection types?
 - a. **They are classified differently for parcel tax purposes.**
7. Has your Board considered usage thresholds and multiple connection types with associated limits to daily withdrawals to address the need for water conservation? Please explain. A. **I think you mean cutting a connection off after it reaches its allowable threshold. If so, it has been mentioned by not seriously considered. Such measures would be difficult to enforce, require extensive administrative and operational resources and represent risks to public health and fire safety.**
 [Coordinator's Note: NSSWD does operate a multi-tiered rate structure and categorizes 10 classes of service.]

8. Is there other information about your water system/district that might be of value to SSIWPA and the island's water conservation practices?
 - a. **Watering restrictions are guided by a guide curve developed using the water model for St Mary Lake. Examples are available on the NSSWD website with the monthly lake level and rainfall updates.**
9. Who is the regular operator who checks the system and does the measurements? Do you have any paid staff and if yes, how many? A. **13 staff**
10. Are you willing to share your potable water service fee structure for a) SSIWPA only, or b) public information for our SSIWPA website? If yes, please indicate a) or b) and please send the fee structure documentation to Shannon. A. **Yes, it is publicly available already. See: <https://northsaltspringwaterworks.ca/bylaws/taxation-water-and-other-rates/bylaw-298-tolls-and-charges-2021/>**

Other (October 2019 interview with NSSWD Board Chair – these views do not necessarily represent the views of the entire NSSWD Board):

What challenges are you facing?

A.

- **Moratorium. Trying to find ways to lift it.**
- **Government-funded social housing projects.**

What do you think the priorities are for SSIWPA as related to your group's challenges?

A:

- **Seeking more detailed information on groundwater availability (any new source supplies in the NSSWD?)**
- **Desalination**
- **Have SSIWPA Technical Working Group as review for the work of qualified professionals and staff only.**

Water Survey Responses – Beddis Water Service Area (CRD)

System name	# connections	Avg Daily Use Volume Per Capita	Avg Daily Use Volume (2.1 persons)	Peak Daily Use Volume
Units		L/c/day	L/connection/day	L/connection/day
Beddis Water Service Area	127	192	402	n/a

The Beddis Water Service Commission provided the following survey responses in 2019 when SSIWPA conducted a brief non-data survey of water districts and systems (ref. SSIWPA Agenda Package 2019-10-22):

What challenges are you facing as top priorities?

High operating costs of the Dissolved Air Flotation Treatment Plant at Cusheon Lake:

- The year over year conservation gains within Beddis Water Service Area are resulting in shortfalls in revenue. This is problematic because continuing to cover shortfalls with parcel taxes, the district will end up in a situation where the water sale portion will become so small relative to the parcel tax, that there will no longer be an incentive for users to conserve water as vigorously.
- How to make use of organic sludge by product from the DAF system and managing water intake challenges.

Winter recharge to the lake and effects on water quality:

- If spring levels are down, and a hot summer follows with high rates of evapotranspiration the Cusheon Lake volume is low, water temperatures go up, and cyanobacterial risks increase.
- Water quality testing by CRD for cyanotoxins may not be occurring in the fall and blooms are now occurring in the fall/winter.

Chlorinated by-products, and aging pipes.

As reported in the minutes of the Beddis Water Service Commission’s Annual General Meeting (2019):

The Beddis Water System service totaled 18, 543 m³ as annual demand in 2019. The average usage volumes in the table above and Appendix Table 2 were calculated from the total demand value divided by the number of connections. The system is fully metered, and water meters are read quarterly. Water meter information enables water production and consumption to be

compared in order to estimate leakage losses in the distribution system. The difference between water produced and water demand (total metered consumption) is called non-revenue water and includes distribution leaks, meter error, and unmetered uses such as fire hydrant usage, distribution system maintenance, and process water for the treatment plant. Non-revenue water is approximately 29%. Water loss is estimated to be approximately 24% which is considered high for small water system such as Beddis. However, as was in 2018, some of the water loss for the service can be attributed to a number of water main and service line breaks in 2019.

Water Survey Responses – Fulford Water Service Area (CRD)

System name	# connections	Avg Daily Use Volume Per Capita	Avg Daily Use Volume	Peak Daily Use Volume
Units		L/c/d	L/connection/day	L/connection/day
Fulford Water Service Area ¹	95	300	630	n/a

The following SSIWPA survey questions were answered with the use of data taken from publicly-available Fulford Water Service Area AGM report (2019):

7. Does every connection on your system have a water meter? a. **No.**
8. Is usage data tracked by connection and made available to the ratepayer? a. **No.**
9. What was peak day average usage volume per connection or per capita (2.4 average residents per single family dwelling) in 2019/2020?
 - a. **Not treated in annual report, but the range of total production on the entire system of 91 connections during the peak months June to September, 2019 was 2,500 – 3,500 m³/month (equivalent to 40 - 76 m³/system/d).**
10. What was non-peak day average usage volume per connection (or per capita) in 2019/2020?
 - a. **The report indicates off-peak daily average per residential connection of 230 l/connection/annum. That number may not account for the several commercial connections but data for individual connections was not provided. To best of the data provided 2019: 630 l/connection/day or 300 l/c/d. See Appendix, Table 2.**
11. Are you willing to share your potable water service fee structure for a) SSIWPA only, or b) public information for our SSIWPA website?
 - a. **Yes this is public info: See Appendix: Table 1.**
 - <https://www.crd.bc.ca/service/drinking-water/billing-accounts/information-by-area>
 - See also https://www.crd.bc.ca/docs/default-source/crd-document-library/committeedocuments/fulfordwaterservicecommissionssi/20201103/staffreport_fulford_2019agm.pdf?sfvrsn=db2ff8cc_12

Other (October, 2019 interview with Fulford Commission):

- 1) What challenges are you facing? What are SSIWPA priorities to assist with your group's challenges?

A: Watershed capacity - the challenge of determining answers to these questions: What is the annual water availability volume that can be withdrawn from Weston Lake under legislation? Is it being withdrawn, or not?

At the time of this survey (fall 2019), the Fulford Water Service Commissioners were seeking data about licenses, the degree to which the lake could support new water license applications, and information about provincial control of licensing given the apparent lack of water availability measurements and information for the Weston Lake watershed. The commissioners were seeking to increase their ability to make scientifically-based decisions on current and future requests from potential users, both residential and commercial, to join their system. They also sought to estimate future changes to the Weston Lake resources given the uncertainty of climate change and its associated shifts in rainfall patterns.

Controlling costs

Communication challenges:

- Need for public information re: restrictions on taking water from surface bodies; e.g. what is poaching and what to do if you see it.
- The commission cannot contact ratepayers directly due to privacy/confidentiality issues. (This is a Capital Regional District service area.)
- Need local number to call to report low or high water, unusual animal activity, oil slicks or other potential threats to water quality.
- Need communication with other water districts on the island.

Footnote 1: Fulford Connections are not individually metered. Non revenue water = $27,302 * 20\% = 5,460.4 \text{ m}^3/\text{yr}$. So, Total Demand is $27,302 \text{ m}^3 - 5,460.4 \text{ m}^3 = 21,841 \text{ m}^3/\text{yr}$. The calculation for m^3/yr for a SFE is $21,841 \text{ m}^3 / \# \text{ connections on system (95)} = 230 \text{ m}^3 = 230,000 \text{ L /SFE/yr}$. Divided by 365 days/yr = 630 L/connection/day. Per capita is that number divided by 2.4 persons /SFE = 263 L/c/d.

Water Survey Responses – Fernwood and Highland Water Service Areas (CRD)

System name	# connections	Avg Daily Use Volume Per Capita	Avg Daily Use Volume	Peak Daily Use Volume
Units		L/c/d	L/connection/day	L/connection/day
Highland/Fernwood	320	199	427	n/a

There were no respondents to the 2019 or the 2020-21 SSIWPA Water System Survey. The following was gleaned from the CRD’s Report (2019).

The difference between the Total System Production and Total Demand was reported as non-revenue water resulting from leaks, meter error, maintenance, etc. In 2019, non-revenue water was reported to be 34% of total system production, and of that value, 29% was reported to be due to water loss, which is high for a small system like this one.

