



Flood Observer

November 2006 Flood Makes History

The flood of November 6 and 7, 2006 was an historical, natural event unlike any other that has been recorded in Mount Rainier National Park's 108 year history.

Long before National Park status, debris flows traveled from Mount Rainier to the Puget Sound. Areas near Tacoma and Seattle are formed of prehistoric debris from the mountain.

In more recent park history (1946-47), a series of heavy snowstorms caused extreme damage to facilities. For two weeks, the main entrance to the park was closed to the public due to the danger of falling trees from sweeping avalanches at higher elevations.

Mount Rainier has experienced many other floods and mud flows that have changed the natural landscapes and threatened the security of structures. None of these events left the park without utilities and roads, a safe entry corridor or removed campgrounds throughout the four corners of Mount Rainier as has the most recent flood.

An obvious reason for the November 2006 history making flood was, of course, scale. The 18 inches of rain recorded at Paradise in 36 hours exceeded all

previous records. Record amounts fell throughout other regions of the park.

The snow levels during the storm stayed above 10,000 feet in elevation, with the majority of the precipitation falling as rain. Some existing snow above 7,000 feet melted, adding to the runoff in the rivers.

As the rain flowed down mountain-sides and roads to the main watersheds, it caused extreme soil erosion and slides. It uprooted large areas of trees that eventually caused log jams that redirected water.

This event resulted in the undermining or removal of roadways, campsites and utilities. The flood also washed away multiple foot bridges and sections of hiking trails rendering some unsafe for travel.

Another contribution to the flood is a process known as "aggradation", the rate at which the park's glacial riverbeds fill with rock. This occurs as Mount Rainier's glaciers melt. Boulders, rock and silt are captured by the moving glacier and trapped within the frozen ice. All of the embedded material is released into the river as the ice melts. The river gradually tumbles the rock downstream, piling it

up here, washing it away there changing course, seeking the easiest path through the debris. This is why glacial riverbeds are wide and rocky, with the river itself braided into constantly changing channels.

Recent research at Mount Rainier National Park has measured aggradation in most park rivers to occur at a rate of 6 to 14 inches per decade. In comparison, during the November flood, the riverbed where Tahoma Creek flows under the Nisqually Road rose more than four feet.

Due to aggradation, the White River is currently 16 feet above adjacent SR410 in some places. Parts of the historic Longmire Village are 29 feet below the current elevation of the Nisqually River and the river is nearly level with the park road in several places.

With record amounts of water flowing across the landscape into aggraded riverbeds, damage to roads, utilities and structures presented an unsafe environment. Thus the park closed for six months, making the November 2006 flood an historical event.

Rushing Water Changes Mount Rainier

It is hard to imagine that several days of rain in a wet region such as the Pacific Northwest would close a national park for six months. But when copious amounts of water rushed down hillsides and roads and overflowed the rivers within Mount Rainier National Park's boundaries, the end result was a loss of campgrounds, roads, trails and utilities.

Campgrounds

- The Nisqually River breached protective levees to reclaim about five acres of land from the Sunshine Point Campground.
- Erosion caused damage to campsites, the access road and the amphitheater along the edge of the White River.
- A landslide that swept hundreds of feet down to the Ohanapecosh River from Stevens Canyon Road destroyed several campsites at the end of "C" loop in the Ohanapecosh Campground.
- The Carbon River Road washed out, therefore car camping is not available at Ipsut Creek Campground. For 2007, a Wilderness Camping Permit is required for walk-in camping.
- Four backcountry camps were closed. Current openings and backcountry camping permits are available at any visitor or wilderness information center.

Roads

All the main access roads to Mount Rainier National Park incurred loss or sustained damage except for SR410, in the northeast. However, White River did overflow its banks, inundating SR410 for several miles .

- As the Nisqually River swelled it took out 200 yards of the Nisqually Road at Sunshine Point. Rebuilding the road was a priority in order to reopen the park.
- On the Nisqually Road crews have rebuilt embankments to prevent the road from collapsing.

- Kautz Creek changed course about a mile above the bridge on the Nisqually Road and flowed instead through the forest and across the road 200 yards east of the bridge. Two 12 foot diameter culverts were installed to direct the water under the road creating a safe passageway for cars.
- SR123, the major road connecting Ohanapecosh to Sunrise, washed out in four places. One washout, at Milepost 11.5 cuts across both lanes to a depth of 70 feet. Repairs will be extensive. An official opening date has not been announced.
- The Stevens Canyon Road washed out in three places. Due to, a landslide, one lane of traffic is closed at Backbone Ridge.

Trails

Extensive trail damage has been noted around the park and some areas which remained snow covered during the spring are now being evaluated. Stop by a visitor or wilderness information center to see maps and pictures of trail damage and closures.

Damage ranges from sections of trail being obliterated to embankments being undercut. Trees, boulders and other debris may block safe passage. Crews are focused on getting as many trails open as they can , especially the Wonderland Trail.

Most of the 93 miles of the Wonderland Trail, which circumnavigates the mountain, is safe to travel. But due to closures, permits will not be issued in 2007 for people who wish to hike the entire trail.

Bridges

Throughout the spring, trail crews have restored many water crossings. With spring rains and heavy snow melt, hikers need to be mindful of the potential dangers in crossing swift running water (see page 9).

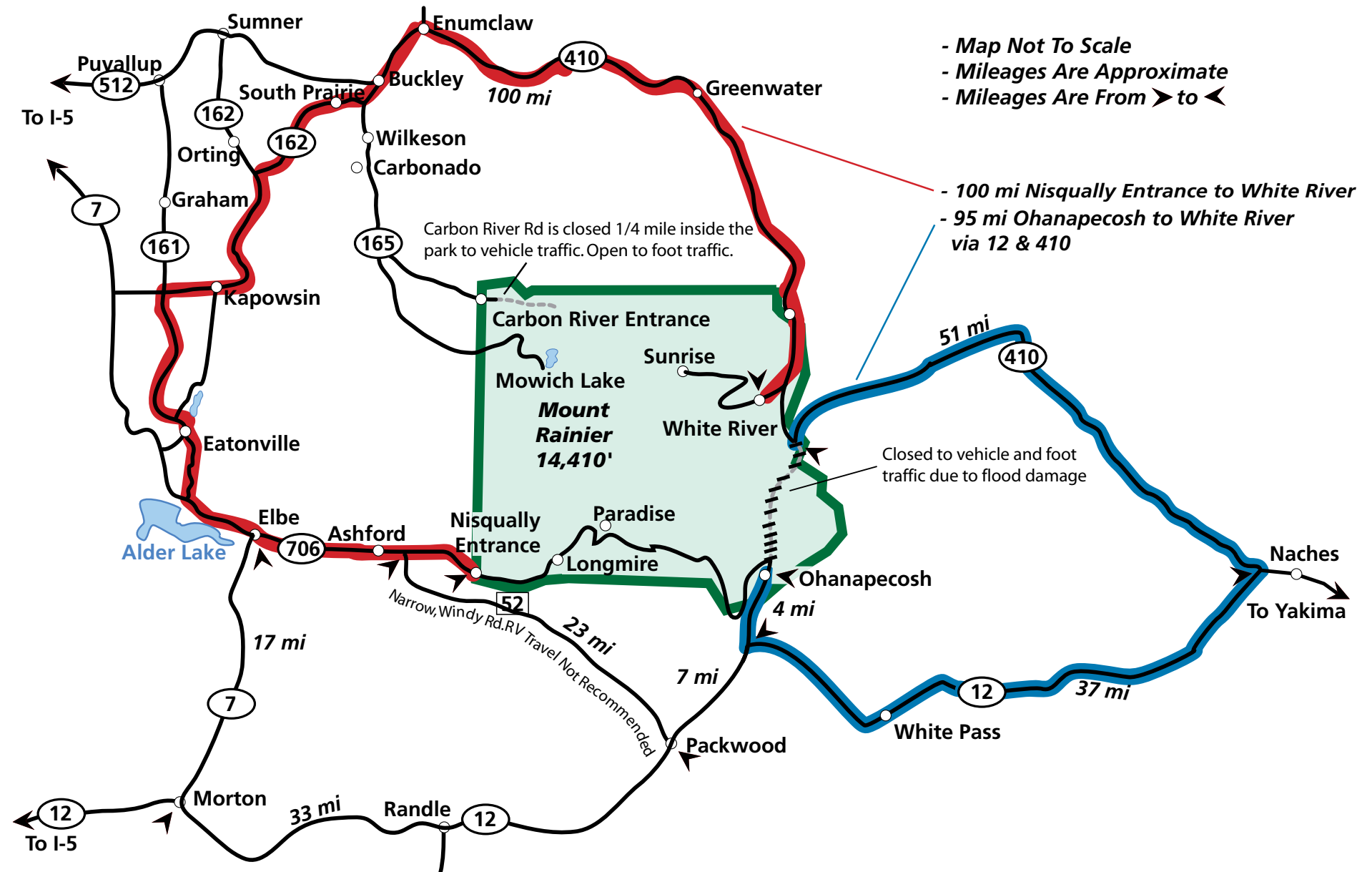


One of four washouts on Highway 123, between Ohanapecosh and White River.

- More than 28 bridges and footlog crossings were damaged or washed away.
- The debris laden Ohanapecosh River destroyed the suspension bridge leading to the island.
- The Tahoma Creek suspension bridge was closed for major repair.

Additionally, the November flood broke the park's main utility lines leaving Paradise and Longmire without sewer, phone, water and commercial power. Water entered the Ohanapecosh Visitor Center. The Kautz Helibase and maintenance yard suffered erosion. Three feet of silt was deposited atop the roots of 1000 year old trees at the Grove of the Patriarchs.

Driving Around Mount Rainier



- Map Not To Scale
 - Mileages Are Approximate
 - Mileages Are From > to <
 - 100 mi Nisqually Entrance to White River
 - 95 mi Ohanapecosh to White River via 12 & 410

Plan Ahead, Fuel Up and Take your Time

Visitors can explore all areas of the park, including Longmire, Paradise, Ohanapecosh, Sunrise, White River, Carbon River and Mowich. SR123 north of Steven's Canyon Road and south of SR410 will remain closed for the summer. The above map highlights alternate routes that will require extra time and gas. Plan ahead and drive safely.

- The Carbon River Road to Ipsut Creek Campground is closed to vehicular traffic. Visitors can park 1/2 mile from the entrance gate and hike or bike 5 miles to the Ipsut Creek campground. To stay overnight obtain a backcountry camping permit from the ranger station at the Carbon River entrance.
- Expect delays when driving Stevens Canyon Road. A short section of Stevens Canyon is limited to one lane traffic. Be courteous to other visitors, pay attention to the stop signs, watch for construction crews and emergency vehicles.
- SR123, between Ohanapecosh and SR 410 (Cayuse Pass), sustained significant damage during the storm. Repairs have begun on this road, but it will not be open this summer. Until these repairs are completed, the following routes are suggested for travel from Paradise and Ohanapecosh to Sunrise:



A landslide on Steven's Canyon Road.

Paradise/Longmire to Sunrise/White River (Southwest corner to northeast corner)

1. From Paradise or Longmire, travel west to the Nisqually Entrance. Exit the park onto SR706 west.
2. In Elbe, SR706 ends and merges with SR7 north.
3. Turn right towards Eatonville at Alder Lake. If you miss the turn then turn right onto SR161 north through Eatonville.
4. The first traffic light north of Eatonville is at Kapowsin Hwy. Turn right onto Kapowsin Hwy.
5. At the four-way stop in Kapowsin, follow Orville Road east.
6. Orville Road intersects with SR162 at a stop sign. Take SR162 towards Wilkeson, Carbonado, South Prairie, Buckley and Enumclaw.
7. Just past South Prairie, SR162 ends and begins as SR165 towards Buckley and Enumclaw.
8. At Buckley, follow the signs for SR410 to Enumclaw. Pay attention because you will need to make two quick right turns.
9. SR410 leads into the park. Once inside the park follow signs to White River and Sunrise.

Distance: 100 miles to White River Road from the Nisqually Entrance.

Approximate driving time: 3 hours

Ohanapecosh to Sunrise/White River (Southeast corner to northeast corner)

1. Turn right from Ohanapecosh Campground and Visitor Center onto SR123 south.
2. SR123 south ends at Hwy 12. Turn left onto Hwy 12 east towards Yakima.
3. Travel 37 miles to the intersection of Hwy 12 and SR410. (If you enter Naches, you have gone too far). Turn left onto SR410 west.
4. SR410 leads into the park. Follow the signs to White River and Sunrise.

Distance: 95 miles to White River Road from Ohanapecosh.

Approximate driving time: 3 hours

The Mount Rainier Annual Pass and The New National Parks and Federal Recreational Lands Pass Program

The Mount Rainier Annual Pass

If you only plan to visit Mount Rainier National Park, consider the Mount Rainier Annual Pass. It costs \$30 and, like the Interagency annual pass (described below), is good for 12 months from the purchase date. The Mount Rainier Annual Pass is available at any Mount Rainier National Park Entrance Station.

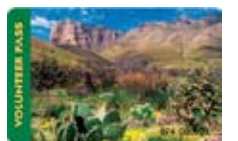
The Interagency Annual Pass

This pass entitles access to, and use of federal recreation sites that charge entrance or standard amenity fees. The Interagency Annual Pass costs \$80 and is valid for 12 months from purchase date. Pass is available at any Mount Rainier Entrance Station.



The Interagency Volunteer Pass

This pass entitles access to, and use of federal recreation sites that charge entrance or standard amenity fees. It is a new type of pass for anyone who volunteers 500 hours or more at federal recreation sites after January 1, 2007. The pass is free and is valid for 12 months from issue date. Contact Volunteer Program Manager Kevin Bacher at (360) 569-2211 extension 3385 to learn about volunteer opportunities at Mount Rainier National Park.



Rise Above the Flood – Explore and Discover Mount Rainier



Mount Rainier's reflection captured in Tipsoo Lake

(continued from page 1)

During the flood, fish found safety in slower streams and may now feed and spawn in new channels. Where rivers divided through the forest, some habitats were lost but the opportunity for another forest to succeed was gained. The Ohanapecosh River deposited 3 feet of silt atop the roots of 1000 year old trees at the Grove of the Patriarchs. Will they continue to live?

Some flora survived the flood. Some fauna adapted to the change in their environment. Visitors, park officials and volunteers also need to adjust to physical and environmental changes. Once you reach your destination, stay and explore the area. Discover and experience Mount Rainier from any location.

Northwest

This is the closest point from Seattle and what more could a nature lover want? Explore the park's only rainforest, subalpine meadows, waterfalls, glaciers and mountain views.

Mowich Lake – Mowich Lake is the largest and deepest lake in the park. Canoes glide across the lake as the wakes ruffle the mountain's reflections. Enjoy the serenity while fishing the deep waters or hiking the nearby trails.

One of the most incredible summer hikes in the park is the Spray Park Trail. It is a six mile roundtrip hike up and down forested terrain to the subalpine meadows of Spray Park. Stay on the trail to minimize your impact on this fragile environment so that it remains beautiful.

The road to Mowich is unpaved after the first three miles and may be rough. Check the road status. Mowich is reached via state SR 165.

Carbon River – At the entrance, gaze into a temperate rainforest. Discover nurse logs and other rainforest characteristics along the 1/4 mile self guided loop trail.

The Carbon River is a dynamic force that continues to braid and change channels. This summer, due to the river's whims, the road is closed. Park your car 1/2 before the entrance station. Hike or bicycle 1 mile to view the natural damage which the November floods brought or 5 miles to Ipsut Creek Campground.

Three miles beyond the campground you can experience the sights and sounds of Mount Rainier's largest glacier, the Carbon Glacier.

Note: Ipsut Creek Campground is for backcountry use only in 2007. You must get a camping permit to stay overnight.

Northeast - Highway 410

The day begins with sunlight pouring over the mountain. Explore Tipsoo Lake, the geology, alpine ecology and meadows.

White River – At the White River Entrance Station the wilderness information center provides current

wilderness camping and climbing permits, trail conditions, and trip planning.

Trails leading to two favorite camps along the 93 mile Wonderland Trail begin from this road. Other trails will lead you to lakes, meadows, and mountain goats as you explore the eastern slopes of Mount Rainier.

Camp at the White River Campground. Listen to the boulders clunk as the water pushes them through the channel. Offer support to the brave who start their climb to the summit from the campground.

Sunrise – If you choose to picnic, hike or simply daydream, Sunrise is the place. Sunrise offers a panoramic view of Mount Rainier and the surrounding peaks from 6400' above sea level. Visit Sunrise mid-week to avoid weekend crowds.

Explore the many facets of subalpine and alpine ecologies. Wildflowers highlight the summer landscape creating meadows that define survival and adaptation.

Stretch your legs along one of the trails, such as the strenuous but awesome Burroughs hike. Look down on Grand Park from the Fremont Trail or stroll the 1 mile round trip Silver Forest Trail.

Learn about the rustic architecture and history of Yakima Park. Ask to visit the historic ranger station. Afterwards grab an ice cream cone at the day lodge.



The clear water of the Ohanapecosh River

Southeast

Old growth is the signature for most of the southeast but it is also has an abundance of wildlife and waterfalls.

Box Canyon - This canyon was carved by the Muddy Fork of the Cowlitz River and scarred by one of Mount Rainier's glaciers. It is 150 feet deep but only 10 feet wide. Enjoy a lunch at the designated picnic just up the road to the east.

Ohanapecosh – Upon arrival at the Ohanapecosh Visitor Center and Campground, observe the old growth forest, its protective canopy and lush understory. Discover the amazing variety of arthropods (insects, spiders, millipedes...) that help decompose the forest floor. Listen to the ravens, thrushes and wrens. Explore the signs and tracks that animals have left behind.

Take the 2.5 mile forest hike to Silver Falls, a 75 foot cascading waterfall. Hike to the Pacific Crest Trail (PCT) via the 12 mile round trip Laughing Water Creek trail. Touch the Wonderland Trail from the Cowlitz Divide Trail. Rangers at the visitor center can also provide information about hiking in the Gifford Pinchot Forest.

Follow the East Side Trail alongside the Ohanapecosh River to the Grove of the Patriarchs. Stand among the ancient trees and wonder about their history. The bridge that crosses the river to the Grove may not be accessible until August.

Simple Ways To Experience the Beauty of Mount Rainier

Walk through a forest

Dream about climbing to the summit

Photograph a flower

Wait for the sound of a glacier cracking

Smell the meadows

Watch the clouds grow and disappear

Sit by a stream

Listen and count the sounds

Take a hike

Visit a rustic historic building

Walk across a suspension bridge

Think about the past

Follow a banana slug

Observe a marmot

Begin your own Mount Rainier tradition

South - Southwest

Besides glaciers, rivers and forests this area is rich in history, offers plenty of hiking, has breathtaking vistas and artistic meadows.

Longmire – Begin your day by taking the self-guided walking tour through Longmire. This is a significant part of the Mount Rainier National Historic Landmark District. Units were built with logs and glacial boulders to reflect the natural setting.

Pick up a walking tour guide at the museum. While there, meet "Charlie" and explore the other natural and cultural exhibits. Talk with the ranger about the history of the area.

The easy, 0.7 mile round trip Trail of The Shadows is across the main road. Explore the early history of the Longmire Mineral Springs Resort.

End your day at Longmire watching the colors of the sunset glow against the snow capped mountain. Spend the night at the National Park Inn or unwind with coffee and blackberry cobbler.

Paradise – Summer at Paradise is, well, Paradise! But with construction of a new visitor center and the rehabilitation of the historic Paradise Inn, weekends are a difficult time to experience Paradise. Avoid busy weekends by visiting mid-week.

- Parking on site is very limited.
- Use the Longmire - Paradise Shuttle to avoid parking congestion.
- Consult the Paradise Visitor Guide for more information (pages 3 and 4).



The Transportation Exhibit at the historic Longmire Gas Station

Where Can I Go To View The Flood?

As repairs to roads and other structures are completed it becomes more difficult to view the effects of the flood from your car. Choose from the following options to observe remaining flood damage:

1. Observe the following locations as you drive along the road from the Nisqually Entrance to Paradise. Do not stop on the road. Pull over only in designated areas.

- Just beyond the entrance, you will approach a curve that opens to a grand view of the Nisqually River. This is the former site for Sunshine Point Campground and Picnic Area. The road beneath you was rebuilt.
- Slow down to 20 mph through the Kautz Creek area. Notice the lack of water flowing underneath the bridge. Proceed with caution through this area. You will see the new channel to which Kautz Creek was naturally diverted and drive on another section of rebuilt road.
- Along the drive, observe the wide river channel which was cut as the Nisqually River eroded away many trees and redefined the landscape.



Above: A channel of the Carbon River carried away the ground beneath the historic Ipsut Creek Cabin.

2. The visitor centers and wilderness information centers have a collection of photographs that describe the scope of change that occurred during the flood. Browse through the pages. Also, a slide show on the flood will be presented at the Jackson Visitor Center at Paradise daily at 3 p.m.

3. Experience and view flood damage by taking a hike! You may have to walk along a rerouted trail or cross a creek without a bridge. The trail may be covered with sediment deposited from a river or stream. You may encounter large obstacles such as downed trees and large boulders may be obstacles. Watch your step and

stay safe but observe the changes which resulted from the November 2006 flood.

4. If you spend a night in one of the campgrounds, the river nearby will provide a story of the flood. Examine the braids in the river channel. Look for debris in the river and watch how the river flows around it. Notice changes in the landscape which may have been redesigned by the flood: open areas, deposits, and undercuttings.

Why Is The River Red?

The water flowing through Kautz Creek, Nisqually River, Tahoma Creek and even the Ohanapecosh River may have a red tint.

According to Barbara Samora, Park Biologist, "We believe that the red waters you see are the result of iron oxidation. It is coming from sedimentation that is occurring upstream where soils and rocks have a high iron content. This is not unusual, as we have seen a red tint in the waters in the past, but we seem to be seeing more of it this year."

In the November flood, landscapes were severely altered, as soil, rock and trees were relocated. With this erosion, sedimentation increases into adjacent streams and provides an opportunity for oxidation to occur.

"In the case of Tahoma Creek," Samora says, "We believe this is also geothermally related (you can smell the sulfur in some locations along the streams), which has been documented in the past."

Geologist Tom Sisson from the USGS notes that pyrite, found at the toe of the Tahoma Glacier, weathers in wet environments. It releases sulfur and precipitates other iron compounds.

Since previous lahars entered the Tahoma Creek drainage, it is likely that weathering of pyrite in those deposits is liberating sulfur as sulfuric acid.

Dedication, Cooperation and Pride Reopen Mount Rainier



On a day to day basis when Mount Rainier National Park enjoys the company of thousands of visitors, many dedicated employees and volunteers work to keep it safe and clean. They provide opportunities for you to experience the park's beauty and heritage. They protect and preserve the natural and cultural resources.

Given the November 2006 flood, these same people urgently responded with pride, determination, sweat and perseverance to reestablish safe access to the landscapes and to honor the ecosystems of Mount Rainier National Park.

The tasks that began while the flood was in progress mainly dealt with personal safety and the security of property. In the days following the flood, assessment and stabilization turned to recovery efforts as road crews rebuilt sections of the Nisqually Road. Teams were established to evaluate trails and wilderness conditions. Power and sewer lines were restored.

As the individual efforts are numerous and hard to recount, the cumulative efforts have resulted in a safe and successful reopening of Mount Rainier. Day to day operations have resumed but flood-

related tasks are in progress.

The rivers and adjacent ecosystems are being studied and monitored. As the snow melts debris is being cleared from trails and foot bridges are replaced. In some cases trails are closed or rerouted.

Visitors will witness the progress day to day and month to month as many projects are completed. The Wonderland Trail will be repaired. Auto access across Hwy 123 will be reestablished. Climbers will have a safe hike on a rerouted Glacier Basin Trail.

Although visitors may not be able to drive through the park this summer to visit all of the features of Mount Rainier, the experience will be safe and enjoyable thanks to a growing team of employees and volunteers (read more about volunteering below).

As the cooperation continues throughout next year, many individuals will provide the skills and talents needed so that Mount Rainier is preserved and protected for the enjoyment of future generations.

Partners in Recovery

In the days and months following the floods of November 2006, thousands of individuals, groups, and businesses contacted Mount Rainier National Park to offer their support. "I've spent my entire 60 years loving and hiking every inch of the Mountain," wrote one person. "It's time to give a little back while this lady still has it in her!"

To assist with recovery projects, and to provide people with opportunities to help out, Mount Rainier National Park formed a partnership this winter with the Student Conservation Association (SCA). A 17 member "Mount Rainier

Recovery Corps" is now leading projects around the mountain, with the help of volunteers and generous financial support from donors and local businesses.

To coordinate fund raising and support, several groups have joined SCA and the National Park Service in forming the "Northwest Storm Recovery Coalition". Members include the Washington Trails Association, Washington's National Parks Fund, National Parks Conservation Association and Mountaineers. Learn more at nwstormrecoverycoalition.blogspot.com.

You can help, too! Visit www.nps.gov/mora to find out more about our volunteer program, including news and photos of current projects, or ask at any visitor center.

Go to www.theSCA.org/Mt_Rainier_Recovery for a complete calendar of volunteer projects. Sign up ahead of time, and make volunteering a part of your vacation. It's a great way to become part of the history of the mountain, and to contribute to a place that has held such meaning for so long.



Trail crew at work after the flood.