



RAINWATER HARVESTING ON THE GULF ISLANDS

Frequently Asked Questions

This document is intended as a resource for Gulf Island homeowners who want to learn more about rainwater harvesting. We are providing answers to the questions that most frequently arose during our education outreach activities in the summer of 2005.

The State of Texas has an excellent guide to rainwater harvesting that answers most of the questions asked by Gulf Island residents. Rather than reproduce its contents in this document we instead frequently refer readers to the *Texas manual*. It can be read on-line or downloaded from: http://www.twdb.state.tx.us/publications/reports/RainwaterHarvestingManual_3rdedition.pdf.

Homeowners looking for additional information may also want to read the Owners Manual developed for the *Ruby Alton Nature Reserve house* on the Islands Trust Fund website at www.islandstrustfund.bc.ca.

Frequently asked questions answered in this document:

1. **Why should people harvest rainwater on the Gulf Islands?**
2. **How much water do Gulf Islanders use on average?**
3. **How can I reduce my water consumption?**
4. **What are typical rainwater harvesting system components?
What materials are acceptable if I want to drink the water?**
5. **Are there health and safety requirements/concerns?
Can I drink the rainwater I collect?**
6. **How much water can I collect from rainwater?
How much do I need to store?**
7. **How much does a rainwater harvesting system cost?**
8. **What kind of maintenance is required?**
9. **What can I do about water for my garden?**
10. **Can I design my own rainwater harvesting system?**
11. **Are there building code standards that I have to meet?
Do I have to get a building permit?**
12. **What are the advantages and benefits of rainwater harvesting?**
13. **Does rainwater harvesting offer environmental benefits to the Gulf Islands?**
14. **Can a home rainwater harvesting system act as a firefighting reserve?**
15. **Where can I get more information about rainwater harvesting?**

1. Why should people harvest rainwater on the Gulf Islands?

Rainwater harvesting is becoming more relevant to Gulf Island residents as problems with groundwater and freshwater quality and quantity become ever more common and urgent. The Gulf Islands have a limited ability to store surface and groundwater, and lose up to 80% of rainwater as runoff to the ocean. Rainwater collection offers islanders the opportunity to hold more freshwater on their island, supplement their current source of ground or surface water (or in rare cases, replace it), and then release this rainwater back into the environment over time, which can benefit ecosystems by providing a source of water during the dry summer months. Rainwater harvesting does not remove water available to local environments, it simply is gathered from a different part of the water cycle.

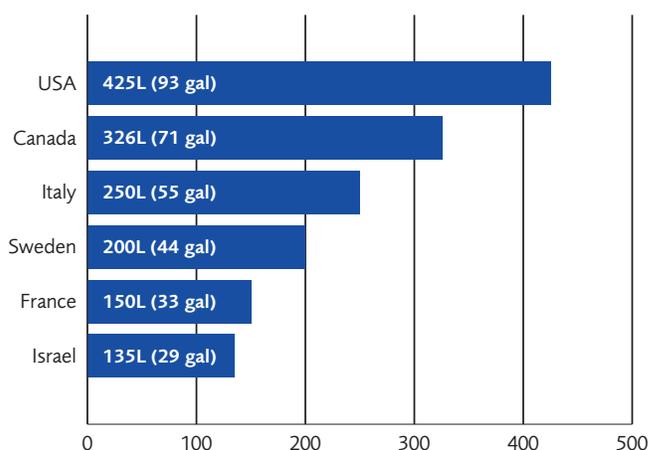
Rainwater management and other efforts to increase the amount of freshwater storage in the aquifers of the Gulf Islands are important. The overuse of fractured bedrock aquifers in several Gulf Island communities has already contributed to instances of saltwater intrusion, an increasing number of abandoned wells, and measurable declines in water quality over the summer months. The susceptibility of these aquifers to overuse and contamination can be expected to increase as population densities, tourism levels, and development infrastructures continue to grow. Lack of access to safe and plentiful water can lead to serious economic, social and environmental issues. Groundwater is common property and as this resource becomes increasingly scarce, community conflict over the resource is expected to increase.

Most climate models indicate warmer wetter winters and hotter drier summers in the future for southwestern BC. Hot dry summers mean that there will be less water available. Groundwater will not be recharged as quickly or as often and more water will be lost to evaporation, likely resulting in lower water tables. Warmer, wetter winters will likely mean less snow and stronger, more intense rains that will increase the amount of rainwater lost to run-off, possibly resulting in increased erosion damage to streams and rivers.

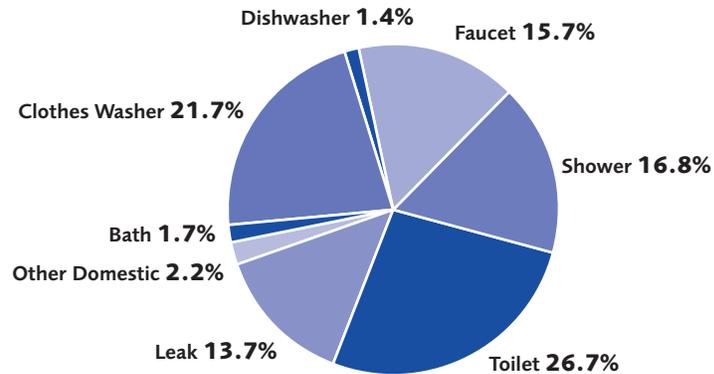
2. How much water do Gulf Islanders use on average?

Many of the water districts in the Gulf Islands report use levels of 50–60 gallons per person per day for full-time resident households. Rainwater dependent users consider 35–40 gallons per person per day a maximum and some are as low as 25–30 gallons per person per day.

Average Daily Residential Water Use Per Person



Water Consumption in the Home



During the summer, outside water use may be as much as 50% or more of the total water used. Even an ordinary rain barrel (a common feature of our grandparents' homes) is a good start.

3. How can I reduce my water consumption?

Whether your water supply is supplemented by rainwater or not, the best investment you can make is in reducing water consumption.

In the Home

1. Check for leaking toilets. **
2. Install a 6 L toilet (mandatory for new construction or renovations). Low flush can be less than 6 litres.
3. Check for leaking faucets or showerheads.
4. Check for leaking pipes or service lines.
5. Install low flow fixtures/faucets.

**To check for leaks: turn off all your water-using appliances including the fridge. If your pump starts, you may have a leak.

In the Garden

- Plant species that tolerate summer droughts.
- Improve the soil to prevent erosion and reduce evaporation by mulching and composting.
- Plant in areas where water is nearby (ie near downspouts) or channel water to plants through the use of small ditches.
- Water efficiently.
- Do not water in the heat of the day or on windy days.
- Set your sprinkler to avoid watering patios, drives and walks.
- Water back from the tops of slopes, as water will run down the slope and seep into the soil.
- Sweep your driveway and walkway instead of washing with a hose.
- Regularly check your hose for leaks.
- Use a bucket and sponge to rinse your car so you will only need a light rinse. Better yet, wash your car less often.
- Use a bucket and squeegee to wash windows.

4. What are typical rainwater harvesting system components? What materials are acceptable if I want to drink the water?

- Operate decorative fountains only when you are there to enjoy them.
- When cleaning outdoor ornamental ponds, use waste water to water lawns and gardens.
- Water only when necessary. Apply a maximum of 2.5cm (1 in.) per week of water to your lawn.
- Manage watering to ensure absorption not runoff.

See *Texas Manual on Rainwater Harvesting*, 3rd Edition, pages 5–19

See Part Two of the Rainwater Harvesting System and Water Supply Description for the *Ruby Alton House Demonstration Project* on the publications page of the rainwater harvesting section of the Islands Trust Fund's website for a detailed description and colour pictures of the components used at the *Ruby Alton House* on Salt Spring Island. This document provides an explanation of why we selected certain components and how the components operate together.

When selecting components for your potable (drinking water) system, ensure that all components have a CSA (Canadian Standards Association) stamp and that specialty components are approved for use with potable water or at least rated "food safe" or better still "fish safe." If drinking the water, it is always a good idea to use an oil-free submersible pump (if your water needs to be transported).

It is also a good idea to seek advice from an experienced professional before buying system components. They can review your system for any design flaws and can advise on the suitability of the products you have selected.

5. Are there health and safety requirements/concerns? Can I drink the rainwater I collect?

See *Texas Manual on Rainwater Harvesting*, 3rd Edition, Chapter 3 on Water Quality and Treatment, pages 21–26.

There are a number of safety concerns to consider when installing a rainwater system. You will want to ensure that the physical system is safe so that no one can fall into a cistern and drown, electrical components are adequately protected, and the system has basic measures to prevent easy or accidental tampering (e.g. locking the cistern hatch).

Safety precautions should always be taken when cleaning the system to prevent falling. Annually, someone is going to have to climb a ladder to clean gutters, and spend time on the roof to clean the roof surface. Your cistern or storage tank will also require cleaning and extreme care must be taken when entering enclosed spaces such as cisterns.

The continued quality of your water will depend entirely on how well you maintain your system. Inadequate system maintenance can lead to stagnant or contaminated water which can present a problem for both potable and non-potable water systems.

If the water is being used for non-potable purposes, the health concerns are less than if the water will be used for human consumption. However, if you are piping non-potable water into your home you must ensure that the piping cannot contaminate the potable water system. You may also wish to consider whether it is safe to bathe young children in the non-potable water given that they might accidentally ingest some of the water. Fixtures utilizing a non-potable water source should be clearly labelled.

6. How much water can I collect from rainwater? How much do I need to store?

It is extremely important that waste water not be used (for potable or non-potable) without proper treatment that has been installed by a professional.

See also the *Owner's Manual for the Ruby Alton Nature Reserve Demonstration System* on the Islands Trust Fund website.

The amount of rainwater available is dependent on many variables such as rainfall, roof size, proportion of actual rainfall you can collect from your roof, storage capacity, etc.

See *Texas Manual on Rainwater Harvesting*, 3rd Edition, Chapter 4 on Water Balance and System Sizing, pages 29–40.

The following tables show average precipitation at various weather stations in the Gulf Islands. The information was taken from the Environment Canada Climate Normals (1971–2000) website at: http://www.climate.weatheroffice.ec.gc.ca/climate_normals/index_e.html. The calculations include both rain and snow. They represent all the weather station data that is available on-line for the Gulf Islands.

Salt Spring Island (St. Mary's Lake)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation (mm)	145.7	111.9	86.8	55.7	44.1	38.8	24.7	30.0	36.5	86.4	163.3	150.3	974.2
Precipitation (inches)	5.7	4.4	3.4	2.2	1.7	1.5	1.0	1.2	1.4	3.4	6.4	5.9	38.4

Salt Spring Island (Cusheon Lake)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation (mm)	150.9	125.1	99.9	67.3	48.9	37.5	22.9	27.6	35.0	88.5	176.5	148.0	1028.1
Precipitation (inches)	5.7	4.4	3.4	5.9	4.9	3.9	2.6	1.9	1.5	0.9	1.1	1.4	40.5

Mayne Island

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation (mm)	120.9	90.4	72.7	46.9	40.7	35.2	22.1	28.1	32.6	76.1	132.7	130.4	828.8
Precipitation (inches)	4.8	3.6	2.9	1.8	1.6	1.4	0.9	1.1	1.3	3.0	5.2	5.1	32.6

Gabriola Island

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation (mm)	129.8	105.9	86.9	57.0	44.9	40.9	26.0	28.2	38.5	81.3	146.9	137.8	924.0
Precipitation (inches)	5.1	4.2	3.4	2.2	1.8	1.6	1.0	1.1	1.5	3.2	5.8	5.4	36.4

Gambier Harbour

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation (mm)	241.4	198.5	174.9	125.7	109.4	83.7	62.6	63.3	81.8	199.9	300.9	275.6	1917.5
Precipitation (inches)	9.5	7.8	6.9	4.9	4.3	3.3	2.5	2.5	3.2	7.9	11.8	10.9	75.5

Victoria International Airport

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation (mm)	136.6	107.8	78.0	44.5	36.5	32.0	19.5	23.9	30.4	75.7	147.2	151.2	883.3
Precipitation (inches)	5.4	4.2	3.1	1.8	1.4	1.3	0.8	0.9	1.2	3.0	5.8	6.0	34.8

Mud Bay (closest station for Denman Island, Hornby Island and Lasqueti Island)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation (mm)	248.4	221.6	161.2	85.6	54.9	46.8	28.8	41.4	61.4	182.3	292.4	280.2	1704.9
Precipitation (inches)	9.8	8.7	6.3	3.4	2.2	1.8	1.1	1.6	2.4	7.2	11.5	11.0	67.1

7. How much does a rainwater harvesting system cost?

If you choose to search the website for additional information, use only the island name (i.e. Mayne, not Mayne Island) as your search word.

If there is no information available about your island you can either select a nearby location, or you can call Environment Canada to help you research precipitation information. They can be reached at 1.604.664.9067.

As an example, the water balance table for the Island Trust Fund's *Ruby Alton Nature Reserve Rainwater Harvesting Demonstration Site house* is posted at: <http://www.islandstrustfund.bc.ca/assets/images/rainwaterharvesting/waterbalancereport.pdf>

How much your system costs depends entirely on how complex your system is, whether you are incorporating the system into new construction or adding it to an existing structure, and how much work you are willing to undertake yourself. A simple rain barrel system can be installed for less than \$100 while a complex system designed to provide potable water to four-person household could cost more than \$35,000 including storage. A simple catchment system for an average sized house can usually be installed for between \$2,500 and \$5,000. Storage is the most expensive part given that a 12,000 gallon cistern typically required for a two person household using entirely rainwater could cost over \$15,000

Systems that combine rainwater with other water sources can add \$5,000 to the system costs, but usually more than pay for themselves by reducing the storage requirements.

When considering a rainwater harvesting system, a homeowner may wish to compare the cost of other sources of water. For example, drilling a deep well in an area of low yields can cost up to \$20/foot. A 450 ft well could cost \$9,000 to drill without any guarantee of potable water (or any water at all). The homeowner would still need to purchase a pump (up to \$4,000) and possibly a storage tank (approx. \$1/gallon).

8. What kind of maintenance is required?

Regular maintenance is crucial to a well-functioning system. When considering the installation of a rainwater harvesting system, homeowners must consider how they will maintain their system. They need to consider such questions as:

- Am I physically capable of cleaning the system?
- Will I be home enough to complete monthly maintenance?
- Can I afford to pay someone to take on maintenance tasks or emergency repairs for me?
- Can I afford replacement parts (such as UV bulbs)?
- If I am away and it looks like very cold weather who will prepare the system so it doesn't freeze?

See *Texas Manual on Rainwater Harvesting*, 3rd Edition, page 50.

See *Owner's Manual for the Ruby Alton Nature Reserve Demonstration System*.

9. What can I do about water for my garden?

Rain Barrels

Installing rain barrels at the downspouts of your eaves troughs is an excellent way to collect rainwater to use on your lawn or in the garden during our dry summer months. Make sure it has a secured lid to prevent children gaining access; this will also discourage mosquito breeding, prevent contamination and keep out wildlife. You will also need an overflow attachment and a hose attachment for watering. Rain barrels can be installed in series to increase storage capacity.

Landscape Holding Areas

Crescent-shaped berms (mounds of earth) constructed around the base of a plant are useful for slowing and holding water on slopes. (To avoid structural or pest problems, locate these water holding areas at least 10 feet from any structures). Around existing plants, construct level berms or moats on the surface to avoid damaging roots. Holding areas around existing plants should extend beyond the drip line to accommodate and encourage root growth. For new plantings, put plants at the upper edge of concave water holding areas to encourage root growth and to avoid extended flooding. You may want to connect several holding areas with channels to spread water throughout your garden.

Ponds

Ponds can also hold rainwater diverted from roofs, and can provide important habitat for a variety of species. However, caution needs to be taken to avoid upsetting the fragile water balance of an existing pond or building a new pond that compromises other areas of ecological importance. Ponds can also be used to rehabilitate waste water if designed by a professional.

10. Can I design my own rainwater harvesting system?

Every house and every rainwater system are different. Homeowners can often easily design a simple system for their garden with advice from the local hardware store or local plumber. However, homeowners need to be aware that their rainwater harvesting system may need to meet BC Building Code standards, and on some islands, need to pass a building inspection. Generally, for most installations, professional advice is a good idea, as a professional designer might save you money by suggesting efficiencies, technologies or innovations that you are not be aware of.

Professional advice is always necessary when installing a potable system. This is for your safety and the safety of any future owners of your home.

11. Are there building code standards that I have to meet? Do I have to get a building permit?

Regardless of where you live in the Gulf Islands you are required to build to the BC Building Code standard. Some islands have building bylaws that are enforced through local building inspectors. Contact your regional district or municipal office for information on your island. For example, many jurisdictions consider large water tanks to be "structures" that must be located within the zoning bylaw lot line setbacks, and in some cases the tank itself must be engineered.

The Code is not really clear on its requirements except that one needs to confirm the supply of potable water. This may be achieved in a number of ways, but to meet the Code one must demonstrate a "level of comfort" to the building inspector.

12. What are the advantages and benefits of rainwater harvesting?

13. Does rainwater harvesting offer environmental benefits to the Gulf Islands?

The pressurized part of the system is separate from the rainwater system and involves the same regulations and equipment that well or piped water systems require. A plumber will be required to help you with this part of your system.

The Islands Trust Fund is working with the Capital Regional District in 2006 to develop draft guidelines that could apply to the whole Islands Trust Area. The guidelines should help homeowners to ensure that their rainwater systems don't create hazards for current or future owners. The guidelines may include topics such as how to reduce risks in the following areas:

- Unstable earth
- Earthquake
- Inadequate filtration and disinfection for drinking water quality
- Cross-contamination
- Drowning
- Flooding

It is important for all rainwater system users to remember that no matter how many precautions are built into the system, only regular maintenance will keep a system safe.

See *Texas Manual on Rainwater Harvesting*, 3rd Edition, page 1–2

Yes, there are potential ecosystem benefits. Increased use of rainwater harvesting systems may help protect the southern Gulf Islands' nationally rare Coastal Douglas-fir ecosystems, by creating a new source of stored water to release during the dry summers. Low groundwater levels can result in increased stress to plant and animal species that are dependent on that water supply. In urban areas, rainwater catchment can also play an important role in effective management of stormwater by lessening surface runoff and erosion, promoting infiltration and aquifer recharge, and protecting water quality and the habitat of local waterways. Rainwater harvesting can also lower stormwater management costs and other infrastructure costs such as waterlines, stormwater piping, maintenance, etc.

When homeowners become rainwater harvesters, they frequently become water conservers at the same time. As residents become more aware of where their water comes from and their rainfall patterns, they recognize the need to reduce their consumption. As more people adopt water conservation practices into their daily lives, the more it becomes a community norm. The values and practices associated with using less water get spread by way of mouth and role modeling. Also, as more residents start to connect water problems with climate change, they may start taking actions to reduce their greenhouse gas emissions (see the One-Tonne Challenge – www.climatechange.gc.ca/onetonne – to learn what you can do).

Increasingly on the Gulf Islands, residents are using water softening systems, filters, UV, reverse osmosis and other methods to treat marginal water sources, hard water and contaminated water. These systems generally use a lot of water for their operation and cleaning and consequently can lead to increased water consumption in a region that needs to conserve all the water it can. Utilization of rainwater harvesting could eliminate the need for these systems.

14. Can a home rainwater harvesting system act as a firefighting reserve?

Water storage cisterns are an integral part of any rainwater system and these cisterns serve a secondary function of providing reservoirs for fire suppression. On many Gulf Islands, local fire departments encourage residents to contact them to add their location to a registry of available cisterns over 10,000 gallons. They also encourage residents to speak to them about installing the correct fitting on the outside of their tank to make sure they can attach their fire hoses to the tank. Fire departments can also provide homeowners with pump and sprinkler information for protecting their home from wild fires.

15. Where can I get more information about rainwater harvesting?

- a. The Islands Trust Fund has posted links to a useful publications and websites on its rainwater harvesting links page
- b. The Islands Trust Fund is financially unable to maintain an active rainwater harvesting education program except for these web-based documents. Homeowners with questions are encouraged to call their regional district or local building inspection office.

Upon special request, group tours of the demonstration site on Salt Spring Island might be possible.

This project was generously funded by:

Vancity/Real Estate Foundation of British Columbia Green Building Grant Program,

<http://www.realestatefoundation.com>

Capital Regional District, <http://www.crd.bc.ca>

Victoria Foundation, <http://www.victoriafoundation.bc.ca>

Rainwater Connection, <http://www.rainwaterconnection.com>

The Salt Spring Island Foundation



Islands Trust Fund

200-1627 Fort Street, Victoria, BC V8R 1H8
Telephone **250.405.5151** Fax 250.405.5155
Email itfmail@islandstrust.bc.ca
Web **www.islandstrustfund.bc.ca**