



## Curbing Stormwater Pollution

### Cleaning Up Washington's Toxic Runoff

Lisa Stiffler and Eric de Place

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One Coho salmon does a flopping dance of death atop the creek's surface. Another swims in dazed circles, then limply drifts downstream. A third lies on its side, mouth gaping open and shut, fins splayed.<sup>1</sup> In Seattle's Longfellow Creek, researchers at the Northwest Fisheries Science Center found that nearly four out of five female fish died with a belly full of eggs, perishing before they could spawn.<sup>2</sup>

The culprit in this story is the most mundane of villains: the rain. As rainwater streams off roofs and over pavement, it mixes a toxic cocktail of oil, grease, antifreeze, and heavy metals from cars; pesticides lethal to aquatic insects and fish; fertilizers that stoke algal blooms; soap; and bacteria from pet and farm-animal waste. A heavy rainfall delivers this potent shot of pollutants straight into streams and water bodies—threatening everything from tiny herring to the region's iconic orcas.

Stormwater doesn't match the traditional image of pollution. There are no factory smokestacks belching waste, no pipes with a steady trickle of noxious effluent. Despite appearances, stormwater packs a wallop. Runoff from streets and highways long ago surpassed industry as the number one source for petroleum and other toxic chemicals that wash into the Northwest's rivers, lakes, and bays.<sup>3</sup> Today, scientists fear that if runoff pollution continues unchecked, it could wipe out some of the region's urban and suburban salmon runs.<sup>4</sup>

In addition to this environmental toll, stormwater runoff carries a steep price tag. Stormwater triggers flooding and landslides, causing millions of dollars worth of property damage. Cities and counties in Washington spend more than a quarter billion dollars a year trying to control and clean contaminated runoff.<sup>5</sup> Stormwater threatens to make drinking water undrinkable and vast beds of shellfish unsafe to eat.

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Fully addressing the region's stormwater woes will require significant investments, a modernization of building codes, and tougher restrictions on sprawling development.

In 2010, Washington's leaders will have two key opportunities to turn the tide. The state Legislature can find a way during the current legislative session to help pay for stormwater fixes, including "low-impact development," the most affordable and effective way to curb polluted runoff. Later in the year, the state also plans to update its stormwater regulations, offering a second opportunity to improve stormwater management.

But in order to understand the potential in these opportunities, we need to look more closely at what the region is up against.

## Rivers of runoff

Ten bathtubs full of water. That's how much rain pours off one average-size house during a good-sized drenching. In a typical year in central Puget Sound, approximately 26,600 gallons of stormwater rush into the gutters and streams from that single home.<sup>6</sup> And there are more than 1.5 million houses in the state, as well as countless more apartments, condos, warehouses, offices, stores, and other buildings.<sup>7</sup>

When the rain runs off that home's roof—and its driveway, sidewalk, and lawn—it flows into a labyrinth of stormwater infrastructure. Seattle alone has hundreds of miles of storm-drain pipes and thousands of storm drains and catch basins.<sup>8</sup> From the pipes and gutters, torrents of water typically flow into creeks and rivers that empty into lakes and bays—most often without any treatment. In some places the stormwater system actually merges with the sewer system. During downpours, runoff can overwhelm the sewers, sending massive volumes of untreated sewage pouring into the Snohomish and Skagit rivers, Lake Washington, and Puget Sound. In November 2009, for example, the combined sewer in Port Angeles dumped more than 25 million gallons of sewage and stormwater into the city's bay.<sup>9</sup>

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Sometimes the stormwater infrastructure simply backs up, flooding streets and basements. Seattle recently identified more than 600 privately-owned properties at risk of flooding, a risk that goes beyond property damage.<sup>10</sup> In 2006, a woman in the city's Madison Valley neighborhood drowned when her basement suddenly filled with filthy stormwater during a downpour.<sup>11</sup> In 2009, a dozen homeowners in the same neighborhood sued the city. They alleged that Seattle officials failed to take action to prevent repeated flooding of runoff tainted with sewage, mercury, arsenic, and other noxious and dangerous contaminants.<sup>12</sup>

## Stormwater's costly and toxic cocktail

What falls as rain reaches Puget Sound loaded with deadly chemicals. Petroleum is the Sound's largest pollutant from stormwater runoff. But the runoff is also chock-full of other chemicals, including copper from the brakes on cars and pesticides sprinkled on roofs and lawns that threaten salmon at very low concentrations.<sup>13</sup> For other harmful

chemicals, including lead, mercury, and plasticizers called phthalates, stormwater is now out-polluting the big industrial facilities that were long believed to be the worst environmental offenders.<sup>14</sup> In all, approximately 14 million pounds of heavy metals, flame retardants, dioxins, oil and grease, and other dangerous pollutants are washing into the Sound each year—and that’s a conservative estimate.<sup>15</sup>

This deadly concoction helped earn the region’s orcas the unfortunate distinction of being “among the most PCB-contaminated marine mammals in the world,” according to Canadian scientists.<sup>16</sup> The banned chemicals are long lasting in the environment and accumulate over time in wildlife, harming their immune function, reproduction, and brain development. PCBs and other stormwater pollutants are among the top threats to the survival of the orcas, a federally protected endangered species.<sup>17</sup>

Polluted stormwater puts drinking water supplies at risk too. Runoff is the primary source of dangerous chemicals that contaminate Lake Whatcom, Bellingham’s sole source of drinking water. As new houses pop up around the lake, the city’s leaders are struggling to keep up with the growing volumes of runoff. Bellingham and Whatcom County combined have spent more than \$5 million in stormwater-related capital improvements, plus \$20 million in land acquisition to limit development.<sup>18</sup> Yet the lake contains levels of mercury and phosphorus that exceed safe levels.<sup>19</sup>

Stormwater also imperils Puget Sound’s world-renowned shellfish industry. Of the 95 places where enterprises harvest oysters, clams, and other shellfish, more than one-third had elevated levels of fecal waste in 2007, waste that is often traced to tainted stormwater runoff or failed septic systems.<sup>20</sup> Over the past decade, the gross revenue earned by Washington’s shellfish industry fell by two thirds to \$55 million in 2008. Research from the University of Washington suggests that pollution-triggered harvest closures are a significant cause of the industry’s decline.<sup>21</sup>

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Recreational harvest of the sea’s bounty is also suffering. Shellfish gathering has long been a tradition for many Northwest families, but Health Department officials say the entire stretch of shoreline from north of Everett to south of Tacoma is unsafe for beachgoers to gather shellfish. Stormwater and sewage plants have polluted it too much.<sup>22</sup> As sprawling development and the added stormwater that comes with it continue, the battle to protect shellfish from runoff will grow more urgent.

“It’s like the guy with the finger in the dike,” said Bob Woolrich, a manager with the Health Department’s Office of Shellfish and Water Protection. “They keep improving the dike, but there keeps being more water to stop.”

## Putting a LID on stormwater

A stroll down a stretch of 2nd Avenue NW in Seattle is almost a walk in the park. The slightly meandering residential street is lined with wide strips of native grasses, small shrubs, and trees. Along the shoulder, interspersed among parking spots, are ponds and swales—gentle depressions—that fill with water during a downpour. You won't find sludgy gutters brimming with muddy water and trash, or deserts of black asphalt lining the roadway.

The street was one of the Northwest's first experiments in "natural drainage systems." A decade ago, workers jackhammered up the block and rebuilt it to catch and clean stormwater the way it happens naturally. In a forest, rainwater falls on branches and leaves and slowly evaporates, or it soaks into the ground and gets sucked up by plants. The project—called SEA Street—has been wildly successful, nearly eliminating stormwater runoff, even during heavy rains.<sup>23</sup>

*The SEA Street low-impact development project has been wildly successful, nearly eliminating stormwater runoff, even during heavy rains.*

Natural drainage systems are slowly cropping up around the Northwest. It's all part of a movement called "low-impact development" or LID. The logic of LID is to try to replicate nature's way of managing rainfall. It means taking surfaces that normally repel water—roofs and driveways, for example—and making them spongy. That can mean green roofs covered in water-trapping soil and plants, like the ones capping a building complex at the Evergreen State College in Olympia.<sup>24</sup> It can mean hooking downspouts to rain barrels or cisterns to store the water that does run off, or having downspouts flow into "rain gardens" where ponds with deep layers of gravel and soil help water soak into the earth. It can mean building driveways from a lattice of pavers that leave some of the soil exposed, like the parking lot built at the Boundary Bay Brewery in Bellingham, or the residential alleyway built of porous concrete in the same city.<sup>25</sup>

LID is both less expensive and more effective at cleaning stormwater than the traditional gutter-and-storm-drain systems. A study by the US Environmental Protection Agency compared the cost of stormwater projects that were built using LID techniques to what they would have cost using conventional strategies. In 11 of 12 cases examined across North America, the LID option was cheaper by anywhere from 15 to 80 percent.<sup>26</sup>

Low-impact development is gaining popularity, but still faces hurdles. Developers often are more comfortable sticking with the conventional systems that they know. And in many cases, city building regulations even require traditional infrastructure, whether mandating wider roads to accommodate parking plus emergency vehicles, or prescribing stormwater pipes when a swale would work better and cost less.

## Death by a thousand rainstorms

Puget Sound faces a death not so much by a thousand cuts as by a thousand rainstorms, each flushing foul stormwater into Washington's cherished inland sea. Saving the Sound as a place to fish, beach comb, dig clams, and enjoy watching seabirds and orcas will require a long-term commitment and a dramatic shift in how we build our streets and homes and landscape our yards. Given the infinite ways in which stormwater picks up pollutants and flows into rivers and the sea, its solution will likely take multiple initiatives that tackle the problem from different angles.

Washington's leaders have an opportunity to launch two of these initiatives, taking important steps toward making low-impact development more widespread.

First, state legislative leaders can look for ways to provide funding for stormwater management—especially for cost-effective low-impact development—that can stanch the flow of runoff. Second, the Department of Ecology is crafting a set of rules to specify where and how cities and counties should require the use of LID.<sup>27</sup> If Ecology establishes robust standards that hasten widespread adoption of smart LID strategies, Puget Sound and the waterways that feed it could reap big benefits for a modest price.

The stormwater problem is only likely to worsen if the region's population swells as projected to more than 5 million residents by 2020, roughly a 13 percent increase from today.<sup>28</sup>

"Time is not on our side," said Tom Holz, a stormwater and LID expert who's helping advise Ecology. "We may lose the battle just simply through dallying."

## About the Authors

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**Sightline Institute** is a not-for-profit research and communication center—a think tank—based in Seattle. Founded in 1993 by Alan Durning, Sightline's mission is to bring about sustainability, a healthy, lasting prosperity grounded in place. Our focus is Cascadia, or the Pacific Northwest.

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