Whidbey Island Conservation District

- How and why WICD became involved in Low Impact Development / Alternative Stormwater Management
- Why it makes sense for WICD to work in this arena
- What the WICD program looks like
- The future

Conservation District Law in WA State

- Chapter 89.08 RCW
- 89.08.110 Preamble

- (4)…Whereas, there is a pressing need for the conservation of renewable resources in all areas of the state, whether urban, suburban, or rural, and that the benefits of resource practices , programs, and projects, as carried out by the state conservation commission and the conservation districts, should be available to all such areas;
- Definitions
- “Renewable natural resources”, “natural resources” of “resources” includes land, air, water, vegetation, fish, wildlife, wild rivers, wilderness, natural beauty, scenery and open space;
- “Conservation” includes conservation, development, improvement, maintenance, preservation, protection and use, and alleviation of floodwater and sediment damages, and the disposal of excess surface waters.

The Era – 2005 - 2009

- The District was reinventing itself after some difficult years.
- Regionally, concerns were elevating over the health of Puget Sound.
- Stormwater was identified as a key problem.
- Local developers were interested in appealing to people who live on Whidbey Island because they embrace “living green.”
- WICD was funded by the Dept. of Ecology to provide technical assistance for “Green Ground” urban consultations and to work with a developer on the Highlands Development.

Langley, WA
“The Village by the Sea”

The Highlands Development

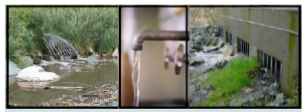
The Highlands Development, located in Langley , WA, is a development that was designed to meet Low Impact Development (LID) standards.

WICD role:

- To review engineering plans for drainage.
- To provide presentations on the function of LID at outreach events sponsored by the developer.
- To develop a guide for living responsibly within the development. The guide was adopted into the Covenants, Conditions and Restrictions (CC&R's).

The Highlands Development

- Streets are narrow to allow for more pervious area.
- Bioswales convey water to large chambers or rain gardens for biofiltration and treatment.
- Natural swales and gardens network among the streets and homes to slow the stormwater down and clean it very much like it would have been treated naturally in a northwest forest.
- During heavy rainstorms, you may see standing water in the rain gardens and drainage swales. This means the natural drainage features are hard at work, cleaning the stormwater runoff.



Why is LID Important?

- Stormwater pollution has compromised virtually all urban creeks, streams and rivers in Washington State.
- Shellfish harvest at many beaches is restricted or prohibited due to pollution. Stormwater runoff is often one of the causes.
- Stormwater is the leading contributor to water quality pollution of urban waterways in the state.
- The erosive forces and sheer quantity of stormwater runoff can cause flooding and property damage.
- 72% of Whidbey Island's drinking water comes from groundwater, recharged solely by rainfall. When stormwater runoff is piped into Puget Sound, groundwater is not recharged.

Where does your runoff go?

As part of a WICD Rain Garden Workshop in June 2008 a Rain Garden was installed at Island County Annex Building, near the corner of 6th and Main in Coupeville, WA.

For more information on Low Impact Development (LID) or technical assistance for your projects, please contact the Whidbey Island Conservation District (WICD).

Stop by our office: 404 NE Center Street in Coupeville
Mailing Address: PO Box 490 - Coupeville, WA 98239
Phone: 360-678-4708
Web Site: www.whidbeycd.org

This brochure was developed by **Whidbey Island Conservation District** staff and partners. Facts and definitions were adapted from the **Puget Sound Partnership** publications and provided by The Highlands, photos by WICD staff and The Highlands.

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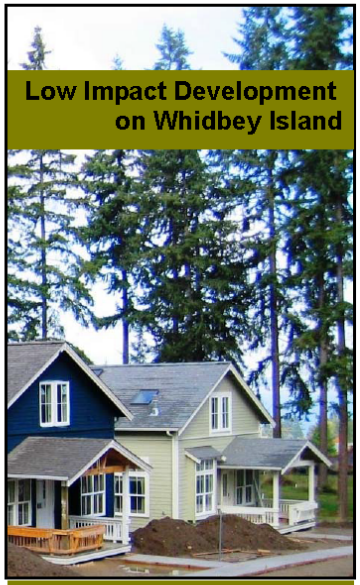


Low Impact Development on Whidbey Island

The Highlands at Langley
A showcase of LID techniques

An alternative approach to site development and stormwater management, Low Impact Development (LID) is gaining popularity throughout the Puget Sound area. LID practices help developers create built environments that mimic the hydrology of the original, natural landscape to reducing the impact on streams, wetlands and Puget Sound.

Whidbey Island Conservation District

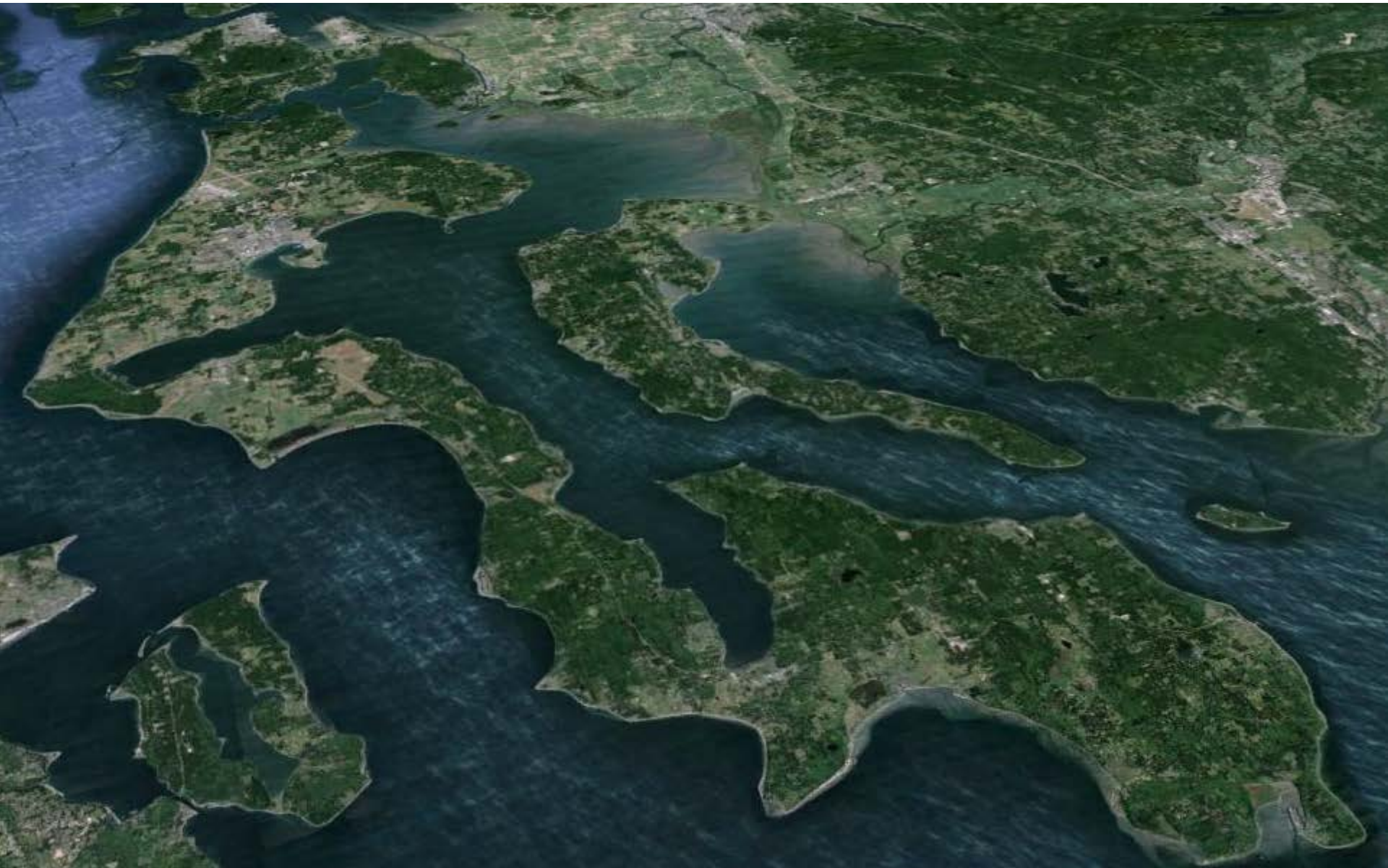
WICD - Alternative Stormwater Hub

- WICD started the LID Summit Work Group
- Goal was to coordinate efforts around alternative stormwater management
- Included cities, towns, county, universities, interested professionals
- Resulted in several series of workshops and tours educating land/home owners, jurisdictions and professionals
- Now much of this has moved to a state level

Alternative Stormwater Management on Whidbey Island, WA

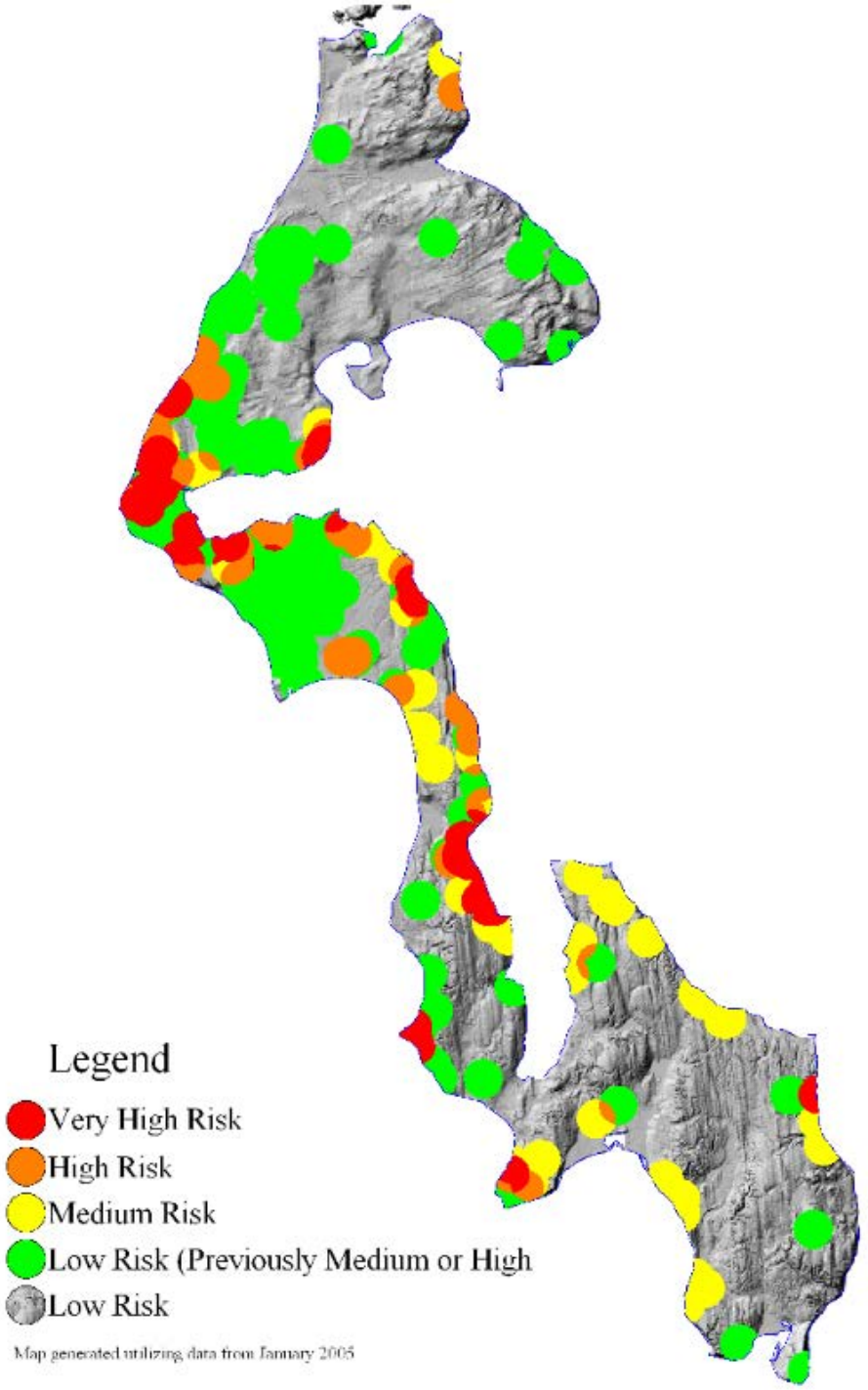
WHIDBEY ISLAND CONSERVATION DISTRICT
WICD
preserving natural resources

Whidbey Island



Aquifer Protection

- Whidbey Island has been designated a “Sole Source Aquifer” by the EPA. Approximately 70% of residents rely on groundwater as their potable water source.
- In areas where groundwater withdrawals exceed recharge from rainfall, seawater intrusion into aquifers is a problem.

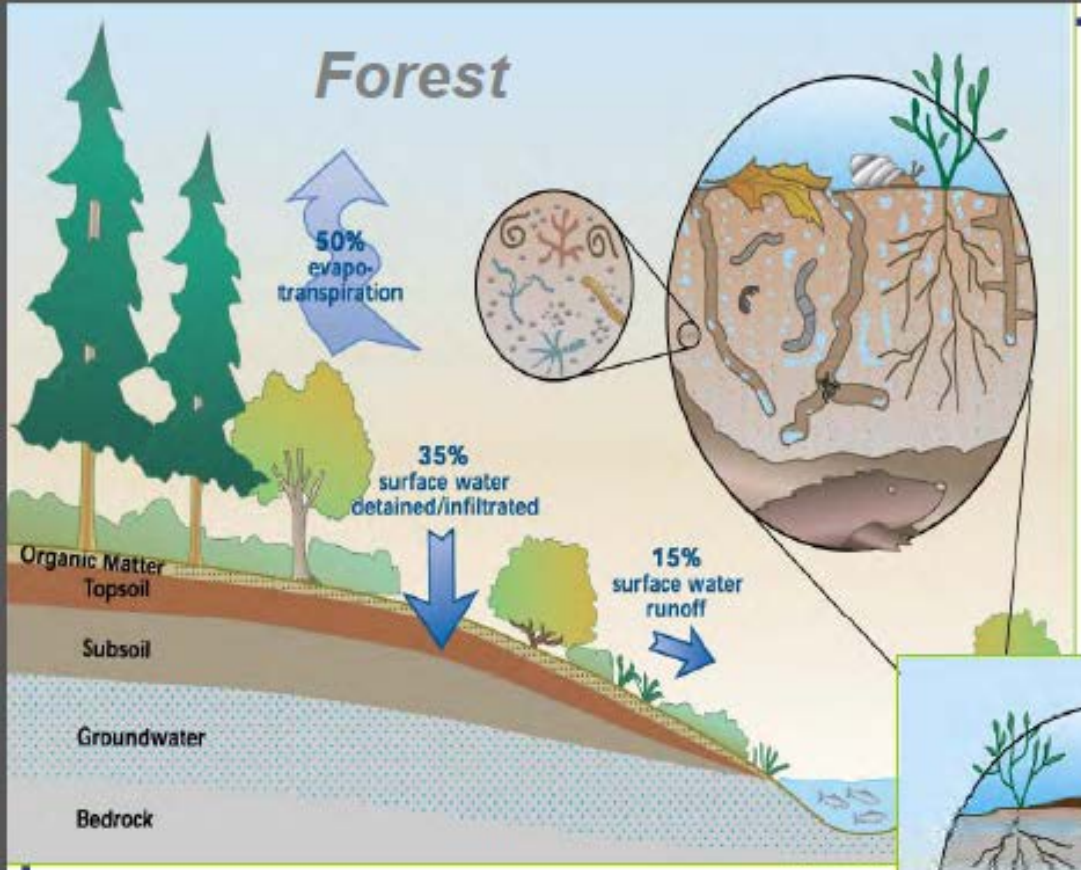


Restoring Watershed Functions

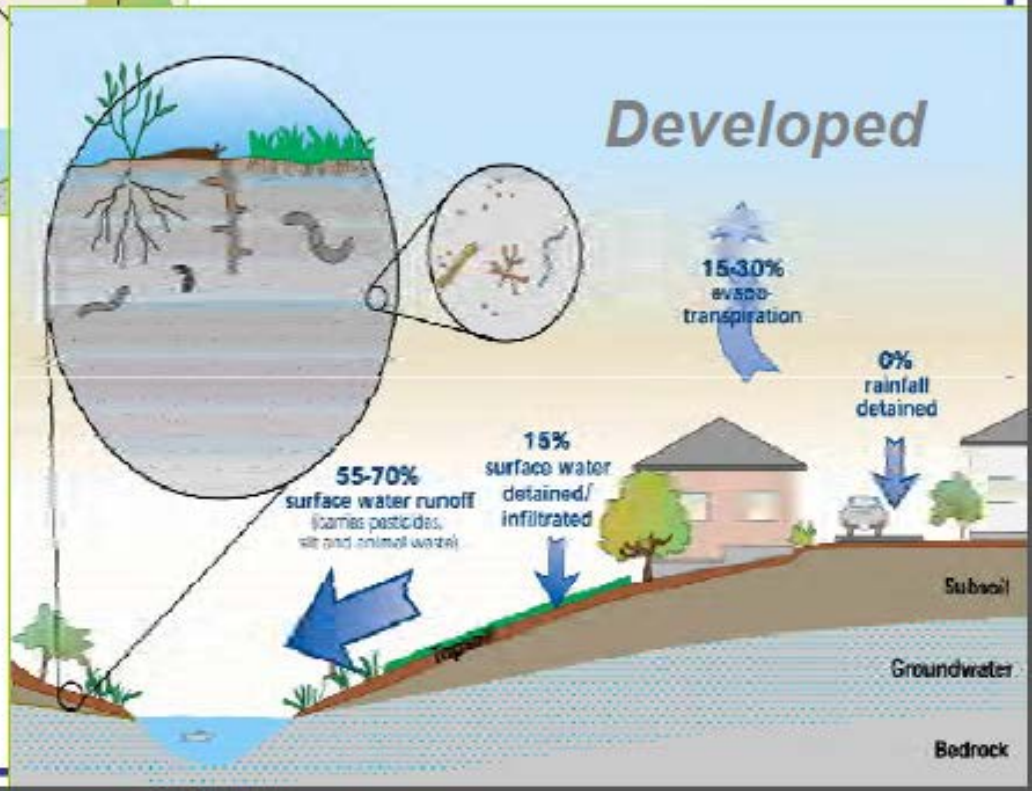
Hydrologic Functions

- Reducing runoff
- Reducing Peak Flows
- Filtering Stormwater
- Recharging Groundwater

Development Effects



Before development: forest soils absorb rainfall – release it slowly



After development: rainfall rushes off roofs, roads, and compacted soils

Impacts of Development

- Increased Runoff = Increased pollutant transport
- More erosion and sedimentation
- Lower summer base flows in streams
- More stream channel erosion
- Decreased groundwater recharge
- Less available water in soils

Much of our rainfall reaches Puget Sound

How much? How fast? How dirty?

Traditional Stormwater Management

Stormwater Pollution

- Runoff from urban areas is a leading cause of water quality degradation in surface waters (U.S. Environmental Protection Agency, 2000).
- Development reduces rainfall pathways for storage, infiltration, and groundwater recharge, and increases surface runoff.

Stormwater Runoff Contains

Oil, grease, metals and coolants from vehicles;

Fertilizers, pesticides and other chemicals from gardens and homes;

Bacteria from pet wastes and failing septic systems;

Soil from construction sites and other bare ground;

Soaps from car or equipment washing; and

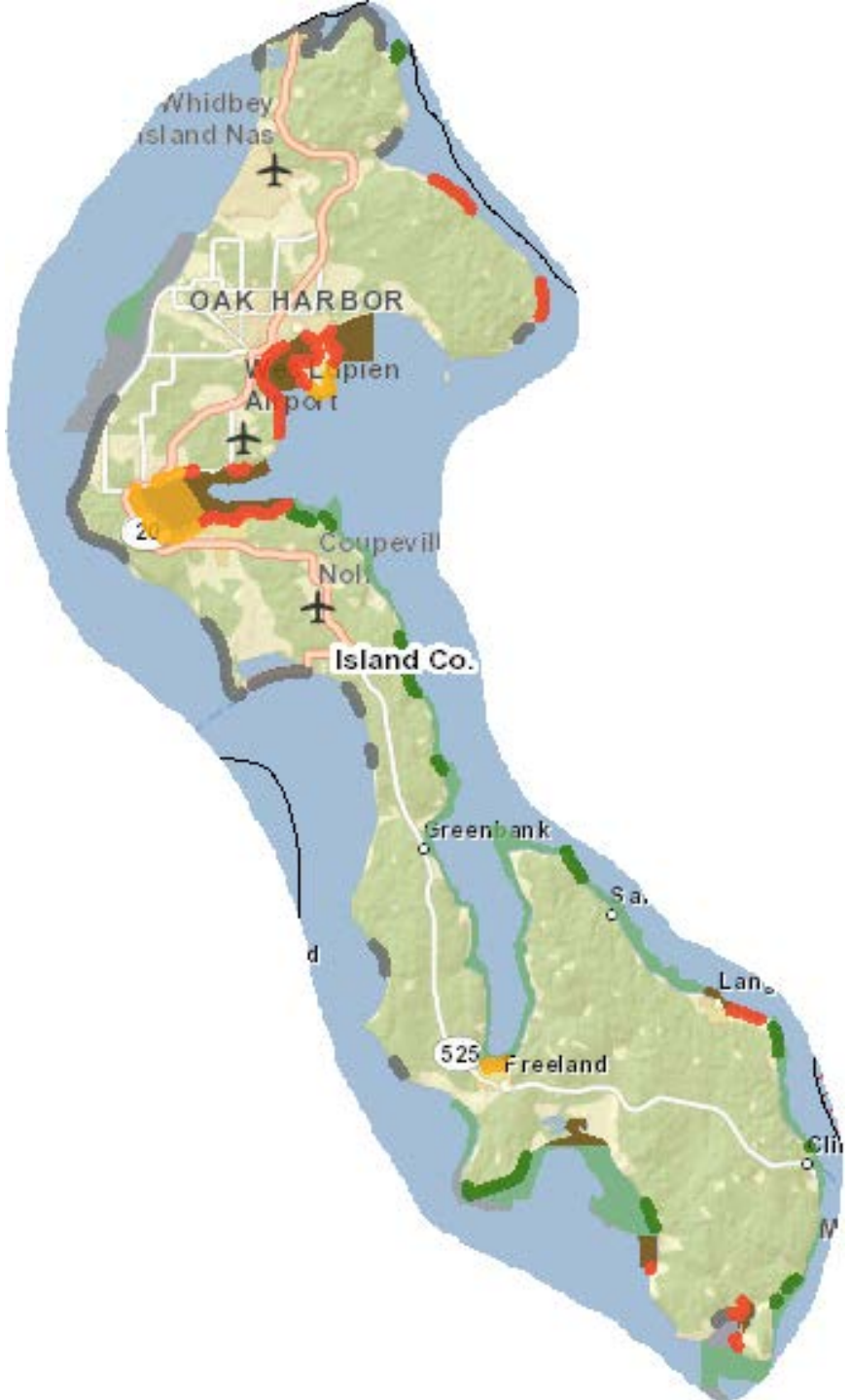
According to People for Puget Sound, 14 million pounds of toxic chemicals enter Puget Sound waters annually.

Stormwater runoff collects and accumulates significant pollutant loads, including suspended solids, oil and grease, organic carbon, nutrients such as nitrogen and phosphorus, heavy metals copper, cadmium, nickel, chromium, and zinc, toxic organics such as pesticides and fuel residues, and pathogens -Davis and McCuen 2005.

Stormwater pollution has contributed to closing thousands of acres of productive shellfish growing beaches. Stormwater runoff can also close swimming beaches and contaminate drinking water supplies.

Shellfish Closures

From Washington State Department of Health Shellfish Division



Shellfish Harvest Area Classification

- Approved
- Conditionally Approved
- Unclassified
- Closed Due to Pollution

Beach Closures from 2000 to 2011

- 49 percent (11,588 closing/advisory days) were attributed to unknown sources of pollution.
- 47 percent (10,954 closing/advisory days) were attributed to polluted runoff and stormwater. In 2010, 36 percent of closing advisory/days were attributed to polluted runoff and stormwater. -Natural Resources Defense Council

Marine mammals bioaccumulate toxins

Harbor seals in Puget Sound are seven times more contaminated with the persistent toxic chemicals known as PCBs than those living in Canada's Strait of Georgia, which adjoins the Sound.

Cullon, D. L., S. J. Jefferies, P. Ross, 2005, "Persistent organic pollutants in the diet of harbor seals (Phoca vitulina) inhabiting Puget Sound, Washington (USA), and the Strait of Georgia, British Columbia (Canada): a food basket approach," Environmental Toxicology and Chemistry 24 (10); pp. 2562–2572)

Economic Factors

- The tourism industry in the Puget Sound region is valued at $9.5 billion a year, with hundreds of thousands of people drawn to the sound for its natural beauty and recreational opportunities.
- The Puget Sound's fishing and shellfish industry, dependent on clean waters, is conservatively valued at $147 million a year. This includes all recreational, treaty, non-treaty, commercial, and aquatic farm production activities. - *Focus on Puget Sound: Economic Facts,*

Commercial Shellfish Farming

Adds 84 full time jobs to the local economy, and harvests several million pounds of sustainably produced seafood

Impacts to Salmon

Studies have shown that pollutants in stormwater interfere with the ability of fish to detect and respond to chemical signals in aquatic environments. Chemosensory deprivation has important implications for salmon, as these migratory animals rely on their sense of smell to find food, avoid predators, navigate from the ocean to freshwater spawning habitats, and assess the reproductive status of prospective mates.

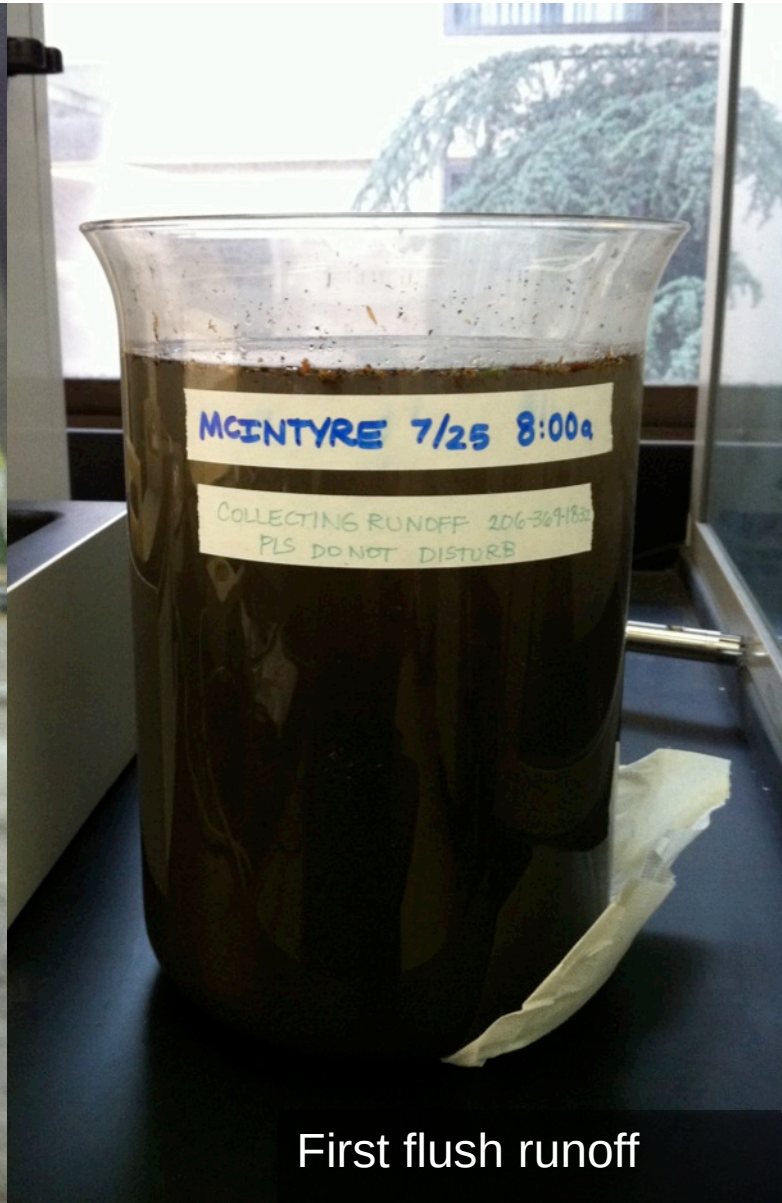
Dying Before You Spawn

- In the late 1990s, stream restoration monitoring personnel documented apparently healthy coho dying within hours of arriving at spawning reaches, before they spawned
- Symptomatic fish showed signs of acute neurological distress and died within hours of entering spawning reaches
- When females were examined, they were full of healthy, ripe eggs that had not been released

Collect runoff, characterize baseline toxicity

Project lead: Jenifer McIntyre, postdoc, Washington State University

Downspout from highway



First flush runoff

Exposure to urban runoff is sufficient to cause adult coho pre-spawner mortality

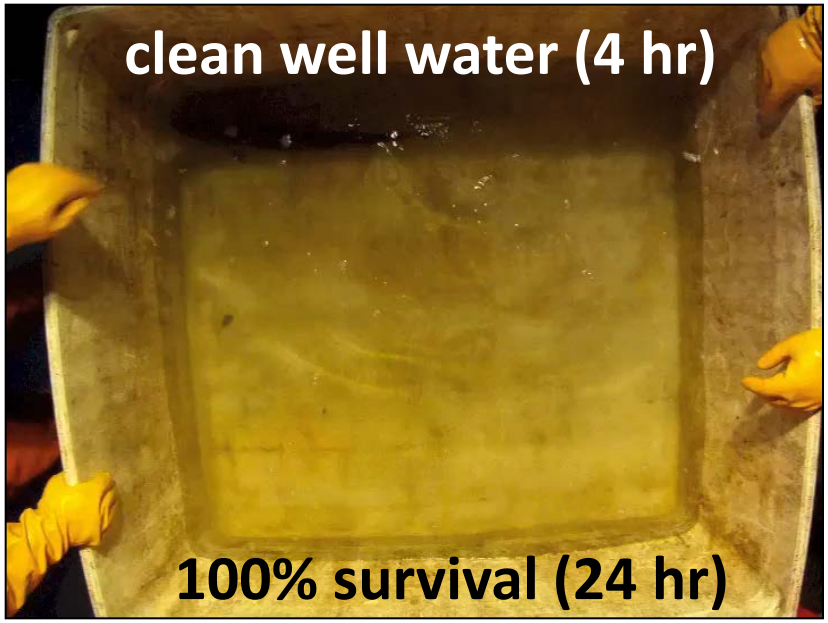
unexposed (3.5 hrs)

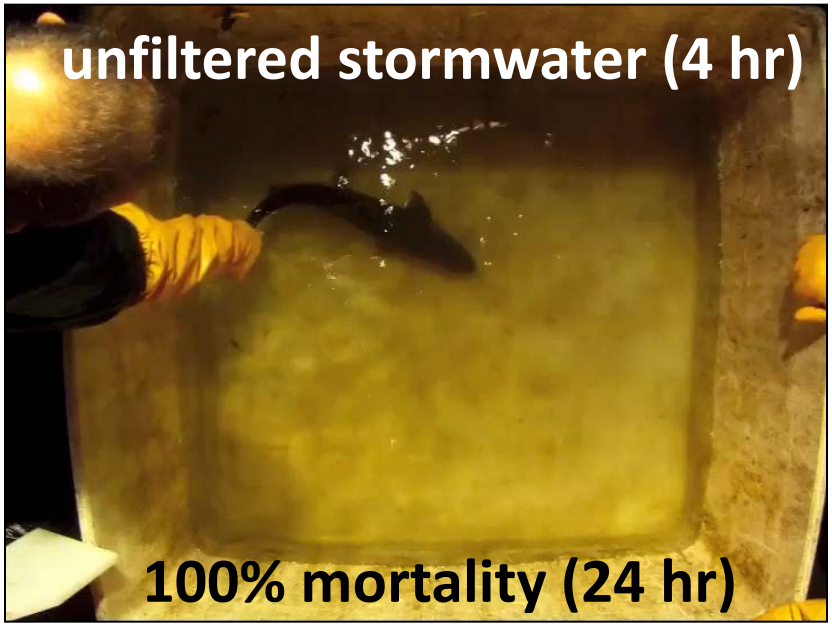
stormwater-exposed (3.5 hr)

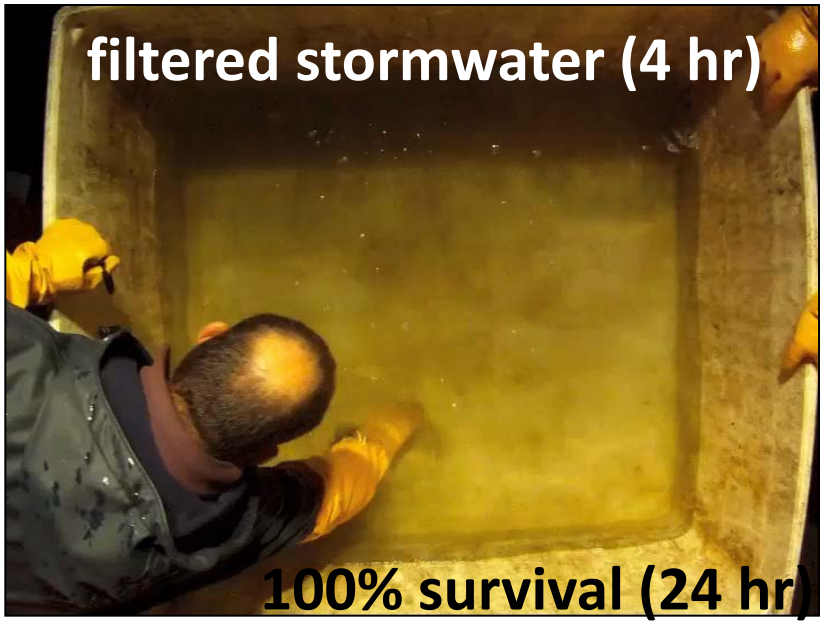
November 11th, 2012

Experimental design, Fall 2012-14

Stormwater runoff exposures, 2013-14





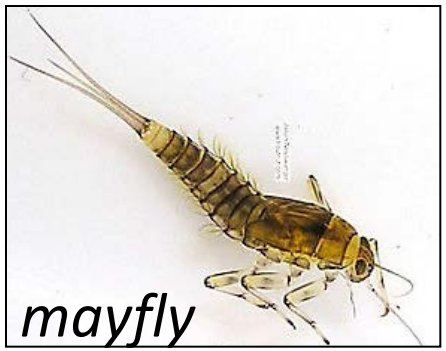


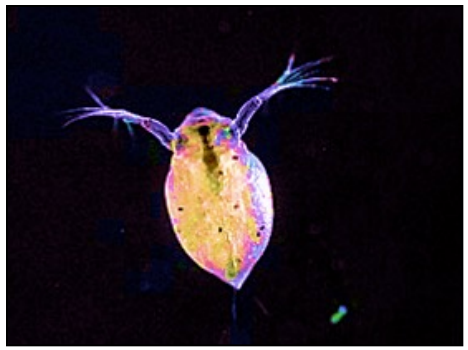
Seven distinct storm events.
In all cases:

100% mortality (or symptomatic)
vs.
100% survival

Survival of salmon and their prey before and after soil bioretention treatment

Fall 2012





water flea

% MORTALITY

100%	85%	100%
0%	4%	0%

Result: toxicity largely eliminated

What Can We Do?

We can reduce runoff from our properties by:

- **Dispersing stormwater flows from rooftops and driveways.**
- **Slowing and Cleaning up stormwater via on-site soil infiltration.**
- **Catching, storing, and utilizing rainwater.**
- **Releasing stored water slowly.**

How to filter stormwater, and keep it out of Puget Sound:

- Rain Gardens
- Grassy Swales
- Rain Barrels/Tanks
- Plant Trees
- Treat Soil Gently
- Reduce Impervious Surfaces

Keep Stormwater on the Site

Runoff Rates With Bioretention vs. Without

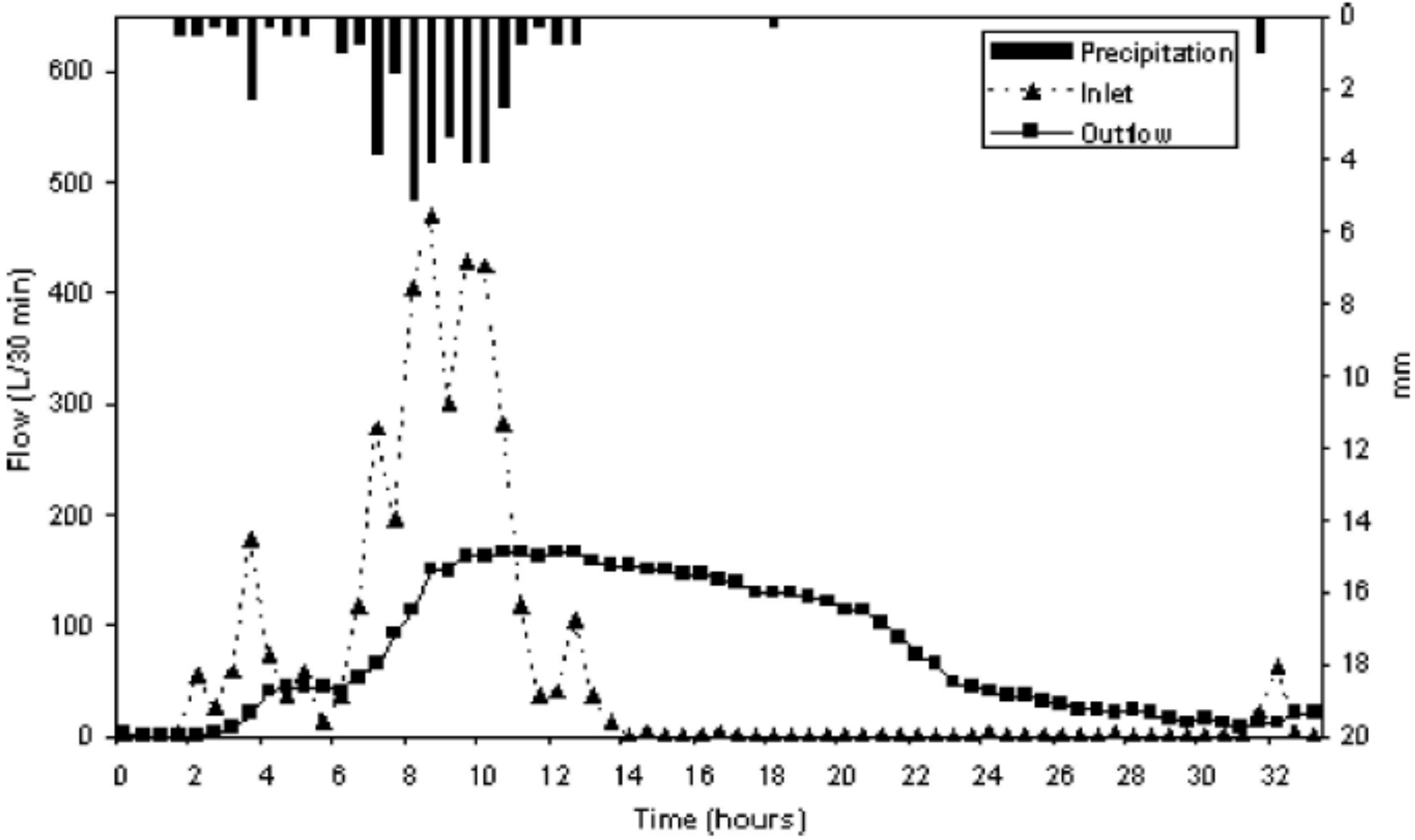


Figure 3. Precipitation, inflow, and outflow (underdrain) for one event, Haddam rain garden.

Bioretention systems are effective at removing heavy metals and other pollutants from stormwater.

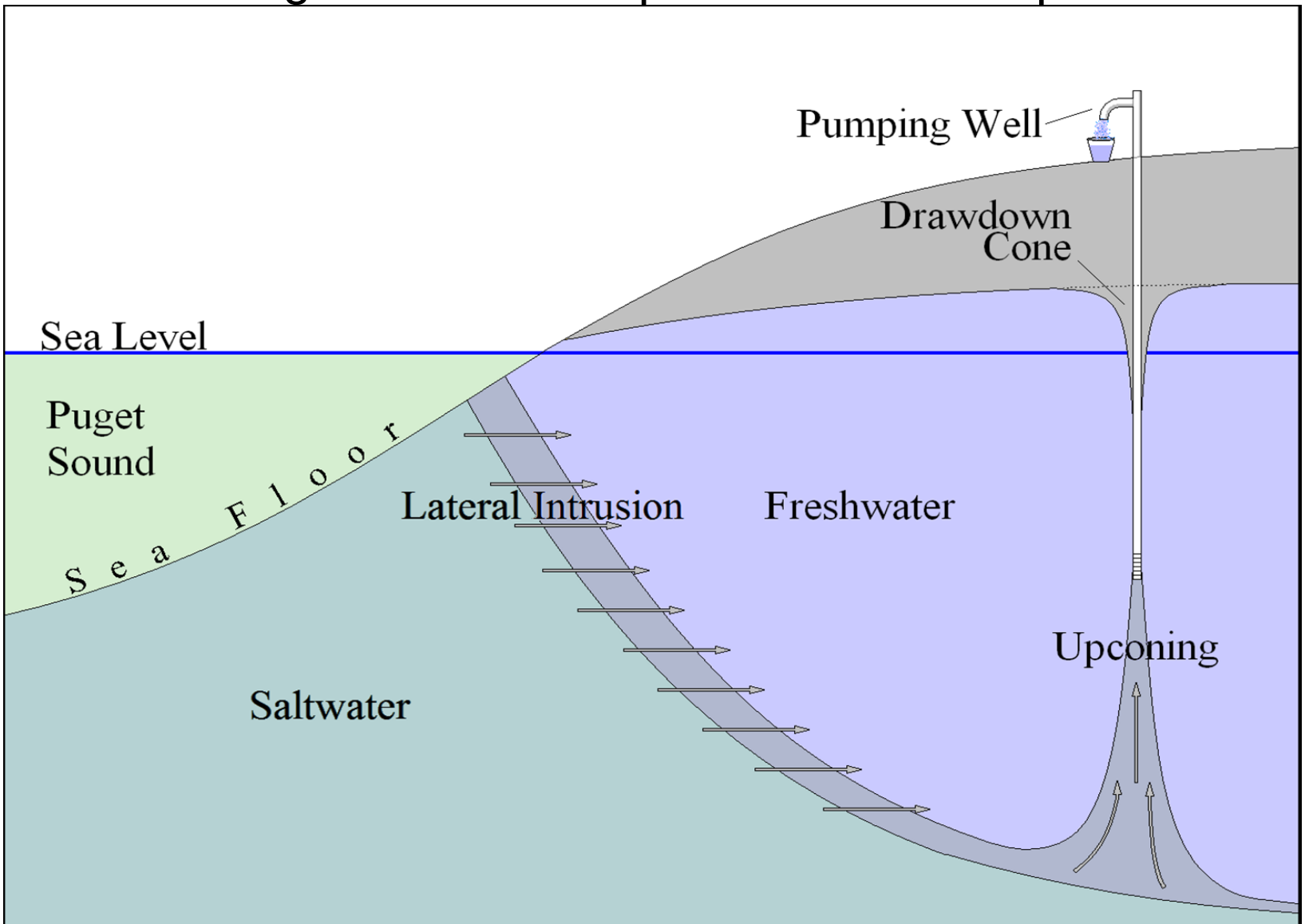
Island County Courthouse Rain Garden

Benefits of Alternative Stormwater Techniques

- Can better protect water resources.
- Can reduce infrastructure costs.
- Creates more attractive, livable communities.
- Can enhance property values.
- Helps meet regulatory requirements.
- Recharge to aquifers

Aquifer Impacts

The position of the freshwater/saltwater interface moves in response to changes in flow and pressure in the aquifer.



Before…


Into the ground, not into the Sound

Rainwater Collection & Reuse

We can reduce stormwater runoff and impacts to groundwater aquifers by collecting and reusing rainwater.

What YOU can do to reduce water pollution in Puget Sound

- Filter and infiltrate your stormwater through a rain garden
- Maintain your septic system regularly and don’t flush hazardous wastes
- Minimize use of fungicides, pesticides and herbicides
- Collect and reuse your stormwater with a rain barrel
- Water more efficiently, or not at all
- Prevent erosion on your property
- Pick up pet and livestock waste
- Tell your friends and neighbors!

Questions or Comments?

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Whidbey Island Conservation District

360-678-4708