

# America's Best Beaver Program

## Kudos to Jake Jacobson and Snohomish County, WA Public Works

Over the last ten years Jake Jacobson has created a ground-breaking program to protect roads from beaver flooding, while saving salmon habitat in Snohomish County, Washington. This program, the first of its kind in North America, is much appreciated by those doing road maintenance, such as Dave Finney, who supervises several road crews. Finney is a 22-year employee of Snohomish County Public Works, who has witnessed conditions before and after the beaver installations began. When asked whether the devices had decreased his workload, Finney replied "Oh yes, definitely. A few sites had to be cleaned out every other day. Now we clean them once or twice a year. Usually we can leave them alone. Some we don't touch for a year."

He added, "Sometimes beavers move back in, but the devices definitely do help and they are environment friendly. Fisheries [part of the Washington wildlife agency] had some concerns in the beginning, but the salmon get through fine."



Jake Jacobson with his last device.

When asked why this program has been so successful, Finney said, "Jake Jacobson took it on and developed it. Kudos to him!"

Snohomish County is quite large, bigger than the state of Delaware, and its human population has doubled in the last twenty years with many people moving into rural areas. Yet, the beaver program for this county, has taken only 10-15% of Jacobson's work time as a Watershed Steward.

Less than a year after Jacobson was hired in 1999, he was asked to find a lasting solution for the county's beaver flooded roads.

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**"I was thrust into dealing with the beavers and I really got to like it."**

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In 2000 Washington citizens had passed Initiative 713 that banned the use of most kill traps. During the 1990s, an average of 5,289 beavers were trapped each year in Washington. During the 200-2001 season the trapping ban caused that number to plunge 88%. As the growing flat-tail population flooded more Snohomish County roads, highway crews responded by ripping out dams, but they knew it was a losing battle.



Two interns make a notch in a dam for a flex pipe.

Previously, Jacobson had been somewhat familiar with beavers, because he grew up on a lake they inhabited. He says, "While steelhead fishing, I'd been aware of beavers' presence, but not of conflicts. We all know they are good for the system if they're not in somebody's backyard. I was thrust into dealing with the beavers and I really got to like it."

Jacobson, who earned a B.S. in environmental studies at the age of 45, describes himself as "a general purpose guy." Luckily, he has the engaging personality of an educator, along with the curiosity and drive needed to take on a challenge "under fire." The road maintenance division initially funded Jacobson's beaver work with a budget of less than \$3,000.

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After surfing the Web, he discovered the popular Clemson Leveler. In August of 2000, Jacobson notched a dam on Spada Creek that was flooding a nearby road. He and a crew then installed a Clemson with a 10-inch diameter, 120-foot-long pipe. For a cost of \$800, this solved the flooding, without harming any beavers, and kept the habitat intact. But, Clemsons have a small mesh size, and Snohomish County has three salmon species that are protected by the Endangered Species Act. "When I first started, Fisheries wanted no barriers across streams," he says.

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Although he had identified five more potential sites for beaver devices, Fisheries had similar concerns about using a metal "cowcatcher" to protect culverts — even though the bars were 12" apart. Jacobson solved his dilemma after attending a 2001 workshop given by Skip Lisle. There, he learned how to build a Flexible Leveler, using a large diameter corrugated polyethylene (flex) pipe with the inlet protected by cylindrical filter of sturdy wire.

Michel LeClair had first used flex pipes with triangular welded cages at their inlets in Canada's Gatineau Park during the 1990s, Lisle's version improved the cage-like filter by making it an easy-to-build cylinder. Jacobson adapted this design by building a more "fish friendly" cage out of two cattle panels with large 6 x 8-inch openings. Not only is the Flex Leveler easier to build than a Clemson, he found the materials cost 65% less.

Jacobson also installed some trapezoidal fences at culverts, but they tended to collect debris and become "trash racks" that impede fish passage — except at very large flowages. He improved the performance of one fence in a narrow stream by adding a Flex Leveler.

Beaver dams naturally stabilize stream flows and decrease the risk of harmful flash floods. Using flow devices to manage upstream water levels also lessens the risk of damage, injuries or even deaths, from a dam blowout. For example, someone once dynamited a dam on Panther Creek in Snohomish County. As a wall of water rushed downstream, an 8-year-old boy narrowly escaped drowning when his



*Drilling holes in a flex pipe allows air to escape so it sinks.*

cousin pulled him to safety.

Jacobson installed 14 Flex Levelers within a few years. They "worked well at culverts and constricted sites," though fields could be challenging. He said, "The biggest challenge is keeping the pipe from lifting up [he solved this by using t-posts to anchor the pipe at a dam] and/or losing the drop due to a second dam." He warned landowners that a second installation might be needed, because the beaver is still "active in the neighborhood with a lot of time on his hands." If beavers built a new dam, at times he moved the Flex Leveler there, but "We leave the downstream ones in place, even if the beaver have abandoned that particular pond (for now)."

Jacobson made field visits, talked with landowners (if needed), and set up crews of county public

works interns, and WA Conservation Corps members to install systems. By early 2007 Jacobson had over 50 installations in place in Snohomish County. Although, "Nothing works 100%," the Flex Levelers became his most used device.

At a few sites with huge flows, he installed ready-made Beaverstops from Canada (cutting one vertical wire on this cylindrical device made

a 6 x 12-inch slot for fish passage). At a few remote locations where roads were built on peat and had sunk, he recommended raising the roads. This was done.

Although his installations were limited to solving flooding conflicts that impacted county roads, he distributed hundreds of copies of BWW's "How to..." booklet about managing

beaver flooding to landowners. He also had the engineering plans for his flow devices posted on his highly informative web pages about beavers in Snohomish County.

He created Power-point programs, both for children and for adults. The latter stated, "Most culvert protective fence systems cost \$400 to \$800 installed and beaver pond pipe systems usually cost \$600 to \$1800 installed. Trapping usually costs from \$400 to \$1200 per colony, but will usually need to be repeated in the near future." Live-trapping is likewise a short-term solution that often costs "well over \$100 per animal."

By 2005, he was monitoring 85 "hot spots" with about 15 new sites being added per year. Pleased with the savings in money and manpower, road maintenance had raised the beaver program's yearly budget to \$9,000.

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## America's Best, Continued from p. 5 Gnawing problems

Jacobson's crews also responded to complaints about felled or gnawed trees. He tried various deterrents, but found staking sturdy wire fencing around trunks works best. He says, "Most beaver cutting occurs within 50 feet of the water," and "Vegetation loss from browse may not be as bad as it appears at first."

County crews plant tens of thousands of willows in riparian areas, using potted 18" saplings with roots, because "Beavers pull the live willow stakes right out." They have to be protected for a few years until well rooted.

### No problem with fish passage

"Fish are going to get over dams as they always have—by jumping over the dam during temporary high flows during the upstream migration, or slipping through the cracks in the dam during a downstream migration..." Jacobson said. "I have yet to demonstrate a blockage to fish in over 35 installations of flex pipe systems."

In addition, he later reported, "...of the 50 [devices] we have installed, only two have failed to work as planned. Both were set with the pipe inlet too low to the ground and were plugged by mud and debris..."

He said in December 2007, "We had severe flooding in the southern part of our county in the urban areas from smaller creeks that left their banks.... I never received one complaint about those pesky beavers making it worse."

"Our road maintenance folks,



Staking wire fencing to protect a tree.

management and road crews, are still of the opinion that we can fix road flooding due to beaver by modifying dams, rather than removing animals.... That is good news for all."

Small culverts with 18" diameters, or less, often can't handle stream flows, and these are being replaced in the county at a rate of 6-8 per year. Washington state rules now specify new culverts must be two feet wider than the stream. Jacobson explains that when a culvert is 10-12 feet wide, "beavers can dam it, but not plug it." Several feet of air usually remains above the dam and it will wash out.

His latest PowerPoint program "Beaverworks within Humanworks, Practical Solutions" concludes, "We can learn to live with beavers if we have reasonable expectations." Besides giving many beaver programs over the last decade (including three-hour+ workshops), he has led field tours of the installations, (including a recent

### No beavers have had to be removed from sites with installations.

one for King County road personnel) and has taken many phone calls from out of state as this innovative program became a nationwide model for coexistence.

Although Jacobson never asked for an increase in the beaver program's budget, by 2010 Road Maintenance had raised it to more than \$40,000. Dave Finney, who supervises several Snohomish County road crews, said, "The amount of maintenance needed [by flow devices] depends upon how active the beavers are at each site.... Usually we can leave them alone."

When asked about how low water levels are kept next to roads, Finney said, "Each site is handled on a case by case basis. Basically, determine what you can live with and not impact the road base. Determine what is the ordinary high water at the site and try to work with the wetland (no minimum increase)." Sometimes the water has been one foot below the road for a long time, and sometimes it's two feet below and we had to lower it to an historic level."

Ted Parker, aquatic biologist with SC Road Maintenance Division, said, "The devices "are good for salmon as they have helped reduce sediment in

streams." He explained "The installations are extremely effective for the Road Maintenance Division, because crews don't have to return to the sites time after time. Installations can be used to prevent damage to the road prism, or infiltration, by controlling the water level." He said, "At some locations, devices have been in place for many years and they are extremely efficient, very cost-effective."

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Jake is the best, very professional."  
"Good public relations" too

"Another huge benefit of this program is when the public sees it, they'll often ask questions. Then they say, "We love those things." It's good public relations."

Not surprisingly, Road Maintenance expressed concern when Jacobson, who was born in 1947, announced his plans to retire in 2010. But he gave notice many months in advance to allow time to train his successor, Senior Habitat Specialist Mike Rustay. And conditions seem to be stabilizing. Jacobson said this spring, "Only one new beaver problem site was reported in the last four months." Currently, "about 70 sites in the county have devices that are all working."

Jacobson joked, "I lost my last chance for glory" after he bailed on giving a beaver talk at the 2010 conference of the Society for Ecological Restoration Northwest (SERN), because he was needed to organize the three-day event with 160 speakers. He has been president of SERN since 2005, and this year was honored with that organization's 2010 Special Award. Although formally "retired," he will continue his beaver presentations, such as one for Washington Dept. of Transportation biologists this summer.

"They didn't know how much was lost," Jacobson said of managers who routinely had beavers killed in the past—and at times more recently. He calls his beaver work, "an assignment that I turned into a lot of fun, and it's worked for us."