A visit to Mount St. Helens

Meta Lake illustrates natural recovery following volcanic eruption.

The impact of the explosion is still clearly evident. The ash-gray skeletons of conifers, felled by the searing blast, fan out for miles from the crater of Mount St. Helens in southwestern Washington.

The May 18, 1980, eruption displaced roughly 2.6 km^3 of rock and devastated more than 500 km^2 of forest, mostly to the north of the mountain. Trees within 10–15 km of the mountain peak were burned and uprooted. Beyond that, high winds and flying debris created a blowdown zone. Up to 150 m of rock and ice covered some areas. Accumulations of ash were measured as much as 330 km from the volcano. Mud flows choked nearby rivers and streams.

Two years later, the U. S. Congress established the 44,000-hectare Mount St. Helens National Volcanic Monument. The Act essentially directed the USDA Forest Service to allow the area to recover naturally.

Life is barely returning to some sections of the Monument, while other sections already support an abundance of plants and animals. Reforestation efforts on commercial timber lands affected by the eruption have gone well. More than 26 million seedlings, primarily Douglas-fir and noble fir, have been planted on about 25,000 ha. Of that, Weyerhaeuser replanted 16,000 ha.

In a tour of the Mount St. Helens Monument, Jerry Franklin talked about "biological legacies," how they've influenced recovery at the site, and how they relate to new forestry concepts. Franklin is professor of ecosystem management in the College of Forest Resources at the University of Washington, Seattle, and participated in the White House Forest Conference last year.

"We ended up relearning a lot of things we already knew, but somehow had forgotten in our sacred cows and our half truths...such as the notion that clear-cutting is the same as wild fire," Franklin said.

About two weeks after the eruption in May 1980, a group of scientists went by helicopter to Ryan Lake, about five miles from the crater. "Our whole vision of Mount St. Helens was one of a moonscape," Franklin said. The scientists thought they would be able to watch everything start over from scratch and proceed through primary succession. They thought the area was "sterilized," that plants would gradually work their way back into the area from the margins.

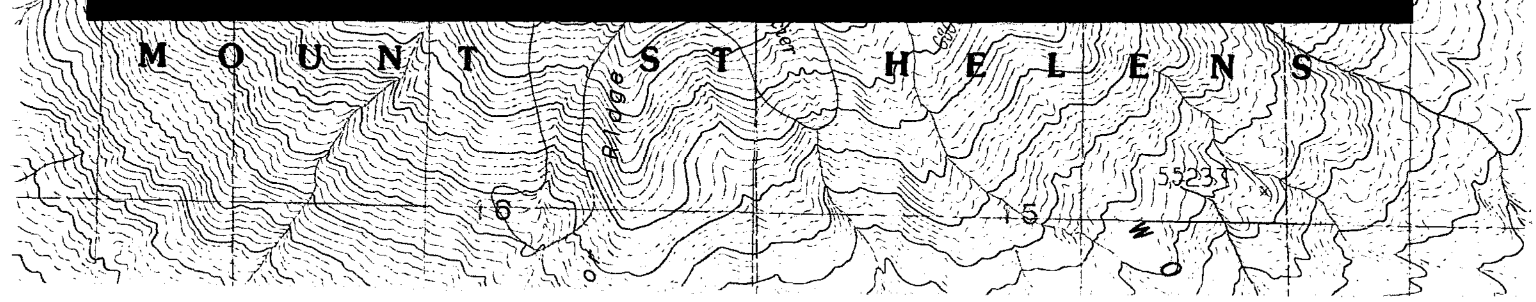
What they found, instead, were survivors. Fireweed was already sprouting through the soil. "I looked around and there were hundreds and thousands of these sprouts coming up," Franklin recalled. Beetles and ants were crawling on the surface, and gophers had been digging in the bank.

"What we learned in the days, and weeks and months and years that followed was that there was an incredible legacy, both living and dead, that had carried over from the old ecosystem to the new ecosystem," Franklin said. Those carry-overs greatly influenced the recovery process.

Many animals that lived in the ground survived the blast. Plants that reproduced from root stocks or rhizomes, such as sedges, grasses, and fireweed, began to grow back.

Other variables such as late-laying snow banks provided shelter for some plants and animals. "Anything above the snow line was killed, anything below the snow line survived," Franklin explained. "So what we had was instant forest." Silver fir and hemlock—trees that were 2–4 ft tall at the time of the eruption—were protected and survived.

BY DONALD G. MEADOWS



Jerry Franklin *discusses recovery processes at Meta Lake.*

uniformly outside the monument on land that has been replanted and is managed by Weyerhaeuser and the USDA Forest Service, Franklin said. But other attempts to assist nature have not gone as well.

Initial recovery efforts after the eruption included grass seeding to stabilize slopes and removal of woody debris from in and along streams. Overall, the seeding effort was ineffective. Most of the initial stream sediment came from erosion of avalanche material deposited in the North Fork Toutle River. Erosion on steep slopes actually aided recovery by exposing richer soil and surviving plants.

"What you see from all of these are a couple of general principles. One is, nature leaves a lot of material behind, both living and dead. Tremendous legacies are carried over from the old into the new and greatly enrich the new in terms of structure, function, and organisms. Nature also has a way of being very erratic in terms of impacts. The very uniform, hundreds and hundreds of acres of disturbance are not typical. You tend to get a highly patchwork situation—mosaics of different intensities of burning, of different intensities of wind throw."

In most cases, what nature tends to do is kill a lot of trees, to do it in a very irregular fashion, and then carry it over into the new ecosystem, whereas we tend to be much more uniform and

At higher elevations, sub-alpine meadows protected by snow came back intact.

Meta Lake is a good example of a high lake that was ice-covered at the time of the eruption. There were surviving brook trout, and in some cases rainbow and lake trout, in other ice-covered lakes. In some streams fish that initially survived, suffocated or were buried later by ash that washed into the system.

The lake served as a source point from which small fish and other organisms were washed down to recolonize areas like Clearwater Valley. Migratory fish such as steelhead and salmon that normally would have gone up the Toutle River encountered ash and turned off to spawn in the Kalama or Lewis River systems. Since the river has begun to stabilize and the amount of sediment has been reduced, fish are coming back to spawn.

All these surviving organisms began to immediately repopulate the area. "There was also an incredible legacy of dead material," Franklin observed. Some trees were knocked over, some were left standing, and others were blasted completely out of the ground. Logs that fell into stream systems were especially important for the structure they provided that has helped maintain diversity.

Admittedly, the forest has been reestablished much quicker and more

Meta Lake shows the effects of the eruption and its recovery.

much more thorough in our editing process. We remove a great deal more of the structure than nature would.

"This begins to suggest some ways that we can key off of what nature has done and use it to achieve specific kinds of objectives, either in retaining habitat or recovering to a particular kind of habitat or ecosystem over a period of time," Franklin said.

"So it was that the Mount St. Helens event stimulated us to think generally about the concepts of biological legacies that have moved us into thinking about different levels of forest harvest, different patterns of levels of retention, and different kinds of patterns over the landscape as a whole in terms of how we configure our management areas," Franklin said. "Again, the notion isn't one that you're going to want to duplicate nature, because we have other kinds of objectives. But the notion is that we can use what nature has done as something of a model to give us some feeling for what these organisms have lived with over the past centuries and millennia and begin to incorporate that into our thinking."

Trees knocked over by the eruption

One of the challenges at Mount St. Helens is to make sure studies continue, said Peter M. Frenzen, Monument scientist. The first 5–10 years are just the start of the recovery period; the habitat is changing and becoming more complex, he said.

"In terms of change in the area over time, we have essentially a very large natural experiment created by the volcano. We have 150 square miles of forest blown down, scorched in various way," Frenzen said.

The area presents a long, complex disturbance gradient, he explained. At the outer edges is green forest that had its understory removed by ash fall. It progresses from a green, intact forest canopy with no understory into a standing dead forest with no understory. Next is standing dead forest with understory that was protected by snow. Closer to the volcano you have blown-down forest, with and without understory, with and without areas protected by snow. Finally, closest to the volcano, the entire surface was changed and areas were sterilized by intense blows, Frenzen said.

Scientists have been observing how various wildlife species react to the different habitats. Elk actually increased dramatically, Frenzen noted. They found ample food supply and altered their feeding patterns to night because of the heat. The area was also restricted, so the elk were relatively undisturbed. High reproductive rates have increased elk populations to about 1200 in the area. Closing part of the area to hunting and a string of mild winters have also helped elk thrive.

"We feel we can learn some important things in the long term from how the various organisms cope," Frenzen said.

Just east of the Monument lies the Upper Clearwater Valley. The area was salvage-logged and planted, mostly to Douglas-fir. Because the area has been repeatedly salvaged for the merchantable timber and put into monoculture, "most of these legacies have been removed," Frenzen said. Forest researchers are going back into those areas, looking at some alternative thinning regimes, modifying the vegetation, introducing more structure into it, and comparing the recovery in those different silvicultural regimes with the recovery in the Monument, he explained. In that way they can better compare managed and natural recovery results. TJ

***Meadows is editor of* Tappi Journal.**