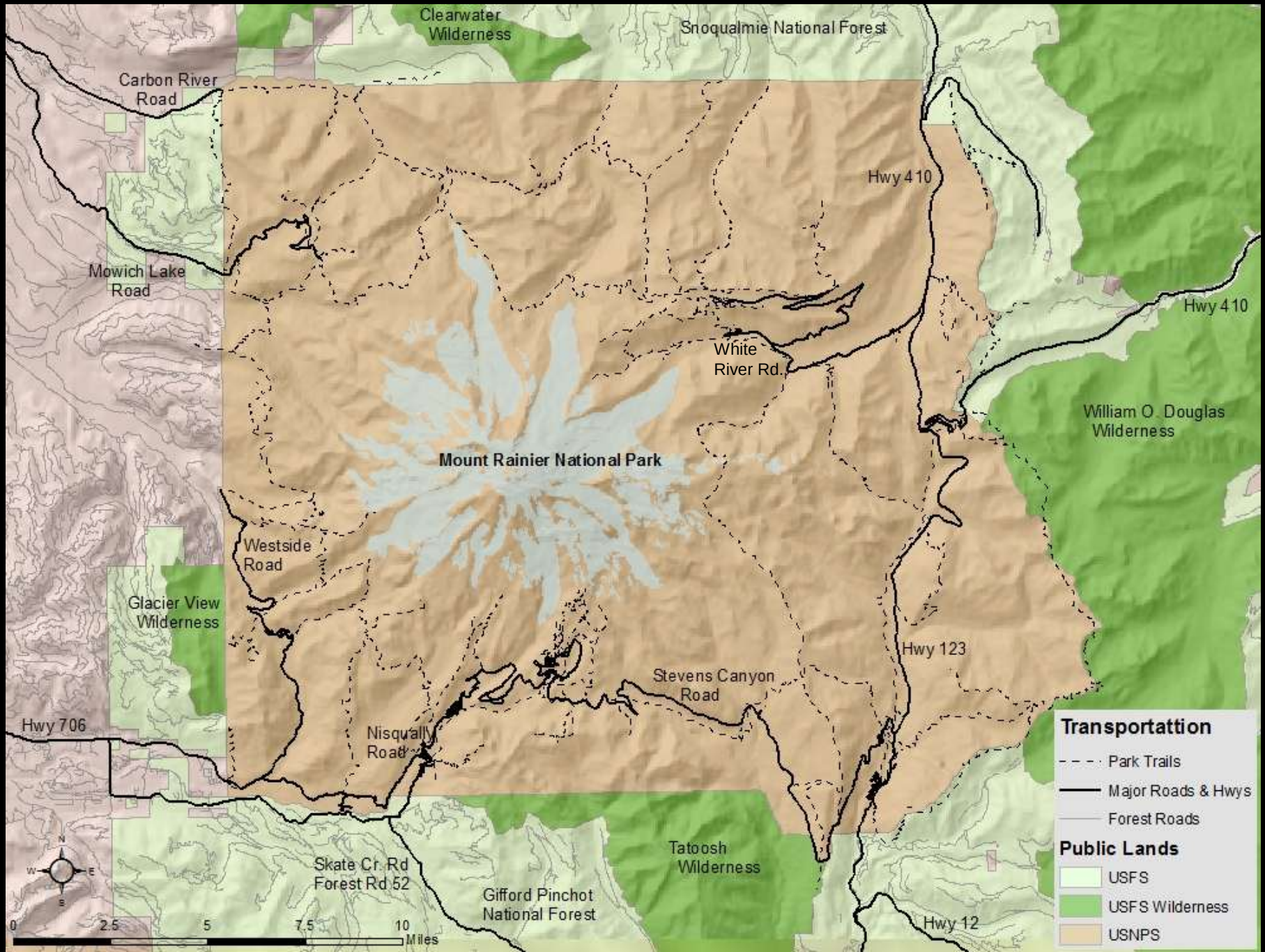

North Coast and Cascades Network
National Park Service Inventory & Monitoring Program
CANADA
WASHINGTON
Bellingham
North Cascades
National Park Service Complex
San Juan Island
National Historical Park
Ebey's Landing
National Historical Reserve
Port Angeles
Olympic
National Park
Cascade Mountains
Seattle
Wenatchee
Mount Rainier
National Park
Olympia
Pacific Ocean
Yakima
Lewis & Clark
National Historical Park
WASHINGTON
OREGON
Fort Vancouver
National Historic Site
North Coast and Cascades Network

Mount Rainier & Vicinity



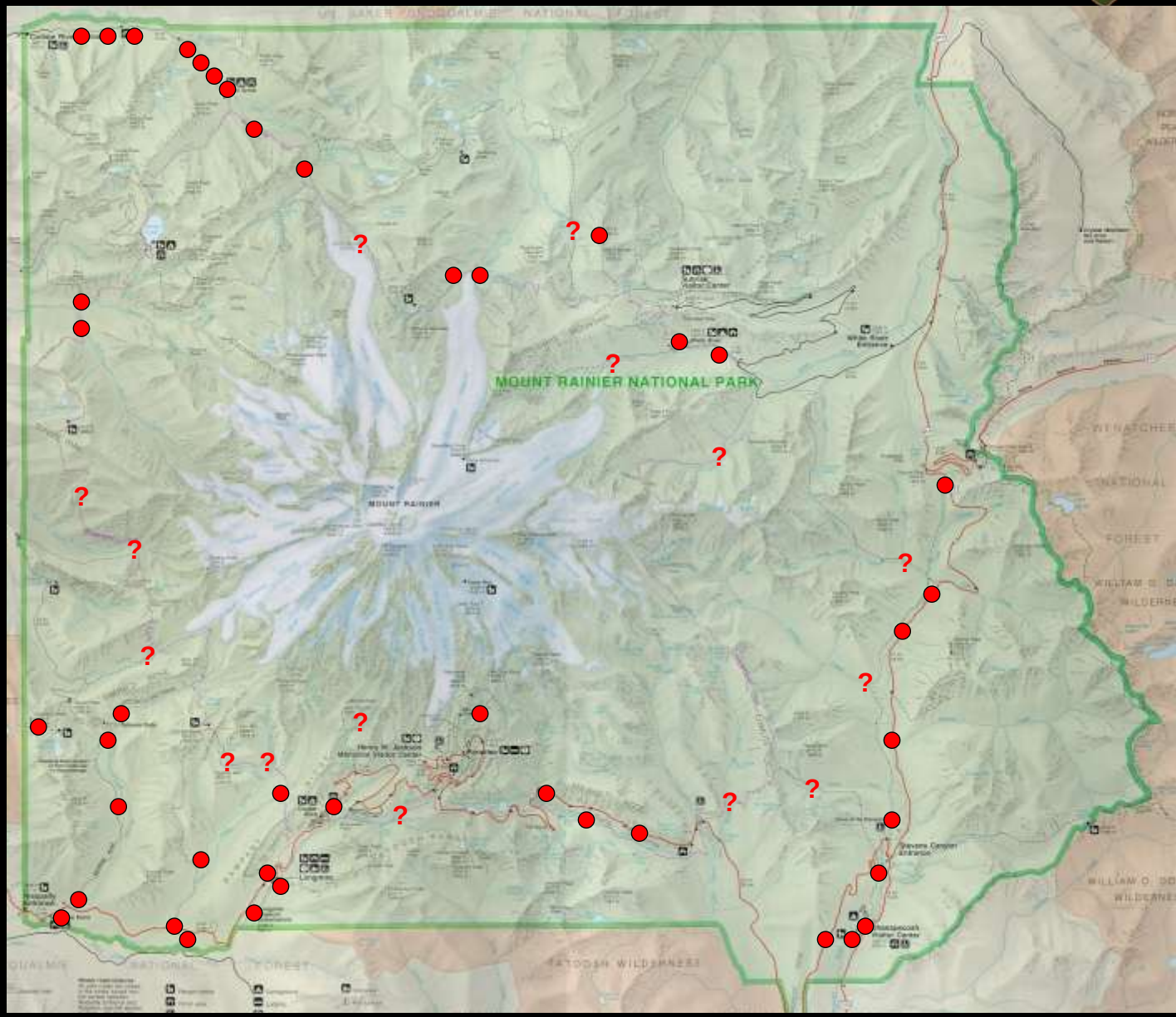
Mount Rainier National Park

The Great Flood of November 2006

Updated April 27, 2007

Mount Rainier National Park

The Great Flood of November 2006



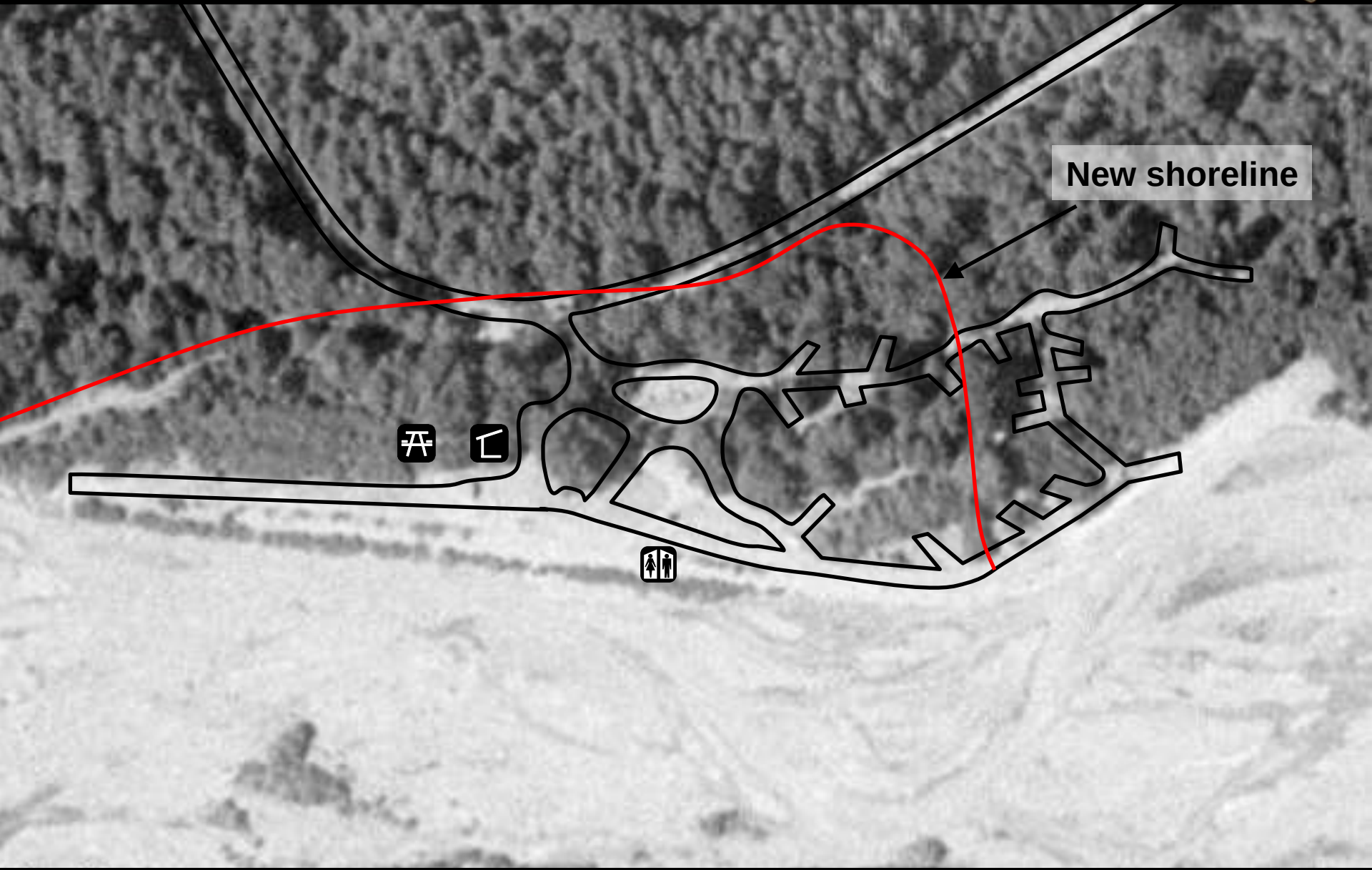
KEY

- Known damage
- ? Probable damage

The damage was extensive. Some areas haven't even been surveyed yet, due to winter snow.

Mount Rainier National Park

November 2006 Flood Damage



Sunshine Point

Mount Rainier National Park

November 2006 Flood Damage

In all, more than 5 acres of land were washed away.

Mount Rainier National Park

The Great Flood of November 2006

When the first rangers returned on the morning of November 7, the damage was instantly apparent.

Mount Rainier National Park

November 2006 Flood Damage

At Sunshine Point, the Nisqually River now flows where there once was a campground.

Mount Rainier National Park

The Great Flood of November 2006

Road repairs at Sunshine Point, in fact, began on November 8, the day after the storm.

Mount Rainier National Park

The Great Flood of November 2006

More than 10,000 tons of rock were used to rebuild the road at Sunshine Point.

Mount Rainier National Park

The Great Flood of November 2006

A mile up the road, Tahoma Creek caused extensive damage to the Westside and Nisqually Roads.

Mount Rainier National Park

November 2006 Flood Recovery

From the General Management Plan:

“Westside Road is subject to frequent washouts along Tahoma Creek, where glacial outbursts have repeatedly scoured out the roadbed, and at the culvert at Fish Creek. Currently, private vehicles are not allowed to cross the washout section to the high ground beyond.

Mount Rainier National Park

November 2006 Flood Recovery

“Under the preferred alternative visitors could take shuttles, hike, or ride bicycles along the road. Minor improvements would be made to Westside Road so shuttles could use the road…. Shuttles would drive as far as Klapatche Point and probably would operate from July through September. This period could be extended based on visitor use patterns. Limited interpretation would be provided on the shuttle.

Mount Rainier National Park

The Great Flood of November 2006

On the afternoon of November 6, as the rain continued to fall and the rivers rose, park staff and visitors evacuated the park.

Mount Rainier National Park

The Great Flood of November 2006

The riverbed under the Tahoma Creek Bridge rose more than four feet during the November flood.

Mount Rainier National Park

November 2006 Flood Damage

Aerial surveys showed that the creek had changed course more than a mile upstream from the road bridge.

Mount Rainier National Park

The Great Flood of November 2006

Instead, it crosses the park road a quarter mile east of the bridge.

Mount Rainier National Park

The Great Flood of November 2006

Two miles further, Kautz Creek no longer flows under the road bridge.

Mount Rainier National Park

The Great Flood of November 2006

During the flood, it also flowed down a service road, carving a channel through the park's primary helibase.

Mount Rainier National Park

The Great Flood of November 2006

Culvert placement in Nisqually Road at Kautz Creek

Mount Rainier National Park

The Great Flood of November 2006

Finishing cement work on the up hill side of the Kautz culverts

Mount Rainier National Park

The Great Flood of November 2006

Kautz Creek culverts installation complete with water flowing on Friday April 27, 2007

Mount Rainier National Park

The Great Flood of November 2006

At Milepost 5.2—a mile below Longmire—the Nisqually River carved away the embankment to the edge of the park road.

Mount Rainier National Park

The Great Flood of November 2006

Trucks now deliver rocks weighing as much as 15 tons each to the construction sites at Mileposts 5.2 and 9.1.

Mount Rainier National Park

The Great Flood of November 2006

Park road crews have used the rock to rebuild the roads' embankments from the ground up.

Mount Rainier National Park

The Great Flood of November 2006

One key factor is an entirely natural characteristic of the park's glacier-fed rivers.

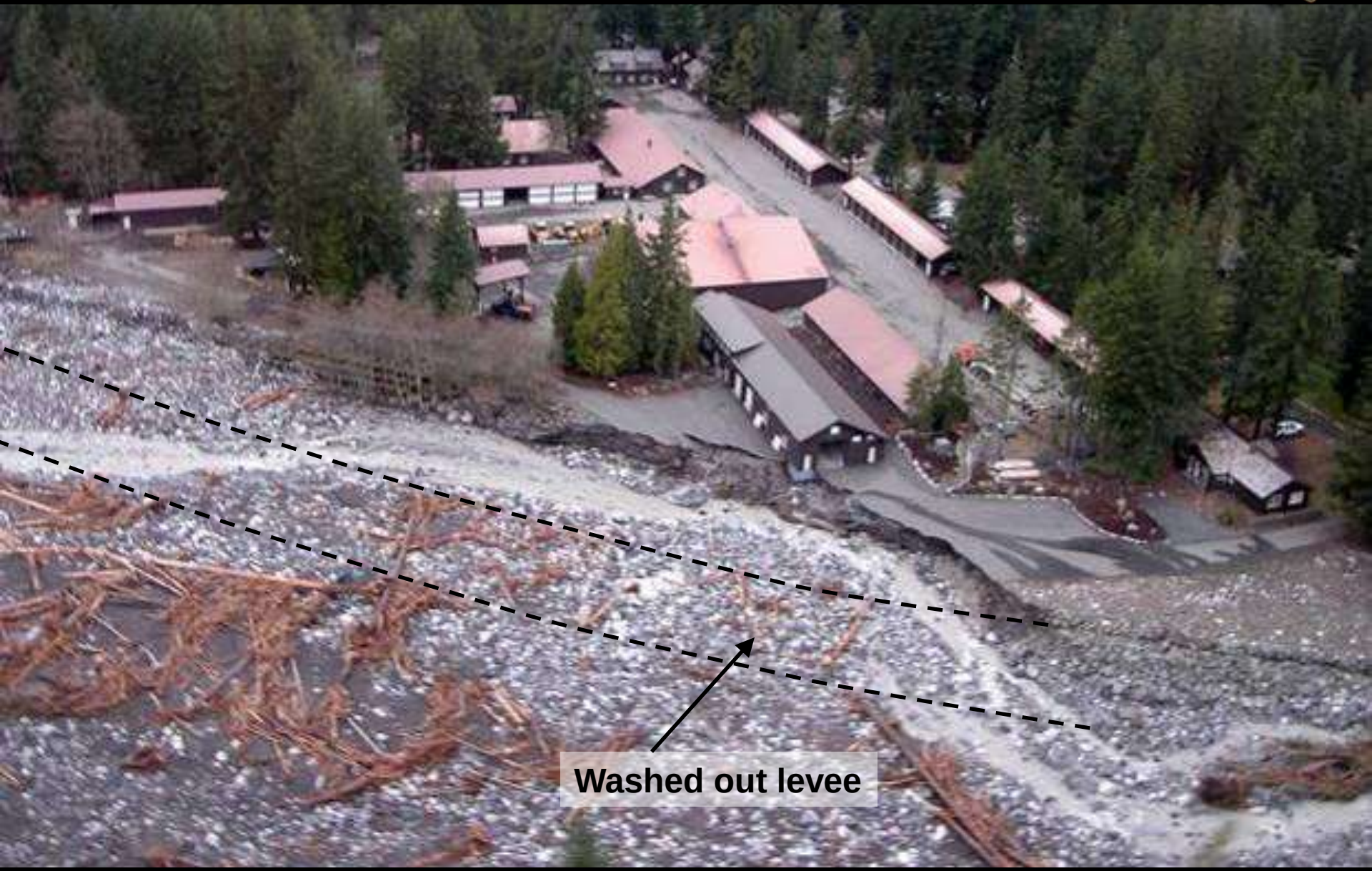
Mount Rainier National Park

The Great Flood of November 2006

The Nisqually River flows higher than parts of Longmire.

Mount Rainier National Park

The Great Flood of November 2006



At Longmire, most of the protective levee was washed away.

Mount Rainier National Park

The Great Flood of November 2006

The park's Emergency Operations Center was undermined by the river.

Mount Rainier National Park

November 2006 Flood Damage

Across the river, a service road, which doubles as an emergency exit, was also undermined in several places.

Mount Rainier National Park

The Great Flood of November 2006

Similar damage occurred at Milepost 9.1, above Cougar Rock Campground.

Mount Rainier National Park

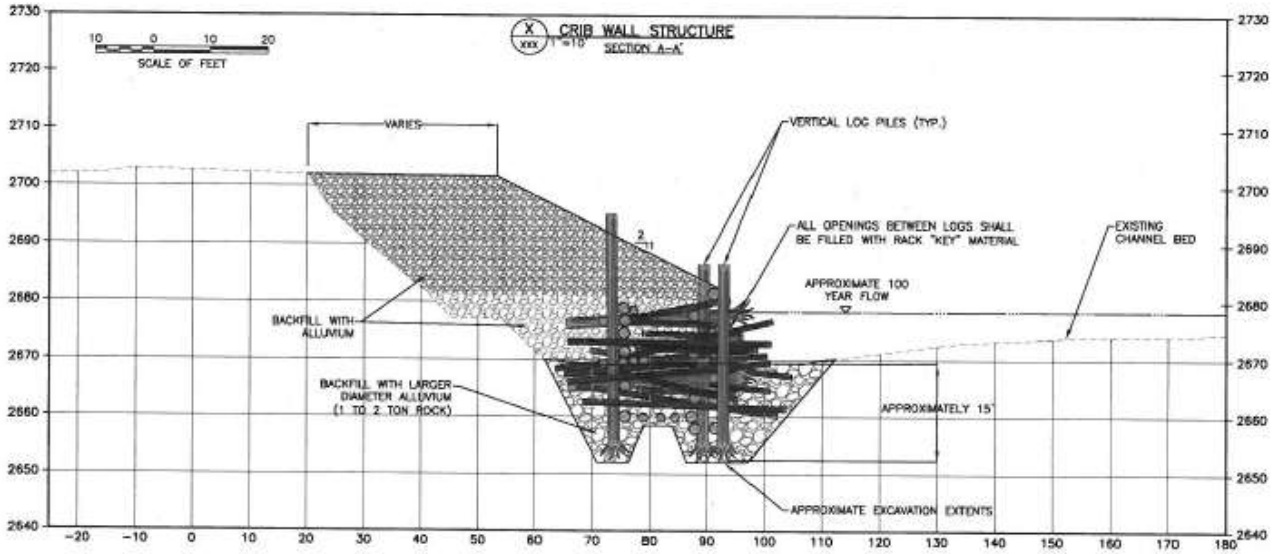
The Great Flood of November 2006

Park road crews have used the rock to rebuild the roads' embankments from the ground up.

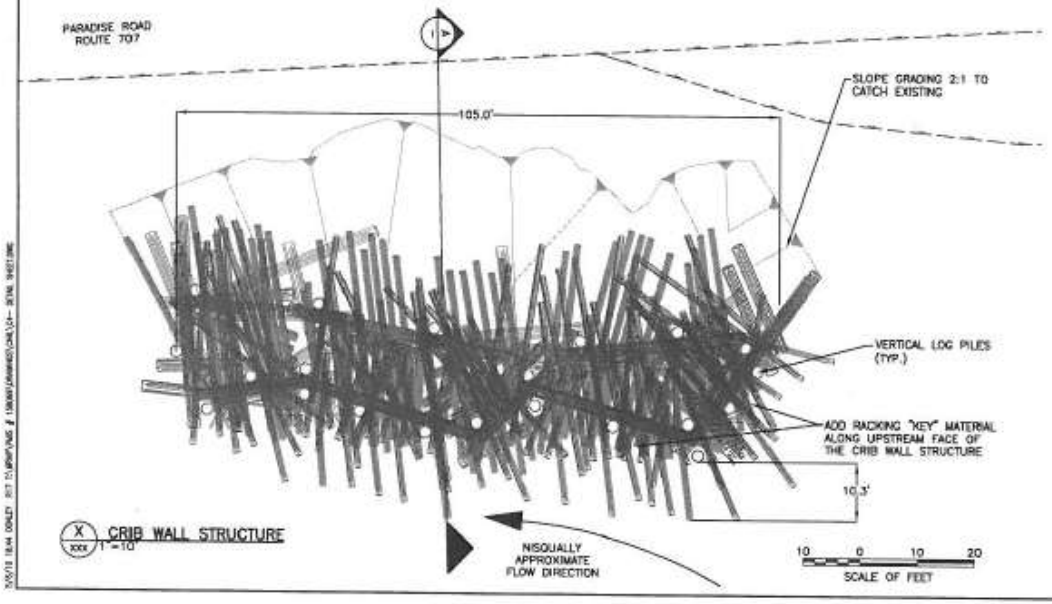
At this site, about ½ mile below the Lemolo headwaters, bridge

NOTES:

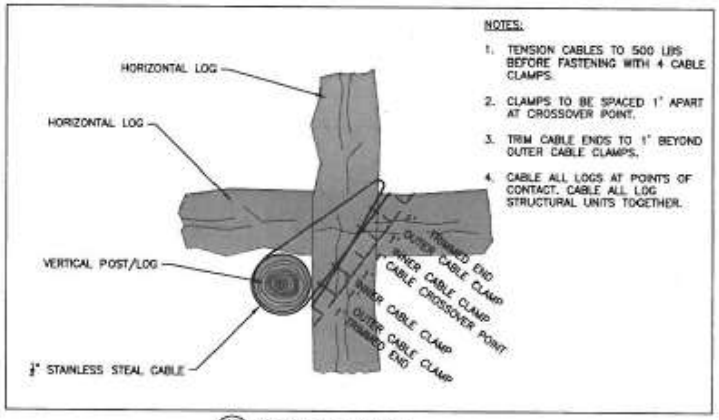
1. PLANTING PLANS SHALL BE COORDINATED WITH THE OWNER AND ARE NOT INCLUDED IN THIS PLAN SET.
2. PLACE KEY MEMBERS ACCORDING TO LAYERING PLAN ON C-X.
3. BALLAST MATERIAL TO BE PLACED ACCORDING TO ENGINEER.
4. PLACE RACKING LOGS AT ENGINEER'S DISCRETION.
5. DO NOT BACKFILL SIDES OF STRUCTURE, LEAVE AS A POOL.
6. ADJUST FINAL GRADE ON BANK SIDE AND DOWNSTREAM SIDE OF CRIB WALL AS NEEDED TO TAPER TO EXISTING GRADES AND TO MINIMIZE DISTURBANCE WITHIN THE CHANNEL.
7. EXISTING RIVER BED ELEVATION VARIES. CONTRACTOR SHALL DETERMINE EXCAVATION DEPTH AND STRUCTURE HEIGHT BASED ON EXISTING RIVER BED ELEVATION.
8. STRUCTURE IS TO BE EMBEDDED INTO THE BANK. CONTRACTOR TO VERIFY LOG CRIB WALL PLACEMENT AND BANK TREATMENTS WITH ENGINEER PRIOR TO EXCAVATION AND CONSTRUCTION.
9. RACKING "KEY" MATERIAL SHALL CONSIST OF SMALL TREE TRUNKS AND BRANCHES 4-10" INCHES IN DIAMETER.



X/XXX CRIB WALL STRUCTURE
1"=10'
SECTION A-A'



X/XXX CRIB WALL STRUCTURE
1"=10'



NOTES:

1. TENSION CABLES TO 500 LBS BEFORE FASTENING WITH 4 CABLE CLAMPS.
2. CLAMPS TO BE SPACED 1" APART AT CROSSOVER POINT.
3. TRIM CABLE ENDS TO 1" BEYOND OUTER CABLE CLAMPS.
4. CABLE ALL LOGS AT POINTS OF CONTACT. CABLE ALL LOG STRUCTURAL UNITS TOGETHER.

X/XXX CABLE ATTACHMENT
N.T.S.

PERMIT SET
NOT FOR CONSTRUCTION

DESIGNED: T. Abbe	SUB SHEET NO.
DRAWN: C.M.D.	
TECH. REVIEW: C.M. / T.A.	
DATE: 5/7/10	

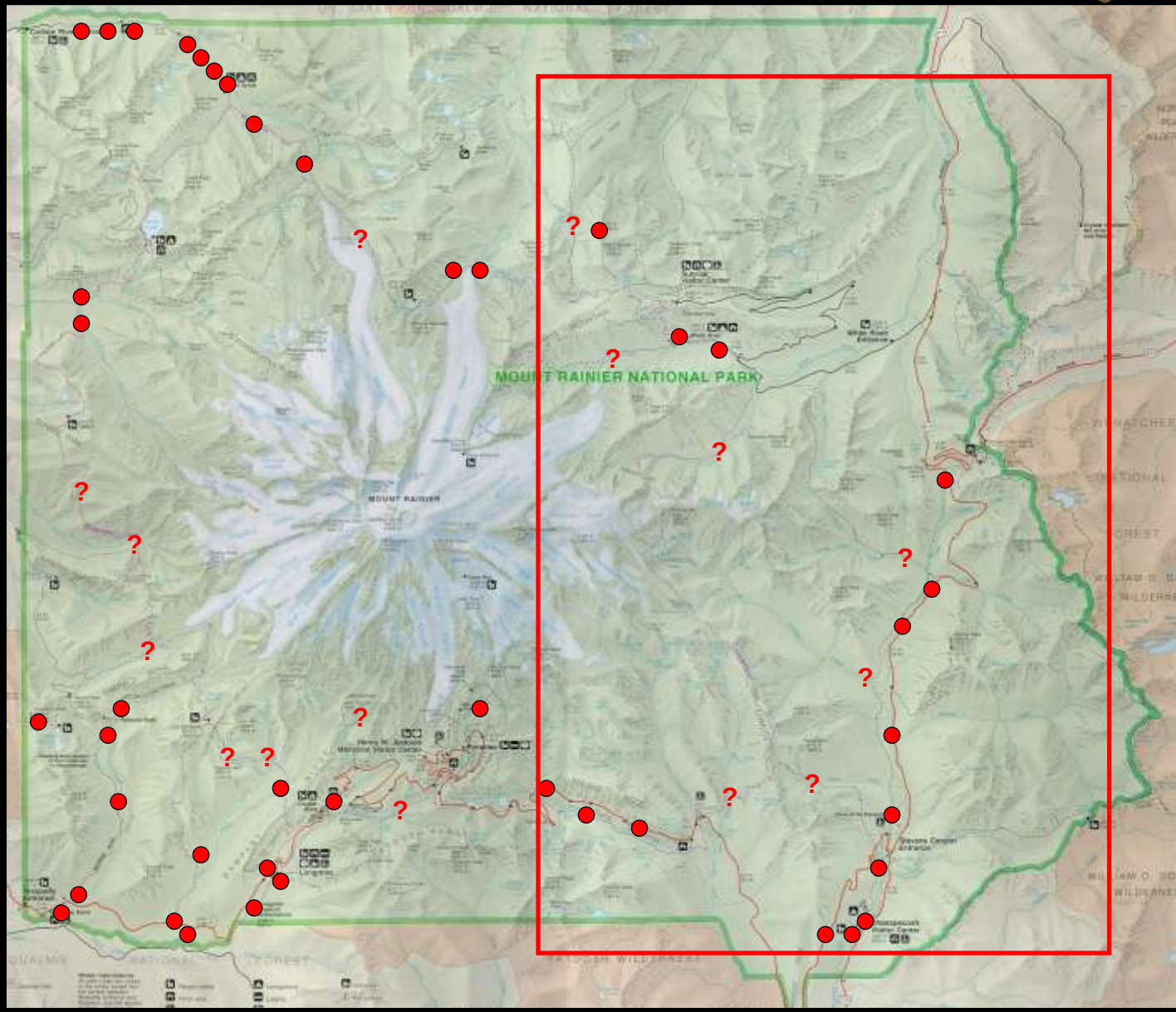
TITLE OF SHEET
LONGMIRE
FLOOD PROTECTION
DETAIL SHEET
MOUNT RAINIER
NATIONAL PARK

DRAWING NO. 105
102089
PMIS/PKG NO. 158068
SHEET D-1 of 14


HITACHI

Mount Rainier National Park

The Great Flood of November 2006



KEY

- ● **Known damage**
- ? **Probable damage**

The east side of the park fared no better.

Mount Rainier National Park

The Great Flood of November 2006

Helicopter flights revealed three washouts in Stevens Canyon.

Mount Rainier National Park

The Great Flood of November 2006

The worst, on Backbone Ridge above Ohanapecosh, sits atop a landslide thousands of feet long.

Mount Rainier National Park

The Great Flood of November 2006

The bottom of the landslide is visible across the river from the Ohanapecosh Campground.

Mount Rainier National Park

November 2006 Flood Damage

Highway 123 washed out in four places.

Mount Rainier National Park

November 2006 Flood Damage

The worst washout, at Milepost 11, cuts across both lanes to a depth of 70 feet.

Mount Rainier National Park

The Great Flood of November 2006

Debris covers the road in many places, and the edge is undermined.

Mount Rainier National Park

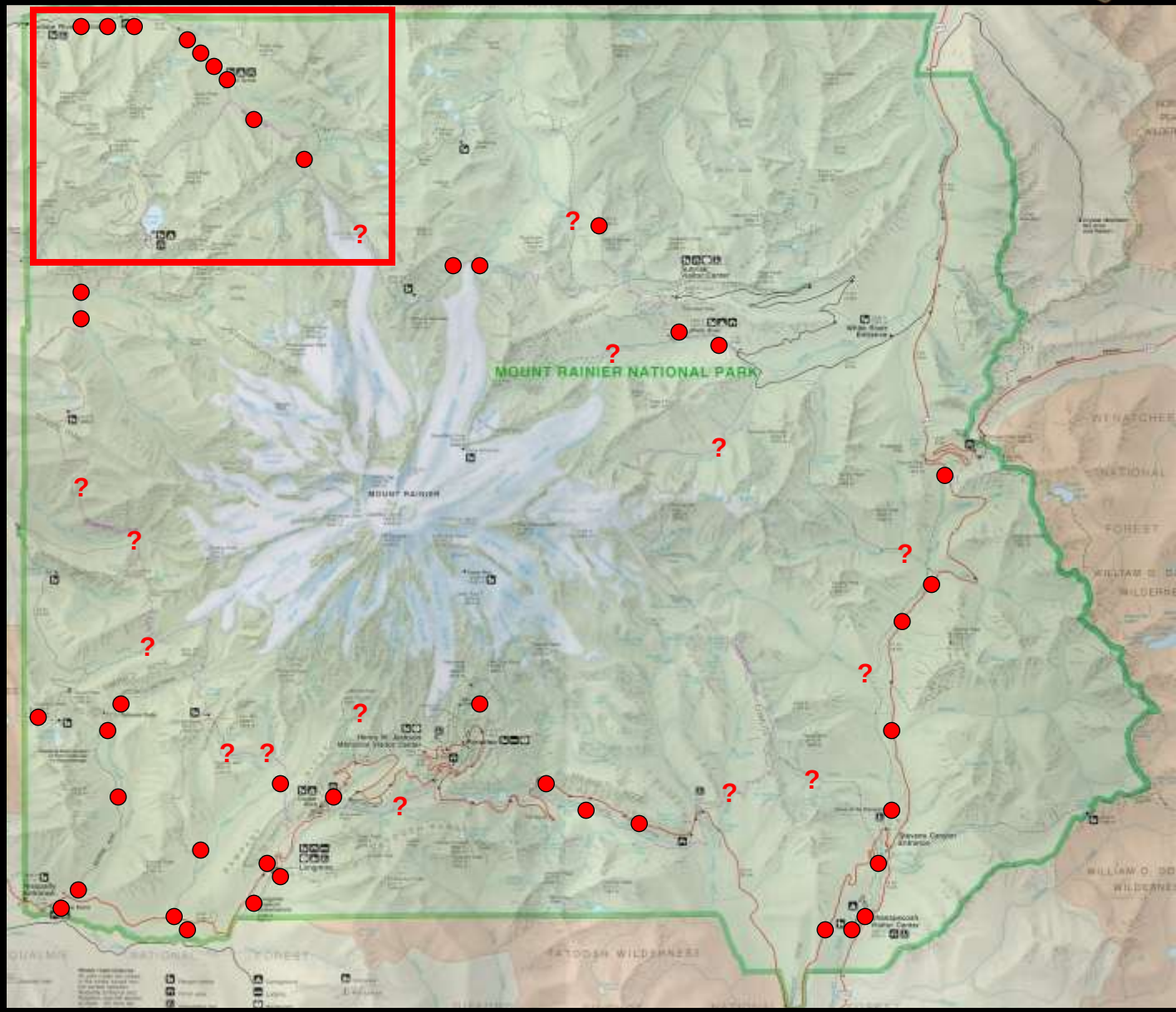
The Great Flood of November 2006

18 inches of rain fell in 36 hours, flooding roads like Highway 410 that usually stay dry.


MT. BAKER – SNOQUALMIE
NATIONAL FOREST
US

Mount Rainier National Park

The Great Flood of November 2006



KEY

- ● **Known damage**
- ? **Probable damage**

Some of the most dramatic damage occurred along the Carbon River.

Mount Rainier National Park

The Great Flood of November 2006

The Carbon River Road was damaged or destroyed in numerous places.

Mount Rainier National Park

The Great Flood of November 2006

In all, about two miles of road were destroyed.

Mount Rainier National Park

The Great Flood of November 2006

In some places, the river erased the roadway entirely.

Mount Rainier National Park

The Great Flood of November 2006

In others, it scoured new channels as much as 12 feet deep.

Mount Rainier National Park

November 2006 Flood Recovery

"The acquisition of land as part of the proposed boundary adjustment… would provide an opportunity to relocate nonhistoric maintenance functions and employee housing to an already disturbed site within the boundary adjustment area."

Mount Rainier National Park

The Great Flood of November 2006

In many places, the only reminders that a road used to exist are the road signs still standing alongside new river channels.

Mount Rainier National Park

November 2006 Flood Recovery

From the General Management Plan:

“Carbon River Road is adjacent to the Carbon River, and some segments of the road are within the floodplain. In some areas, the roadbed is lower than the level of the water. The National Park Service has repeatedly implemented expensive measures to protect the roadbed, such as berming the riverbank, diverting the flow, and repairing the roadbed. The National Park Service cannot continue to make major repairs to this road to ensure long-term vehicular access without adversely affecting river resources.

Mount Rainier National Park

November 2006 Flood Recovery

“Private vehicles and shuttles would be permitted on the road until a major washout occurred. At that time, the road would be dedicated to nonmotorized uses (hiking and biking)…. Administrative vehicles needed for preservation, maintenance, and emergencies would continue to be permitted on the road. The existing historic road corridor would be maintained in a manner consistent with the National Historic Landmark District designation.

Mount Rainier National Park

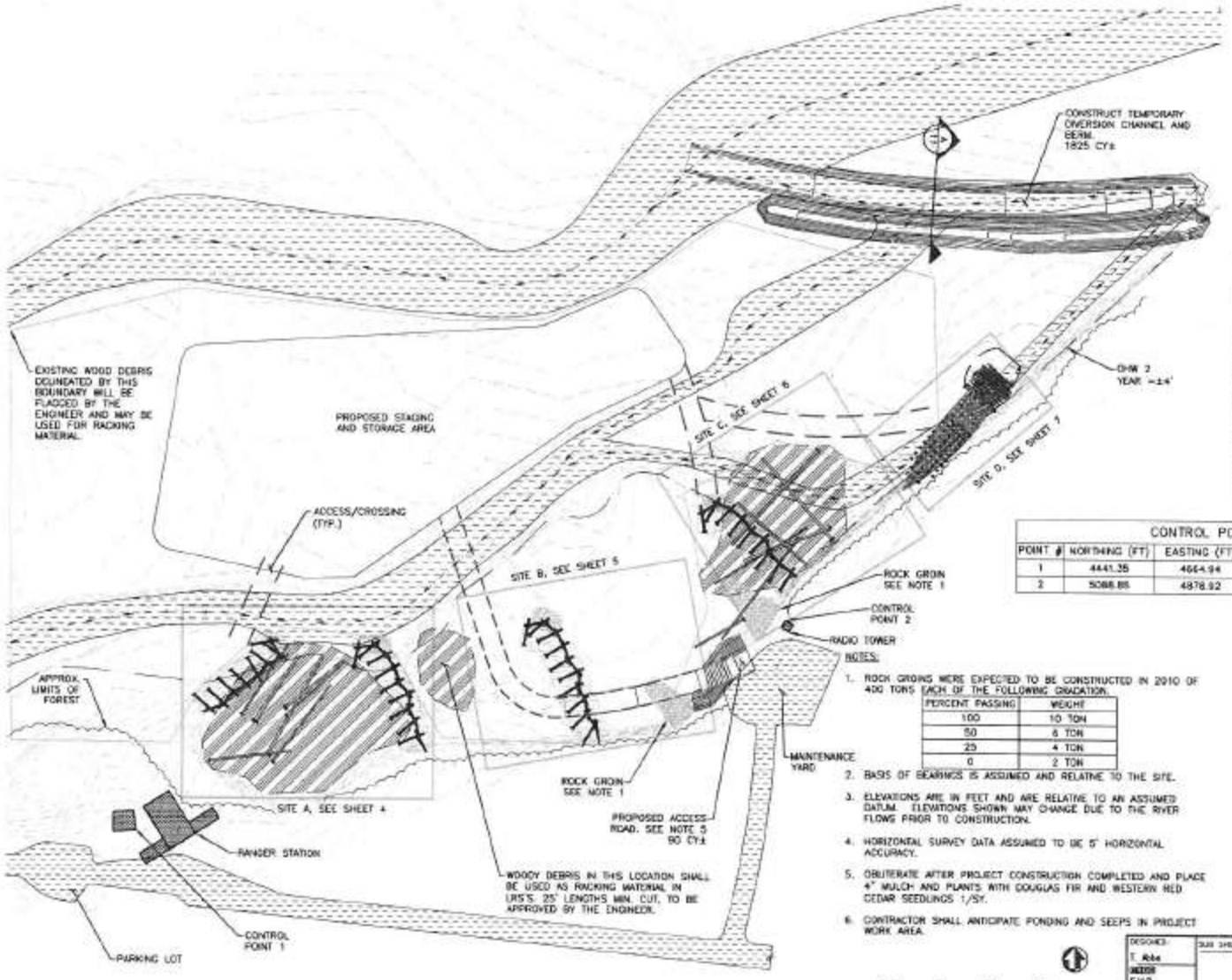
November 2006 Flood Recovery

"….Camping would continue as it is now until there was a major washout of the road, at which time the road would be closed to visitor motorized vehicles. The Ipsut Creek campground would then be converted to a walk-in/bike-in camping area, consistent with the National Historic Landmark District designation. With the approval of the proposed boundary adjustment… additional camping and picnic spaces would be provided in the boundary adjustment area near the Carbon River entrance."

Mount Rainier National Park

The Great Flood of November 2006

The historic Ipsut Creek Patrol Cabin was undermined by a stray branch of the river, but fortunately did not wash away.



INDEX OF SHEETS	
SHEET	TITLE
1	TITLE SHEET
2	NOTES
3	SITE PLAN
4	SITE A
5	SITE B
6	SITE C
7	SITE D
8	LRS TYPE 1
9	LRS TYPE 2
10	ELJ SEQUENCING PLAN
11	SECTIONS AND DETAILS

CONTROL POINTS (ASSUMED DATUMS)				
POINT #	NORTHING (FT)	EASTING (FT)	ELEVATION (FT)	DESCRIPTION
1	4441.35	4664.94	5093.90	SOUTHEAST CORNER OF BUILDING
2	5088.88	4878.92	5110.17	NORTH CORNER OF TOWER PAD

NOTES:

1. ROCK GROINS WERE EXPECTED TO BE CONSTRUCTED IN 2010 OF 400 TONS EACH OF THE FOLLOWING GRADATION.

PERCENT PASSING	WEIGHT
100	10 TON
50	6 TON
25	4 TON
0	2 TON

2. BASIS OF BEARINGS IS ASSUMED AND RELATIVE TO THE SITE.
3. ELEVATIONS ARE IN FEET AND ARE RELATIVE TO AN ASSUMED DATUM. ELEVATIONS SHOWN MAY CHANGE DUE TO THE RIVER FLOWS PRIOR TO CONSTRUCTION.
4. HORIZONTAL SURVEY DATA ASSUMED TO BE 5' HORIZONTAL ACCURACY.
5. OBLITERATE AFTER PROJECT CONSTRUCTION COMPLETED AND PLACE 4" MULCH AND PLANTS WITH DOUGLAS FIR AND WESTERN RED CEDAR SEEDLINGS 1/SY.
6. CONTRACTOR SHALL ANTICIPATE PONDING AND SEEPS IN PROJECT WORK AREA.

Timothy B. Abbe

JACK C. BAUER

DESIGNED: T. Abbe	SUB SHEET NO.	TITLE OF SHEET: CARBON RIVER ROAD FLOOD PROTECTION SITE PLAN MOUNT RAINIER NATIONAL PARK	DRAWING NO. 105 105,517
DRAWN: SWB			PMS/TPG NO. 152639
TECH. REVIEW: J.B/C.D			SHEET 3 OF 11
DATE: 9/10/10			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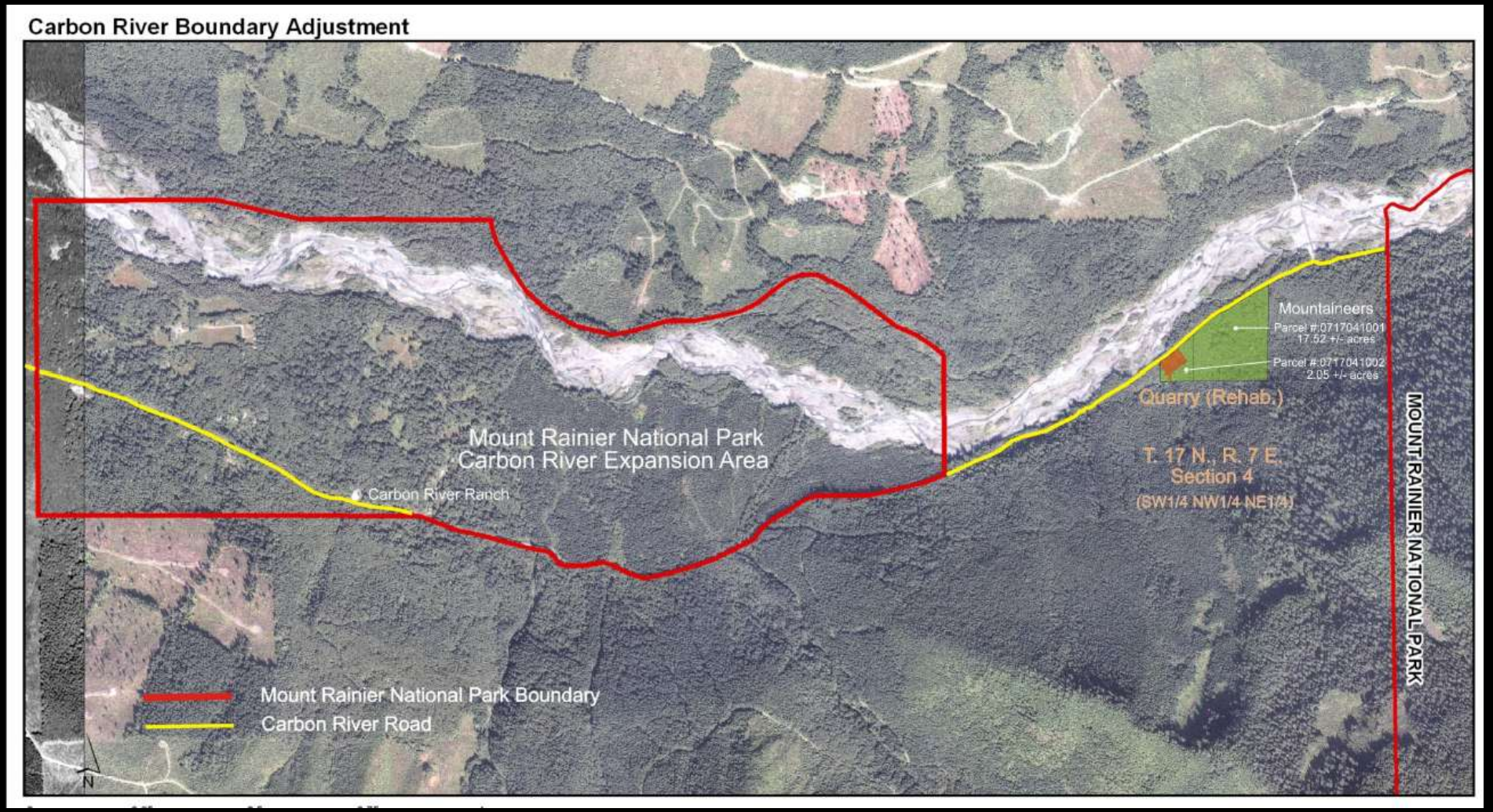
VOL


Carbon River Boundary Adjustment
Mount Rainier National Park
Carbon River Expansion Area
Carbon River Ranch
Mountaineers
Parcel #:0717041001
17.52 +/- acres
Parcel #:0717041002
2.05 +/- acres
Quarry (Rehab.)
T. 17 N., R. 7 E.
Section 4
(SW1/4 NW1/4 NE1/4)
MOUNT RAINIER NATIONAL PARK
Mount Rainier National Park Boundary
Carbon River Road
N

Mount Rainier National Park

The Great Flood of November 2006

ca. 1920

2006

Meanwhile, Mount Rainier's glaciers have gradually melted during the historic period.

Mount Rainier National Park

The Great Flood of November 2006

Over the last century, the Nisqually Glacier has retreated almost out of sight from the road bridge.

Mount Rainier National Park

The Great Flood of November 2006

A comparison of the Nisqually Glacier in 1974 and 1994 shows glacial retreat in a single generation.

Mount Rainier National Park

The Great Flood of November 2006

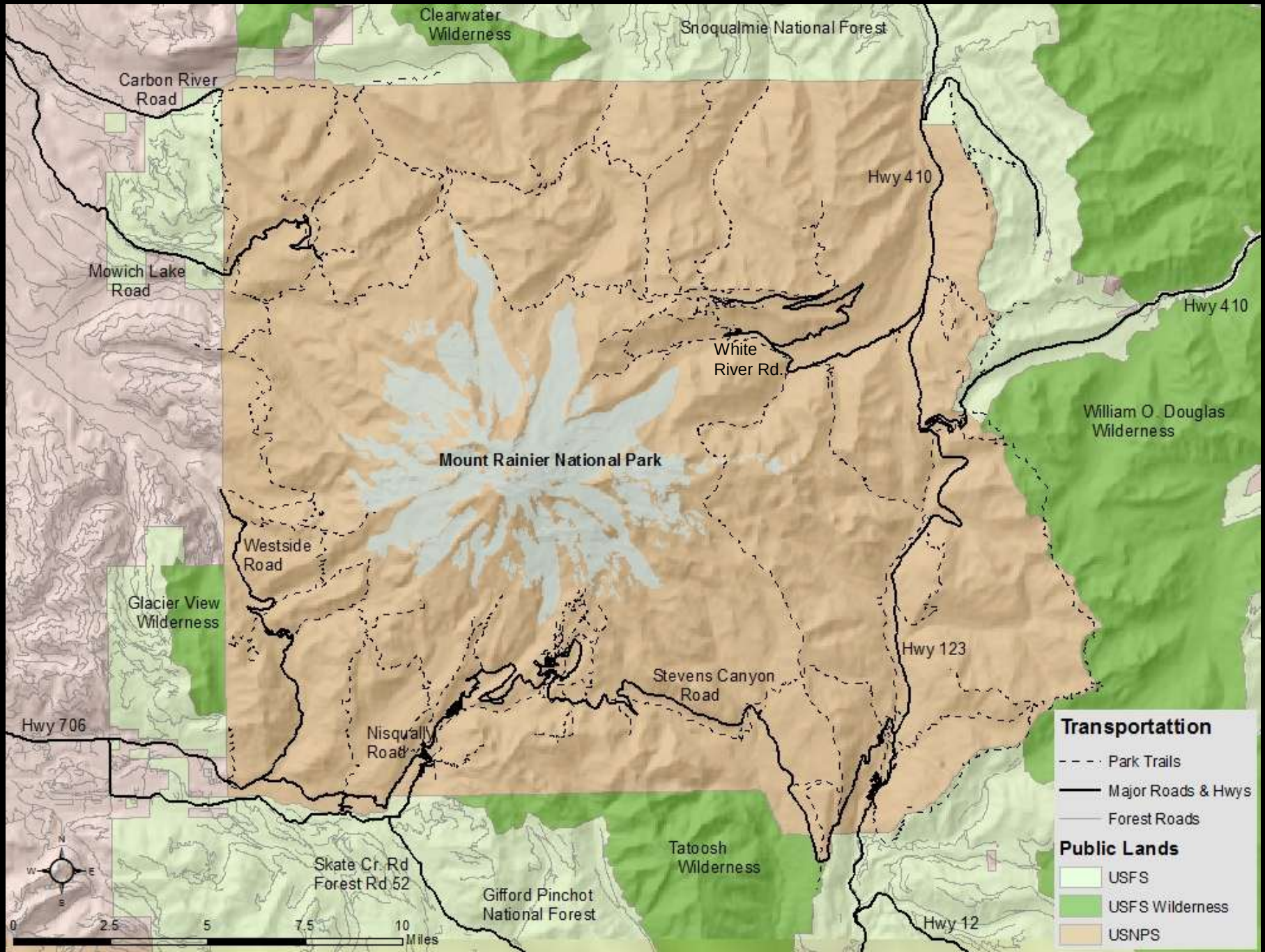
The more the glaciers melt, the more debris is dumped into the rivers.

Mount Rainier National Park

The Great Flood of November 2006

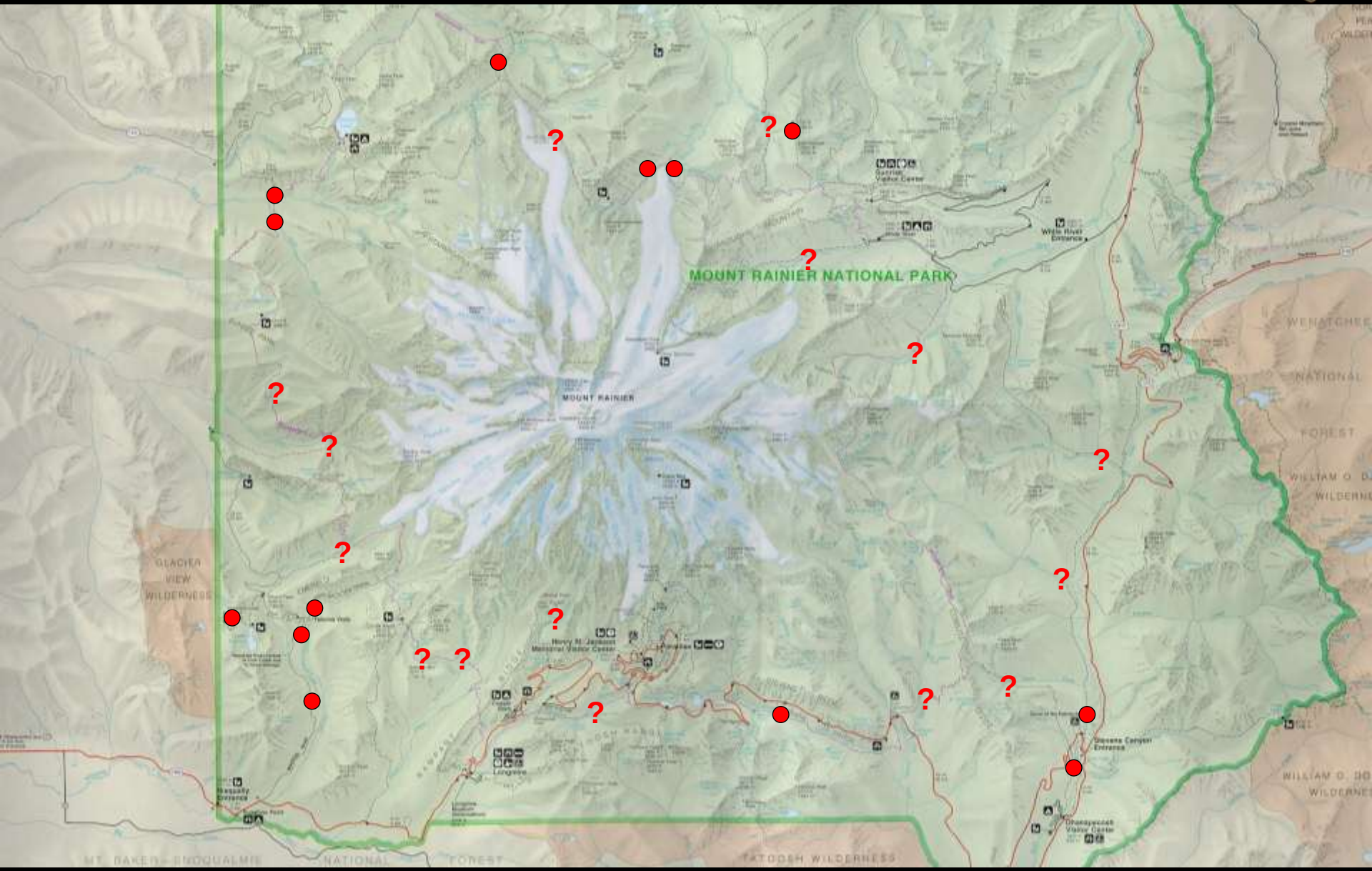
As the glaciers melt, their moraines become exposed and erode into the rivers as well.

Mount Rainier & Vicinity



Mount Rainier National Park

The Great Flood of November 2006



In addition to roads, trails were damaged all over the park. Much of the damage remains hidden by the winter snow.

Mount Rainier National Park

The Great Flood of November 2006

Aerial and ground surveys (including Carbon River and the Wonderland Trail at Kautz Creek) have found extensive damage.

Mount Rainier National Park

The Great Flood of November 2006

Trail bridges were damaged or destroyed all over the park, including the suspension bridge at the Grove of the Patriarchs.

Mount Rainier National Park

The Great Flood of November 2006

High wind, with gusts up to 120 miles per hour, ripped the roofs off the Fremont and Gobbler's Knob Fire Lookouts.

Mount Rainier National Park

The Great Flood of November 2006

A windstorm in December added more debris to the road and trails.


08.05.2008

Mount Rainier National Park

The Great Flood of November 2006

In some places, the process is much faster, causing riverbeds to rise tens of feet over the past century.

Mount Rainier National Park

The Great Flood of November 2006

Rebuilding the park's trail system will begin in April or May, when the trails melt out from winter snow.

Mount Rainier National Park

The Great Flood of November 2006

Our management choices are local, but the challenges are global in scope.