



**Clatsop, Columbia, and Tillamook Counties
and the
Oregon Department of Forestry**

Forest and Debris Recovery Final Report Winter Storm - December 2007

**Prepared by the
Forest and Debris Recovery Team**



*Confluence of the
Nehalem and
Salmonberry Rivers
w/Foss Bridge and
Tillamook RR Bridge*

Executive Summary

The storm that struck the Pacific Northwest on December 2 and 3, of 2007 caused significant wind and flood damage along coastal Oregon and Washington. As damage reports came in, and statewide mobilization of emergency services coalesced, the Governor requested that the Oregon Department of Forestry (ODF) become integrated into the Office of Emergency Management and the Emergency Operation Centers (EOCs) of affected counties. As a result, the scope of ODF's involvement expanded from assessment of forest lands to a need for a coordinated effort to support and assist the counties in recovery and assessment.

In response to the request by the Governor and the three counties, ODF assembled a Forest and Debris Recovery Incident Management Team (IMT) to assist the counties in assessing damages to forest lands and natural resources attributed to the storm. The IMT established a command center at ODF's Astoria District office on December 10, 2007, and three branch operation centers in Astoria, Columbia City and Tillamook. The team spent eight days assessing and surveying damage. Assessment efforts were conducted in coordination with the county EOCs, multiple state and federal agencies, and private forest landowners.

The primary objectives of ODF in support of the three counties were to:

- Develop an assessment of storm damage related to forest roads, downed timber, and forest debris where there are concerns about risk to public safety, roads and infrastructure and natural resources.
- Facilitate solutions related to the salvage of applicable material, debris removal, debris jams and critical urban forest concerns.
- Provide status reports and information related to damage and assessment/coordination efforts.
- Identify any potential legal, regulatory, and/or economic barriers to local recovery efforts and forward to policy makers and/or groups for consideration.

Results of the assessment have been summarized in the attached report. A draft of this document was provided to the counties in late December to solicit feedback. Comments received from the counties were built into this final report. It is an assessment of the heaviest of the storm damage on the north Oregon Coast. **It is not a comprehensive assessment. It is aimed at identifying the most significant damage and immediate concerns. It does not address damages to municipalities; nor federal, state, and county roads.** At this time, other affected Coast Range counties, such as Lincoln, Polk, Washington, and Yamhill are not included in this assessment.

The majority of the wind damage was limited to areas within a 20-mile band along the coastal margin. It is estimated that roughly over 370 million board feet of timber is estimated to have blown down in Clatsop County alone. About 25 million board feet is estimated to be down on the Clatsop State Forest. Tillamook County is estimated to have roughly 20 million board feet of

wind-thrown timber; about 15 million is on State Forest lands. Forest wind damage in Columbia County by comparison is negligible. Wind damage to family forest and small non-industrial owners is also substantial but as yet un-quantified. Wind damage to trees in nearly every public park and municipality along the coast is also significant.

Surveys were conducted where there was significant flood damage to forest roads, where landslides had occurred, and where large accumulations of woody debris were deposited. Special assessments were conducted on certain sites where there was an immediate concern. The majority of significant flood related damage that was encountered was in eastern Clatsop County, western Columbia County, and northeastern Tillamook County. Not all flood-related damage on forest land has been assessed, and some land owners have only provided limited information. On State Forest lands in the three counties, the initial amount estimated to repair forest roads is nearly 3 million dollars. Estimates to repair roads on private forest lands is unknown.

The assessment report is a summary of the findings. Details of surveyed sites are contained in Appendix 1 of the report.

As a result of the assessment, a variety of issues and concerns were identified. They can be loosely categorized as: 1) public safety, 2) recovery from damage, 3) natural resources, and 4) economics. Regarding public safety, there are people living in areas that are at risk from landslides and flooding simply by the location of dwellings or infrastructure in relation to slide-prone areas. Leaning and partially standing wind damaged trees also remain a hazard. Better tools are needed to identify where hazards are the greatest, particularly for landslide and debris flow-prone zones to prevent further development in high risk areas. Small municipal and domestic water systems with intakes in slide-prone areas are also a concern, and many were damaged and need to be inspected and repaired.

The amount of downed wood, slide debris, and road damage poses issues regarding obstructions which hamper current forest operations and recovery opportunities. There are also concerns related to large accumulations of woody debris in streams which may pose a threat to property and infrastructure downstream. Further evaluation is needed and a process that identifies where actions should occur and what treatments are considered acceptable. A coordinated process is needed to remove a variety of debris including large wood and sediment across jurisdictional and landowner boundaries. Many small non-industrial forest landowners do not have the resources to address and treat damage repair and debris removal.

Natural resource issues and concerns include inadequate road drainage and stream crossing structures on legacy forest roads and relic railroad grades. Further assessment is also needed to determine the magnitude of damage to aquatic, riparian and terrestrial habitat, particularly for threatened and endangered species. Forest health and fire hazards are concerns as well. The amount of downed wood has the potential for contributing to insect infestations, and poses a wildfire threat that will exist with and without salvage efforts. Damage to urban forest resources is extensive, and management programs for treating and restoring damage, as well as providing for future management needs should be better defined and supported.

Economic issues related to the amount of salvageable material are of particular concern, especially at a time when the market is in a slump and domestic log prices are low. Higher logging costs associated with the difficulties of salvaging wind damaged timber, a depressed market, and lower material value (smaller, un-preferred lengths, less recoverable volume) could compromise profit margins and prevent some forest land owners to abandon salvage opportunities. It is estimated that wind damage to trees also generated an in excess of 100 million board feet of non-sawlog material (i.e., breakage, broken tops and large limbs, short log pieces, etc.), which further reduces the potential for recoverable saw-log volume. Local capacity and infrastructure to process this material is not believed to be adequate, and alternative solutions for capturing its value is needed.

Family Forest Owners and other small landowners may experience difficulties in both finding markets and operators to deal with small volumes of material. This could be a disincentive to pursue removal and recovery of forest damage on their lands, leading to forest health and wildfire concerns.

Another significant concern is the severe damage sustained to the Port of Tillamook Bay Railroad line, particularly in the Salmonberry River Canyon. Many local mills and industries rely on this relatively inexpensive means of transporting raw materials and finished products between markets. Disruption of rail service equates to a reliance on truck transport which will increase transportation costs and affect related commerce and dependent businesses and trades.

The next step is to further clarify issues, prioritize them, identify the resources and cooperators, and develop a course of further needed actions and timelines. ODF assistance to forest landowners in support of the counties will remain a high priority across all Department programs. Interagency coordination and partnerships should be developed to determine where, and which priorities need cooperative and collaborative solutions to support affected forest land owners.

Table of Contents

Executive Summary	i
I. Introduction.....	1
II. Background	1
III. Response – Assessment Actions Performed.....	2
A. Incident Management Team - Assistance to Counties	2
B. Partners and Cooperators	3
C. Assessment Methods.....	3
IV. Summary of Assessment Findings.....	4
A. Wind Damaged Timber.....	4
1. State and Private Industrial Ownership.....	4
2. Family Forest and Other Small Non-industrial Ownership.....	7
3. Urban Forest Resources	7
B. Flash Flood Damage in Forest Lands.....	9
1. Landslide Hazards and Debris Jams	9
2. Forest Roads.....	11
V. Issues and Concerns.....	12
Appendices.....	20
Appendix 1 – Individual Branch Assessment Findings	20
Clatsop County.....	20
Columbia County	25
Tillamook County	36
Appendix 2 – Urban Forestry Assessment	42
Appendix 3 – List of Partners and Cooperators	46
Appendix 4 – Current Policy and Practices.....	47
Appendix 5 – Storm Details.....	51

List of Tables

Table 1. Estimated Acres/Volume (million board feet) of Windthrown Timber by County and Ownership

Table 2. Count of Sites Surveyed by Type of Damage and County

Table 3. Initial Cost Estimate of Road Damage Repair on State Forest Land

List of Photographs

1. Cover Photo – Confluence of the Nehalem and Salmonberry Rivers w/Foss Road bridge and Tillamook RR Bridge
2. Wind damaged forest photo
3. Urban Forest damage photo
4. Debris Jam photo
5. Road damage photo in N Fk Wilson

List of Maps

1. Wind Damage
2. Forest Land Flash Flood Damage

I. Introduction

The large powerful storm that struck the Pacific Northwest on December 2 and 3, 2007 brought gale force winds and intense rainfall, which resulted in extensive damage to forested stands and flooding. Damage was most severe along portions of the Oregon and Washington coasts. Based on maximum wind gusts compiled by the National Weather Service, in Oregon the strongest force of the storm was felt from about Newport to the Columbia River. Within this portion of northwest Oregon, forest lands were heavily impacted.

This document is intended to serve as a report by the Oregon Department of Forestry (ODF) on the heaviest of the storm damage on the north Oregon Coast, principally to forest resources and forest lands in Clatsop, Columbia, and Tillamook Counties. **It is not a comprehensive assessment. It is aimed at identifying the most significant damage and immediate concerns. It does not address damages to municipalities; nor Federal, State, and County roads.** The primary objectives of this assessment are 1) to determine the extent of significant patches of wind damaged timber, and 2) identify immediate concerns related to flood damaged forest roads, woody debris deposits, and landslides. At this time, other affected Coast Range counties, such as Lincoln, Polk, Washington, and Yamhill for example, are not included in this assessment.

II. Background

The storm of December 2007 was of sufficient size and force, to compare with noteworthy storms of the recent past. But it was also unique, in that it not only brought gale force winds, but it followed with intense rainfall, both of which were distinctly focused in different geographic locales. Although the storm was a significant event, particularly to the affected citizenry and their property, it was not as catastrophic or widespread as other notable, well-documented large storms of the past.

According to data from the Oregon Climate Service (OCS), the maximum peak wind gusts of the December 2007 storm were slightly higher than last year's peaks recorded in the December 2006 storm. In comparison, the peak gusts were notably lower than those reported for the Columbus Day storm of 1962. The Columbus Day storm may be associated with the greatest recorded peak gusts on the west coast, but the storm of December 2007 is set apart by the duration of its sustained winds.

Data compiled by OCS suggests that the 2007 storm may be the longest-lasting high-wind event on record for the west coast. The Columbus Day storm lasted only about two to three hours in most locations, but sustained high wind lasted nearly two days during the 2007 storm except for a few brief lulls. The high, long-duration winds were focused primarily on a 20-mile wide strip along the northern Oregon coast (see Wind Damage Map, p. 19), compared to the Columbus Day storm which affected a much larger region from San Francisco north to British Columbia, including the entire portion of western Oregon.

Rainfall for the December 2007 storm compares to that of the 1964 and 1996 flood events, but at a more localized scale. Both the 1964 and 1996 floods were characterized as very large rain-on-snow events, and affected stream flow across a much greater extent of western Oregon. The December 2007 storm generated rainfall slightly less than the record amounts that fell during last year's November event, which contributed to the highest stage on record for the Wilson River. Based upon the observed flood impacts, the greatest rainfall intensities for the three north coast counties considered here was focused primarily in the headwaters of the fast-responding rivers of the Nehalem, Salmonberry, Trask, and Wilson drainages (see Forest Land Flash Flood Map, p. 20). The NWS did not issue a flash flood warning; however, ODF issued a debris flow warning on December 3, 2007.

Based on the data, the storm of December 2007 will be considered one of the top weather events in Oregon, particularly in the last two decades. Its distinct characteristic of two low pressure centers crossing the coast at different times resulted in damaging winds on the coast, followed by intense precipitation in the interior coastal mountains, and flash flooding to valleys downstream. As a result, damage to forest land and forest resources was significant in Clatsop, Columbia, and Tillamook counties (see Appendix 5 for additional storm detail).

III. Response – Assessment Actions Performed

Initially, local ODF districts in Astoria, Forest Grove, and Tillamook began assessing damage on State Forest lands. As damage reports came in, and statewide mobilization of emergency services coalesced, the Governor requested that ODF become integrated into the Office of Emergency Management and the county's Emergency Operation Centers. As a result, the scope of ODF's involvement was expanded, and the need for a coordinated effort to support the counties in recovery and assessment, particularly on forest lands was identified.

A. Incident Management Team - Assistance to Counties

At the request of Clatsop, Columbia, and Tillamook Counties, the Governor tasked the Department of Forestry with establishing a Forest and Debris Recovery Team on December 10, 2007. This Incident Management Team's (IMT) primary task was to assist these three counties in assessing impacts to forest lands and resources associated with the recent storm event. This coincided with the beginning of the recovery phase as the emergency response phase was winding down. The team set up its base of operations at ODF's Astoria District office.

A Memorandum of Understanding was developed and signed by the three counties outlining the following objectives:

- Develop an assessment of storm damage related to forest roads, downed timber, and forest debris where there are concerns about risk to public safety, roads and infrastructure and natural resources.
- Facilitate solutions related to the salvage of applicable material, debris removal, debris jams and critical urban forest concerns.
- Provide status reports and information related to damage and assessment/coordination efforts.
- Identify any potential legal, regulatory, and/or economic barriers to local recovery efforts and forward to policy makers and/or groups for consideration.

B. Partners and Cooperators

A large number and wide variety of agencies and organizations were involved in the overall emergency and recovery effort in Clatsop, Columbia, and Tillamook County. Due to this, a significant amount of effort was placed on coordination and communication to assure alignment of common efforts. Additional efforts were undertaken to coordinate and participate in public meetings and respond to immediate public concerns and provide information.

Due to actual and potential slide issues affecting public safety and state highways in the Clatskanie and Westport areas along the Columbia River, the IMT became involved with a variety of additional organizations. These would include the Oregon Dept of Transportation, Clatsop and Columbia County Sheriff's Office, Clatsop and Columbia County Emergency Operations Centers, and the Clatsop and Columbia County Public Works Departments (see Appendix 3, List of Partners and Cooperators).

C. Assessment Methods

The IMT established three operational branches with one each in Clatsop, Columbia, and Tillamook Counties. Each branch worked with the local Emergency Operations Centers and coordinated with County Public Works, local ODF Districts, private landowners and other state agencies to identify immediate concerns, obtain new data and information, and identify data needs. Aerial observation combined with on-the-ground field reconnaissance was used to fill key data gaps, and to identify issues of immediate concern.

A large number of forest landowners were impacted by this event, though much of the ownership is held by industrial landowners. Each of these counties and landowners were actively involved in assessing and addressing the situation upon the team's arrival. Much of the IMT's assessment work involved the gathering of information from the Emergency Operation Centers (EOC) and other partners and cooperators in each county, including the large industrial landowners. Family forest land ownership in these counties is comparatively low to state and private industrial owners, and the extent of damage for this ownership group has yet to be quantified. In addition,

numerous communities were involved in providing information related to Urban and Community forestry issues.

Field teams were sent to areas where continued or severe damage was likely based on initial reports and reconnaissance. Efforts were concentrated on sites where there were immediate or substantial concerns regarding public safety (i.e., landslide hazards, road washouts, and hazard trees). Cooperating private forest land owners (i.e., industrial and non-industrial) provided information pertaining to location-specific damage and extent on their lands, and the field teams along with the ODF districts then focused reconnaissance on finding unknown damage and hazards. Locations and sites of concern were then surveyed in-depth to characterize further the damage and potential hazards.

Wind damage to forest resources was identified via aerial survey, with field teams verifying and describing the extent and type of damage, stand characteristics, and volume estimates. Detailed assessment results are attached in Appendix 1 of this report.

Several immediate flood and landslide concerns were encountered. Technical specialists from the field teams were dispatched to conduct on-the-ground investigation and risk evaluation. Such immediate concerns were either identified by the branch unit teams, local government officials or local residents. These became sites with special assessments and included actively moving landslides, unstable materials acting as dams, and log and debris jams adjacent to homes or public roads.

IV. Summary of Assessment Findings

A. Wind Damaged Timber

1. State and Private Industrial Ownership

Clatsop and Tillamook Counties both sustained considerable wind damage with Clatsop County by far bearing the brunt of the wind. Combined, the two counties are estimated to have a gross volume of wind damage over 390 million board feet across all ownerships. A note of interest, by comparison wind damage resulting from the Columbus Day storm is estimated to have been 11 to 15 billion board feet in Northern California, Oregon, and Washington combined (Wikipedia.org).

The majority of the heavy wind damage was limited to an area of northwest Oregon extending from Tillamook to Clatskanie, and Clatskanie to Astoria. Thus Columbia County experienced minor wind damage by comparison (see Wind Damage Map, p. 19). Field reconnaissance reveals that all ownership classes near the coast experienced damage. Acreage and volume estimates of wind damaged timber by ownership and county are displayed in Table 1 below.

Table 1. Coarse Estimate of Acres/Gross Volume (million board feet) of Significant Wind Damaged Timber by County and Ownership

Ownership	Clatsop	Columbia	Tillamook	Total
Federal	1,150 / 20	0 / 0	20 / 1	1,170 / 21
State ¹	3,000 / 25	0 / 0	500 / 15	3,500 / 40
Private Industrial	10,350 / 297	0 / 0	300 / 5	10,650 / 302
Non-industrial ²	2,000/28	0 / 0	NA	50 / 0.25
Total	16,500 / 370	0 / 0	820 / 20	17,320 / 390

Gross Volume – Includes defect and breakage, does not include estimated roadside volume

Significant wind damaged timber – Concentrations or suitable as a salvage sale

NA – Information not available

¹Includes all state ownership however, the volume on state lands other than State Forests was minor

²Non-industrial includes city, county, family and other small forest land owners

Clatsop County

State Forest lands and Private Industrial lands sustained the majority of wind damage and have already begun planning salvage efforts. Damage on State Forest lands was mostly on Board of Forestry lands. Non-industrial forestlands within the coastal zone subject to the greatest wind velocities have also been heavily impacted, but further review is needed to verify further the extent (see Appendix 1 for details).



An estimated 16,500 acres of timber was heavily damaged by wind, which constitutes about 3 percent of Clatsop County’s total land base. The total **merchantable** volume (does not include estimated non-merchantable defect) is estimated at 260 million board feet, which is approximately 75 percent of what is harvested annually in the county (5-year average). This suggests that the milling capacity in the area is capable of handling the instantaneous influx of merchantable, wind damaged volume. If the timing of salvage is well-planned, and stand dominated by rot resistant species are salvaged last, then value losses due to decay can be minimized.

This storm event caused considerable breakage in both commercial and pre-commercial stands, creating an estimated 100 million board feet of **non-sawlog** material (broken pieces and tops,

short logs, etc.), far above typical amounts. For context in terms of biomass, 100 million board feet equals approximately 0.3 million bone dry tons, which is equivalent to 24,000 chip truck trailer loads.¹ It is believed that local industry does not have the capacity to process this material.

Fort Stevens State Park which was still recovering from the Veteran's Day Storm of 2007 earlier this year had at least another 200 trees blown down. The Saddle Mountain Trail was extensively damaged and will be closed for an undetermined length of time. Fort Clatsop National Monument experienced significant wind damage and will require considerable clean-up and salvage efforts.

Columbia County

Wind damage on forest land was minor by comparison, and salvageable volume is considered to be negligible. Most of the damage in Columbia County was flood related.

Tillamook County

State Forest and private industrial lands sustained the majority of the wind damage in the county. An estimated 820 acres suffered heavy wind damage, which accounts for less than 1 percent of the county's land base. On State Forest lands, damage was confined almost entirely to the Board of Forestry lands. Salvage efforts have already begun being planned.

The total **merchantable** wind damaged, salvageable volume is estimated to be roughly 11 million board feet, which is approximately 6% of the 5-year average annual harvest in Tillamook County. This indicates that milling capacity is capable of handling the volume available for salvage.

It is estimated that the breakage defect for potentially salvageable commercial-size material amounts to roughly 9 million board feet of **non-sawlog, wind damaged material in Tillamook County**. It is believed that local industry does not have the capacity to process this material.

There are seven State Parks in Tillamook County. Reports indicate that they experienced only scattered blowdown on access roads and trails. Most roads have already been opened and at this time some trails still need some minor clean-up. There are also 5 county parks. The largest, Barview Jetty County Park had the greatest degree of wind damage with 357 trees blown over. Other parks including Kilchis River, Trask River, Whalen Island, and Webb Parks fared much better with only several to a dozen trees being toppled.

Aquatic and Wildlife Habitat

Assessment of storm related damage to aquatic, riparian and terrestrial habitats is very limited. Most of what is known is associated with assessments of the more significant areas of wind damage. The potential for significant damage to habitat along the coastal strip is high. Initial reports indicate that there has been significant blowdown in designated marbled murrelet

¹ Oregon Department of Energy estimates that on a statewide basis 1.86 million bone dry tons of forest biomass were converted to biofuels, electricity, or steam in 2006. In essence, one-sixth of what was generated across the entire state in 2006, is estimated to be in the form of non-sawlog material in Clatsop County as a result of the wind damage.

management areas in the God's Valley and Coal Creek areas. Initial estimates are 100-200 acres of blowdown in these areas. Anecdotal reports from the Clatsop State Forest indicate that severe damage is believed to have occurred to at least three Bald Eagle nests and two Great Blue Heron rookeries, and one marbled murrelet management area. More detailed review by ODF wildlife biologists will be necessary to assess and quantify these impacts. This will occur as planning for salvage harvest proceeds.

2. Family Forest and Other Small Non-industrial Ownership

The extent of family forest ownership (FFO) in Clatsop and Tillamook County comprises about 9 percent (approx. 66,000 acres) of forest lands. There are an estimated 1,310 owners. Family owned forest land is defined as parcels greater than 5 acres and less than 5,000.

Damage is very dependent on local topography and no good estimates of acreage or volume are available yet. Zones of relative severe damage have been identified, however, and an indication of the magnitude of damage and impact is given based on the acreage and number of owners in each zone (see Wind Damage Map, p. 19) and some initial information. In Clatsop County, about 27,775 acres of family forest ownership are located in the general zone of storm damage, based on County Assessor parcel information and the broad damage zone identified by ODF. A crude estimate of storm-affected acreage of FFO in Tillamook Co. is about 22,000 acres based on the total land area in the storm zone and a crude estimate of 6% FFO for the County.

- **Extensive Blowdown** (mostly in coastal Clatsop County, see maps) – areas with severe wind damage includes about 14,862 acres and about 400 different landowners in Clatsop County. It's estimated that roughly 20 million board feet of significantly wind damaged timber is down on small private forest lands. Perhaps about 1,600 acres of FFO land are in the Extensive Blowdown zone in Tillamook County. In this zone, there is severe damage (stand replacement) in both merchantable and submerchantable stands on many parcels. Almost all owners have some damage, but the extent has yet to be quantified.
- **Scattered Blowdown** (inland Clatsop County, see maps) – areas with scattered wind damage includes about 12,913 acres and 160 different landowners in Clatsop County. Perhaps as much as 20,000 are in this zone in Tillamook County., based on the percentage of FFO land out of total land. Most of the damage in this zone consists of scattered or clumped trees, trees at stand edges, narrow strips, and exposed clumps of weaker species. While there may be locally severe damage in small patches, most owners have relatively minor damage and many owners have negligible damage in protected topography. Damage is difficult to see within stands and difficult to quantify overall.

3. Urban Forest Resources

Within municipal boundaries and adjacent county properties, initial investigations suggest there is at least 8 million board feet of wind damaged timber. None of the 19 cities surveyed have a municipal tree inventory, so the responses collected is raw data and anecdotal information that has not yet been quantified in terms of the overall damage. See Appendix 4 for specific details.



Most cities in Columbia County, although pelted by torrential rains, did not experience the sustained wind that occurred along the North Coast. As a result, these cities experienced comparatively little public tree damage within their city limits. Columbia County locations did experience some flooding, which may have undermined tree roots in various locations.

By contrast, cities along the Pacific coast in Clatsop and Tillamook Counties experienced strong winds in addition to the rain for a period of 48 hours. In these cities, many trees failed, blocking roads and causing considerable public and private tree loss and damage. Many of the trees lost were Sitka spruce, red alder, and Shore pine – trees

native to and well adapted to this area. The hardest hit sites were the cities of Astoria and Wheeler, and Clatsop County's Klotchy Creek Park where significant work will be necessary to restore the forest canopy and ensure public safety. Numerous cities reported losses in excess of 100 trees each. A significant challenge for these cities is not in clearing the downed trees, but in evaluating the remaining trees for signs of future hazard potential. Some of these trees are now leaning or have experienced damage to the crowns of the tree, but did not fail completely.

Most of the cities in Tillamook and Clatsop counties dealing with tree damage have demonstrated remarkable resourcefulness in debris clean up after the December 2007 storm. These are towns accustomed to the often inclement winter weather on the north coast. It was evident, however, that some cities have access to greater financial and equipment resources than others.

B. Flash Flood Damage on Forest Lands

Field teams prioritized reconnaissance and assessments in areas where public safety were immediate concerns. Secondary to public safety, forest roads and other sites of potentially unstable slopes (where public safety was not an immediate concern) were surveyed.

Many flood damaged sites were inaccessible to field crews, but were observable from the air. It is important to note that the field reconnaissance was preliminary. Detailed ground surveys were not conducted on all known sites across forest lands in the affected area, only those that were inspected.

Municipalities, along with federal, state, and county roads **were not** part of the scope of this assessment.

The general proximity of the heaviest rainfall of the December 2007 storm was centrally located around the eastern half of Clatsop County, the western portion of Columbia County, the northeastern corner of Tillamook County, and the far northwestern corner of Washington County. The torrential rains in this general area resulted in a concentration of flash flood-related damage on forest lands (see Forest Land Flash Flood Damage Map, p. 20).

A total of two hundred fifty-four specific site surveys were conducted by the field units. There were forty-nine specific sites in Clatsop County; one hundred and five in Columbia County; and 100 in Tillamook County. The number of sites assessed is only a portion of the flood related damage believed to have occurred, and there are unknown sites on forest lands, particularly in un-roaded areas that have yet to be evaluated. The number of sites only reflects where field crews surveyed, some branches were able to visit more sites than others. A count of flood damaged sites inspected is displayed in Table 2.

1. Landslide Hazards and Debris Jams

Landslides and debris flows are common in Oregon on steep slopes or in weak geologic materials, and typically occur during or shortly after major rainstorms. When landslides encounter steep slopes and steep, narrow canyons, they may become debris flows that can travel long distances and accumulate large quantities of soil, rock, trees, and other debris along the way. When debris flows run out of energy and stop, they create a deposit, which usually consists of large woody debris and sediment. Similar deposits are also caused by flash flooding, and may accumulate at multiple locations along a stream channel. In-channel deposits of woody debris and sediment are often re-mobilized when subsequent high-water events occur and they are transported further downstream.

There are areas where debris flows scoured the channel bottom as well as the steep adjacent sideslopes. This has created areas of potential slope instability on the stream-adjacent slopes by removing toe support. It is likely that stream-adjacent areas will fall into the channels, perhaps forming landslide dams or debris flows. Determining whether or not subsequent debris flows mobilize material in the deposits formed during this latest event is problematic. In some cases,

the deposits have lessened the stream channel gradient for several hundred feet creating conditions more favorable for debris flow deposition. Conversely, a large, water-rich debris flow may re-mobilize the stored sediment and woody debris and travel further downstream.

Most of the landslide and debris flows surveyed from this storm were concentrated in eastern Clatsop County, western Columbia County, and northeast Tillamook County, with scattered landslides elsewhere. The combination of intense rainfall on steep slopes composed of weak or highly weathered rocks and erosion-prone soils, (particularly in western Columbia County and the Nehalem River valley), and an



abundance of woody debris from standing and downed timber lead to the occurrence of flash floods, landslides, debris flows, and woody debris deposits.

There are no known current signs of significant impoundments of water that threaten populated areas. It is possible that landslides and debris flows will continue to occur in the area and may generate new threats in the future. There is a potential for subsequent slides to impact structures further. Another large rainstorm would likely trigger additional landslides and debris flows from any number of the marginally stable sites.

Table 2. Count of Flood Damaged Sites Inspected by Field Teams in Each County

County	Roads	Landslides	Debris Flow	Woody Debris Deposits	Total
Clatsop	21	14	7	7	49
Columbia	30	50	10	15	105
Tillamook	60	13	24	3	100
Total	111	77	41	25	254

The most critical sites where special assessments were conducted included the Eilertsen Creek road fill failure above Woodson, the adjacent channels between Woodson and Westport (Olson, Ross, West and Plympton Creeks), and the streams and slopes around Fishhawk Lake. Special assessments were also conducted for multiple danger trees in Warrenton and Wheeler. Special assessments are described in detail in the branch summaries in Appendix 1.

2. Forest Roads

The majority of the detailed forest road reconnaissance occurred on State Forest lands. Private forest land road conditions were not sampled or reported with the same level of intensity. Road assessments were conducted primarily to identify road repair needs on primary haul routes, many secondary forest roads have yet to be assessed. Assessment priorities evaluated risk to safety, dwellings and infrastructure first. Recommendations for repair to forest roads were made and will be provided to the landowners.



There are two distinct and separate types of forest road damage. The first is wind related. This damage is to road access, with limited damage to the actual road structure. The wind damage is greatest near Astoria. Most major roads have been opened. Wind damage to forests in the Astoria basin of the Clatsop State Forest and on some adjacent industrial forests to south is extensive, but with the planned response most roads should be open soon. Because most of these impacts should be resolved quickly, they have not been summarized.

Further east, in the same area with high landslide damage, many forest roads are impassable due to landslides, washouts, and bridge damage. Some of these sites will require drier conditions before repair can take place, so repairs may not be completed until next summer or later. In some cases, entire segments of a damaged road may need to be re-located.

Only major damage to the road system has been reported initially. It does not include minor damages and locations where down trees or debris block passage. Industrial private forest landowners conducted internal assessments of road damage, but only reported general information to ODF. Survey intensity was greater on State Forest lands. State Forest engineering specialists conducted an intensive reconnaissance effort, and reported their findings to the branch field teams. Costs to repair specific road damages on State Forest lands were estimated as shown in Table 3 below. The damage estimates are about twice that from the November 2006 storm that was centered in the Wilson River basin.

Table 3. Initial Cost Estimate of Road Damage Repair on State Forest Land

County	District	Repair Estimate
Columbia	Forest Grove	\$50,000
Tillamook	Forest Grove	\$850,000
Tillamook	Tillamook	\$1,300,000
Clatsop	Astoria	\$200,000
Total		\$2,400,000

Additionally, the Port of Tillamook Bay Railroad has been severely damaged. Many sections in the Salmonberry River Canyon have been completely washed away, often with the canyon scoured from wall to wall. The other north coast railroad is the Portland and Western. It was currently open to Wauna, and was temporarily blocked by debris from the Eilertsen Creek debris flow.

V. Issues and Concerns

A myriad of issues and concerns relative to forest lands and forest resources have arisen due to storm damage. Directly, storm damage gives rise to concerns about the impacts to forest conditions and associated natural resources. Indirectly, the effects of storm damage to both tangible and intangible values become a concern. At a variety of levels, storm damage affects long-range forest and resource planning as well as short-term operations and related activities. Concerns arise over effects to stakeholders, forest land owners, and their near- and long-term goals and objectives. Alterations to management direction and related activities have consequences to neighbors, local communities, and the livelihood of those dependent on forest lands and resources.

The December 2007 storm has affected families, property owners, businesses, communities, local economies, and county and state governments in many ways. The following table identifies the broader public safety, recovery process, natural resources, economics, potential solutions development, and interagency coordination issues and concerns that have arisen from the assessment of this storm damage. In addition, the table describes potential partners and solutions that could be considered by policy makers to address the issues.

This report and the branch summaries in Appendix 1 portray some the damage that was encountered and surveyed on forest lands in the three county area from the storm. The next step is to further clarify issues, prioritize them, identify the resources and cooperators, and develop a course of further needed actions. Interagency coordination and other partnerships will help to determine where, and which priorities need cooperative and collaborative solutions to support affected forest land owners.

Assessment Report Issues

Issue	Applicable Counties	Potential Partners	Potential Solutions
Public Safety and People			
Homes exist and continue to be built or rebuilt in areas inherently at risk from landslides. Landowners may not be fully aware of the risks and so cannot evacuate or take other precautions before or during storm events.	Clatsop, Columbia & Tillamook	DOGAMI, Counties, ODF, ODOT, DSL	Propose acquisition of LIDAR imagery and development of landslide maps. Complete mapping effort and communicate to counties and public.

Issue	Applicable Counties	Potential Partners	Potential Solutions
Lack of public awareness that high-intensity rainfall and flooding was impending	Clatsop & Columbia	NWS, County EOC, DOGAMI	Coordinate with the NWS related to timing of warnings and notification to other agencies. Explore use of the Emergency Broadcast System for future events
Lack of awareness about Oregon's debris flow warning system and its limitations	Clatsop, Columbia & Tillamook	ODF, DOGAMI, NWS,	Complete transfer of ODF system to NWS .
Potential for increased hazardous trees in and around people. As more storms arrive this winter, trees already weakened by the December storm will create a hazard.	Clatsop, Columbia & Tillamook	ODF, PNW-ISA, OSU Extension	Build awareness of "non-obvious" tree hazards among First Responders, city staff, citizens, etc. Encourage formation of city tree boards to disseminate tree and storm-related information.
Concern about the stability of leave trees/buffers in scenic corridors adjacent to highways. This issue needs to be reviewed not only in the context of this storm but for future wind events as well.	Clatsop, Columbia & Tillamook	ODF, Legislature, Counties, ODOT	Review and potentially re-evaluate scenic buffer laws / rules in Forest Practices Act.
Utility transmission lines-tree issues in rural forested areas	Clatsop, Columbia & Tillamook	Counties, Electrical Utilities, Public Utility Commission, Landowners	Coordination between utility companies, landowners and the counties.
Fine sediment deposits, such as those in the Westport area, may increase potential for future flooding to homes and infrastructure.	Clatsop & Columbia	DSL, Army Corp of Engineers, ODOT, Railroad, OWEB, ODF&W	Technical assessment and coordinated effort to address.
Some municipal watersheds and domestic water systems have been impacted by wind damage, debris and sedimentation thus increasing potential for water quality issues	Clatsop, Columbia & Tillamook	Communities, ODF, County Public Works, Water Resources, Department of Health	Assess location of existing intakes. Inspect and repair all water intakes in the areas impacted by the storm
Safety of contractors operating in wind damaged forests	Clatsop, Columbia & Tillamook	AOL, OSHA	Training
Landowners may need additional assistance in selecting qualified and reputable forestry and tree care service providers.	Clatsop, Columbia & Tillamook	ODF, Landowners, AOL, Consulting Foresters, OSU Extension	Educational effort. Provide additional training and guidance to cities, local tree care professionals, and individual homeowners. Use Private Forest, OSWA and OSU websites to direct folks to qualified professionals.

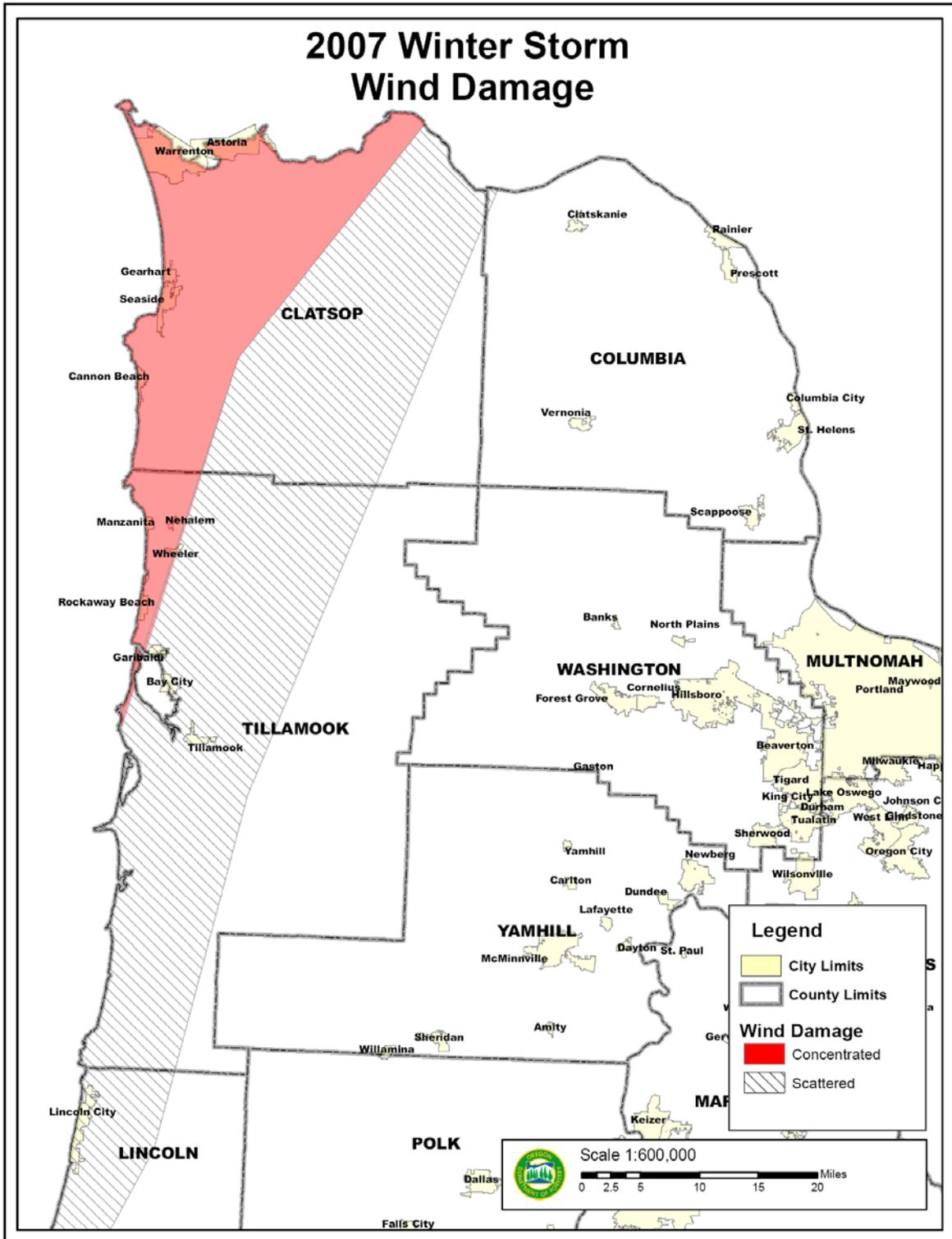
Issue	Applicable Counties	Potential Partners	Potential Solutions
Access and damage to public recreation facilities may have safety or economic effects	Clatsop, Columbia & Tillamook	Counties, OR State Parks, National Parks, County Parks, ODF, Chamber of Commerce, Visitors Association, State Tourism	Inventory, Repair, and Communicate.
Lack of Certified Arborists on the coast to meet needs.	Clatsop, Columbia & Tillamook	ODF, PNW-ISA, OSU Extension	Conduct arborist training seminars and tree care workshops on the coast to add capacity and qualifications; target local tree care companies, city parks staff, and perhaps area loggers. Develop residential emphasis forest program.
Potential for burning large quantities of non-merchantable material will result in air quality and smoke management issues.	Clatsop & Tillamook	ODF, OFIC, Econ Dev, DEQ	Engage Oregon Forest Biomass work group to further develop solutions
Recovery			
The complex permitting process involving multiple jurisdictions on removal of debris in streams can delay or prevent action	Columbia, Clatsop & Tillamook	ODF, ODF&W, DSL	Coordination at State Level Policy Group, Oregon Plan Core Team, as well as at the local level.
Lack of accepted methods for evaluating log and debris jams in streams	Columbia, Clatsop & Tillamook	ODF, OSU, ODF&W, DSL	
Coordinated plans are needed to address storm debris removal that is identified as a potential hazard in drainages with multiple landowners.	Columbia, Clatsop & Tillamook	ODF, OFIC, DSL, OWEB, DSODOT, Counties, Landowners	
Lack of capacity for dealing with non-sawlog woody debris generated by storms	Columbia, Clatsop & Tillamook	Counties, ODF, Landowners	Research cogeneration and cooperative debris disposal opportunities
The effectiveness of current Forest Practices Rules in the wake of this significant storm event	Columbia, Clatsop & Tillamook	ODF, Counties, OSU, Watershed Research Coop	Continue further evaluation of FPA Rules related to effectiveness in significant storm events. See Trask Watershed Study and monitoring efforts.
Small-scale and high-numbers of Family Forestlands make it difficult to quantify damage to those forests and salvage logs	Clatsop	ODF, OSU Extension, OSWA Counties	Coordinate mailings to Family Forestland owners to gather and share information.

Issue	Applicable Counties	Potential Partners	Potential Solutions
Small communities do not have the resources to address community tree issues	Columbia, Clatsop & Tillamook	ODF, League of Oregon Cities	Work with city staff and citizen tree boards in smaller communities to develop individual storm preparedness plans for dealing with downed trees and debris in future storms.
Limited resources and field staff (across all entities) to address workload associated with damage repair and salvage operations could slow recovery efforts. Shortage of technical experts to advise small landowners in dealing with storm damaged timber and Geotechnical issues.	Clatsop & Columbia	ODF, OSU Extension, Counties, Landowners, Legislature, other natural resource agencies	
Natural Resource Issues			
There may be interest to remove wood from streams to address current or future safety needs, potentially to the detriment of aquatic habitat	Columbia & Clatsop	ODF, ODF&W, DSL, OWEB, Army Corps of Engineers	Address true emergencies (risk to people and infrastructure), and coordinate efforts to maintain / establish large woody debris in streams
Impacts on Threatened and Endangered species and potential need to resurvey to provide protection	Clatsop & Tillamook	ODF, ODF&W , USF&W	Focused re-inventory effort and appropriate planning. Prioritize salvage schedule considering bald eagle, heron critical use periods
High fills mostly due to legacy RR grades may not be safe from dam-break floods	Columbia, Clatsop & Tillamook	ODF, DOGAMI, OWEB, ODF&W, Landowners	Increased guidance and training to address more effectively; explore cost-share funding options for maintenance and repairs. (NOTE: the FPA has no authority to require replacement of RR grade unless there is failure of reconstruction).
Some dams in coast range haven't been designed for debris and sediment passage which can damage fish ladders and spillways	Columbia, Clatsop & Tillamook	DSL, Water Resources, ODF&W, Landowners	Conduct an assessment of the dams to determine the extent of the issue.
Some road drainage systems are not adequate to pass large woody debris at stream crossings	Columbia, Clatsop & Tillamook	ODF, ODOT, Counties, OSU, OWEB	Identify those structures most prone to passage problems and prioritize those for cleaning immediately following storm events. Further development of technical solutions, testing, and implementation.

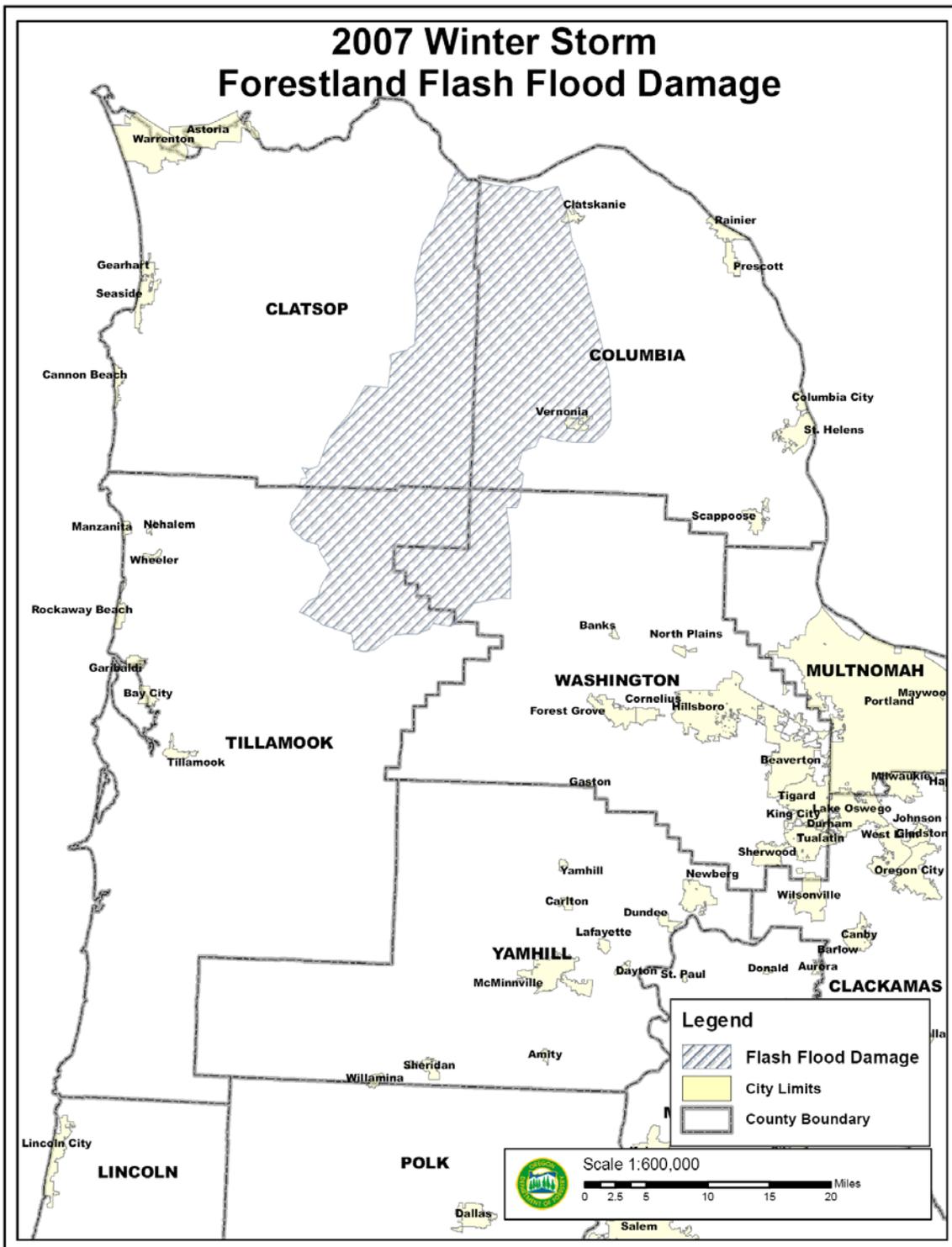
Issue	Applicable Counties	Potential Partners	Potential Solutions
Undersized drainage structures still exist on forest roads	Columbia, Clatsop & Tillamook	ODF, Landowners, OWEB, Watershed Councils, Oregon Plan	Explore additional training, guidance and rule modifications. Alternatively promote voluntary methods identified in Oregon Plan, obtain cost-share funding from OWEB to facilitate watershed level assessment and improvements.
Significant community tree damage due to inadequate tree care, which may contribute to decrease in environmental services derived from community trees (e.g. wind buffering, wildlife habitat, erosion control, storm water mitigation, etc)	Clatsop	ODF, PNW-ISA, OSU Extension	Provide additional training and guidance to cities, local tree care professionals, area Master Gardeners, and individual homeowners
If salvage does not occur, forest health and fire hazard issues may develop because of the large amount of damaged timber.	Clatsop & Tillamook	ODF, Landowners, Econ Dev, Counties, RFD, CWPP	Identify extent of insect and disease concerns and fire hazards. Coordinate with landowners and fire organizations to identify solutions
Economics			
Species and Quantity of sawlog material creates a glut in an already depressed market.	Clatsop	OFIC, OED, mills	
Damage to rail access to Tillamook creates economic hardship	Tillamook	Counties, Port of Tillamook, Mills, FEMA, Federal Govt.	Evaluation of options by Governor's Task Force
Short-term revenues to counties from State Forests may be affected given higher logging costs associated with salvage (i.e. unplanned road building) and lower value material	Clatsop & Tillamook	ODF, Counties,	Communicate this information to Counties
Growth loss on young stands that were just achieving high volume production equates to loss on investment and may lead to revisions in harvest scheduling plans and objectives. Concern that in some instances small landowners may address this loss by developing land rather than reforestation	Clatsop & Tillamook	ODF, OSU Extension, Dept of Revenue, Dept of Energy, County Planning	Landowners may be able to claim timber value lost to blow down on state and federal income taxes. Emphasize the State 50% Reforestation Tax Credit, as long as net salvage revenue is less than reforestation costs. Possible use of Forest Resource Trust 100 % funding of reforestation.

Issue	Applicable Counties	Potential Partners	Potential Solutions
Salvage logging triggers reforestation requirements that may be difficult to meet due to seedling availability and economics	Clatsop	ODF, Nursery Industry	Cost Share available for reforestation (50% Reforestation Tax Credit, Forest Resource Trust). Relaxing reforestation timelines through alternate plans if seedling shortage exists. Coordination with Nursery Industry.
Stream crossing structure repair may delay access to active and planned logging units because of in-stream work periods	Clatsop & Columbia	ODF, ODF&W, DSL, Landowners	Pre-plan and coordinate efforts to effectively use narrow in-stream time periods
Some road damage will require road closure and alternative access, sometimes across other ownerships	Clatsop, Columbia & Tillamook	ODF, Landowners, Counties	Coordination of multi-ownership road systems and access
Shortage of trucking and logging resources	Clatsop & Tillamook	AOL, Econ Dev	Coordinate with AOL to identify closest resources from outside the area that are able to assist.
Low markets and high harvest costs create disincentive to remove downed material	Clatsop & Tillamook	Econ Dev, Dept of Energy, ODF	Take advantage of existing tax credits for biomass utilization. Create markets and/or subsidize.
Certain salvageable species lose value quickly if salvage is delayed (alder, hemlock)	Clatsop & Tillamook	ODF, OSU Ext, Landowners	Educational effort related to prioritizing efforts to get these species out first
Small quantities of logs owned by individual landowners and cities are difficult to remove and market	Clatsop & Tillamook	ODF, OSU Extension, OSWA, Cities, Counties, OFIC	Promote cooperatives and the use of sorting yards. Multiple landowner notifications, an alternate procedure to facilitate the cleanup and salvaging of individual damaged trees or hazard.
Local mills may not be tooled to handle large diameter high value trees and distance to market may be a disincentive to salvage	Clatsop & Tillamook	Portland and Western Railroad, ODOT	Promote cooperatives to address with potential use of sorting yards, etc
Quantity of non-sawlog material may exceed current capacity and market.	Clatsop	ODF, Landowners, Econ Dev, Counties, Dept of Energy	Use of sorting yards for longer term storage of logs, sorting to capture value, etc
Lack of community tree inventories or canopy information for systematic, measurable, tree resource evaluation and comparison after storm event.	Clatsop, Columbia & Tillamook	ODF, Cities, Counties, OSU Extension	Provide training on how to conduct tree inventories and interpret aerial canopy photos for city staff, area Master Gardeners, and interested citizens

Map Section



2007 Winter Storm Forestland Flash Flood Damage



Appendices

Appendix 1 – Individual Branch Assessment Findings

This appendix summarizes the findings and site surveys of the individual Incident Management Team branches.

Clatsop County

Municipalities

Clatsop County Public Works

Ownership Type: County

Oral Interview: Mike Agalzoff 12/11/07

Minimal damage to county road infrastructure. Stockpiling woody material at old sort yard off the Lewis & Clark River. This is on Weyerhaeuser ownership. This stockpile site is a special arrangement between the two entities. Clatsop county also has a stockpile site near the junction of Koppish Road and Highway 30. This is for forest debris from county road clearing but is also available to the general public for disposal of woody debris due to storm damage.

County roads had two small slides that blocked single lanes of traffic. One was on the Lower Nehalem River road and the second was on Northrup Creek road. Both of these events are passable and will be cleaned up by December 21, 2007.

Kloutchy Creek bridge, mile post two on Highway 26, received significant damage due to flooding in the Necanicum River. The bridge abutments were damaged and the bridge is currently closed.

State Ownership

Clatsop State Forest

Oregon Department of Forestry

Ownership: State

Oral interviews with Astoria District staff

Across the Clatsop state forest, windthrow estimates include a total of approximately 3,100 acres. Of this, 1,000 acres was deemed “scattered” and 2,100 acres “stand-replacement.” Volume estimates range from 25 - 30 million BF. It is believed that approximately 80% of the blowdown is salvageable.

There are over 100 storm damage incidences related to debris flows and roads documented throughout the Clatsop State Forest. The majority of this damage occurred on the east half of the county due to the excessively high rain amounts recorded in the two-day storm event. These

incidences include but are not limited to debris flows, plugged culverts, road prism failures, etc. Repair estimates could easily exceed \$200,000. Assessments by state lands personnel are ongoing at the time of this writing.

Oregon State Parks

Fort Stevens State Park

Ownership: State

Phone interview: Teri Wing, Park Manager 12/11/07

More than 200 trees blew down or were severely damaged. The majority of the trees are of low merchantability (shore pine and wolfy Sitka spruce). The trees blocked numerous roads and trails in the park. State parks forester, Amy Gillette, is on site working to develop plan for down and damaged trees.

Twenty foot yurt destroyed. Underground utilities uprooted by windthrow. Blockage of day use trails.

Park manager interested in information regarding debris disposal. Also said the park was still at work on Veteran's day storm, which had greater effect.

Oregon State Parks (south of Fort Stevens State park)

Ownership: State

Interview: Gary McDaniel 12/11/07

Scattered individual windthrow and small pockets of varying age class timber throughout state parks ownership in campgrounds and trails. Estimated 25% below 12" DBH and 75% above 12" DBH. Some old growth Sitka spruce trees were in excess of 6'-8' DBH. No salvage planned in coastal parks due to poor access. Trees will be left as nurse logs. Debris blocking foot trails will be cleared. Ten to fifteen acres of scattered blowdown will be salvaged along Saddle Mountain Park road.

Minimal road damage. Biggest concern is on the Saddle Mtn. Park road. There is a sink hole in the asphalt road at the 6-mile marker on Saddle Mtn. road. A 12" culvert under 8-10 feet of fill failed. Water has a history of flowing under the culvert. Sinkhole is 8'x10' 10' under the road with passage of water under culvert. The total prism is approx. 32'. Asphalt surface is intact. There is currently no surface flow in the channel. Tillamook Head trail has a couple of small slides...very minor.

Minimal structural damage to facilities. Saddle Mtn Trail has extensive damage and will not be usable by the public for an undetermined length of time.

Oregon National Guard Base

Camp Rilea

Ownership: State

Oral Interview: Capt. Sung Yoon Ji, Range Operations Officer 12/11/07

Base has approximately 400 acres of windthrow damage to shore pine (97%) and Sitka spruce (3%). An attempt will be made to salvage 100% of the blowdown into pulp.

Oregon Department of Transportation

Clatsop/Tillamook District

Oral Interview: Dan Lepschat, ODOT Forester

State highway road systems in Oregon Department of Transportation (ODOT) Region 2 (specifically **Tillamook** and **Clatsop** counties) experienced moderate to extensive damage due to the storm event. The majority of the damage resides within Clatsop county and consists of windthrown trees. ODOT ownership (95%) is confined predominantly to right-of-way ownership which is where the main public safety concerns arose. The average right-of-way extends 15-20 feet off of the edge of the pavement.

Loss estimates on timber within ODOT ownership is approximately 200 MBF with ~60% salvageable.

ODOT responded quickly to the incident, assessing roads and clearing them to alleviate delays in commerce. The main focus since the event has been to clean up hazard trees along the right-of-way and maintain public safety.

By statute, trees that fall within ODOT right-of-way and are not removed within 30 days are the property of ODOT. ODOT will contract with local contractors for debris removal once the 30-day limitation has been met.

A debris dam from rising flood waters on the Necanicum River damaged Black Bridge at milepost 5 on Highway 26. Damage estimates are forthcoming.

Federal Ownership

National Park Service

Lewis & Clark National Historic Monument

Fort Clatsop Unit

Ownership: Federal

Oral Interview: Ron Tyson, Unit Manager 12/11/07

The park itself is a total of 1,500 acres. An estimated 650 acres of windthrow is based on ground reconnaissance. Most of the windthrow is sawlog material and estimated at 75% salvageable. Estimate of 50mbf/acre.

Roads are gentle, upland and believed to be largely intact. Many roads are blocked by trees.

Industrial Ownership

Contacts were made with 5 different industrial forestland owners with lands in Clatsop County. Information was obtained from landowner representatives between 12/11/07 and 12/14/07. Additional information was still being obtained from some of the landowners.

Across Clatsop County, windthrow estimates include a total of approximately 10,500 acres on the industrial forest lands. Much of this was deemed “stand-replacement” meaning nearly all, or most, of the trees were blown down. The remainder of the acreage received “scattered” blowdown. Volume estimates could be as high as 300 million BF or more. It is believed that approximately 75 - 80% of the blowdown is salvageable. Most of the volume is western hemlock, with the remainder being Douglas-fir, Sitka spruce and red alder.

This will dramatically affect the harvest schedules and plans for several of the landowners for the foreseeable future.

Road damage consisted mostly of blocked, or partially blocked roads, and a few wash-outs. No estimate of the cost of repairs.

Westport Special Assessment - Slope Stability on Forest Lands of Plympton Creek & West Creek drainage basins above Westport OR.

LOCATION: T7N, R6W, Sections 2, 3, & 12; T8N, R6W, Section 36.

Following the intense storm of December 2, 2007, several observations were made of the watershed area above the town of Westport, OR, specifically:

12/7/07 – Aerial Reconnaissance by ODF

12/10/07 – Aerial Reconnaissance by ODF

12/12/07 – Aerial Reconnaissance by ODF

12/13/07 – ground observations – walking down West Creek drainage by ODF

The observations of 12/7 and 12/10 were made by Astoria District personnel in conjunction with general post-storm information gathering. The observations by Clements and Berry on December 12th were made to specifically determine if there was an imminent danger to the town of Westport from flooding and/or debris torrent. On December 13, Jay Morey and John Tillotson walked the creek following cleanout of a blockage of a 72” diameter culvert on West Creek on a state forest road.

Summary Statement:

None of the observers saw impoundment, or “backing-up” of water in the drainage in question. The aerial observers noted a pile of woody debris below a recent slope failure, observers on foot saw fresh stream bed load, and a new stream bed profile, associated with minor bank sloughs in the areas through which they hiked. No one saw anything that appeared to be backing up the creek.

On Thursday, December 13, a Geotechnical Specialist with the Oregon Department of Forestry reviewed the available information, and the largest of the slope failures, in the Plympton Creek drainage, and has submitted a separate interpretive report.

Detailed Observations :

On December 12, Clements & Berry were dispatched to respond to concerns for possible flooding and/or debris flow. The observation platform was a MD 500 helicopter operated by Terra Helicopters of McMinnville, OR. Mr. Berry works locally and was familiar with the area in question.

Areas of mass soil movement (“slides”) were mapped by hand to a printed aerial photograph of the area, and digital images of the various sites were taken with a Canon brand handheld digital camera with 4.0 mega pixel resolution.

Following the flight, a sketch map was created from the aerial image, depicting the relative locations of the sites in question.

Plympton Creek Special Assessment

Reconnaissance of Plympton Creek Drainage on December 13, 2007.

Due to persistent fog cover, observation of the debris jam in the SW 1/16 of the SW ¼ of Section 2 of Township 7 North, Range 6 West was not possible. However, audible stream flow indicated that significant damming of Plympton Creek was not occurring at approximately 2:30 p.m.

In order to ascertain the abundance of fine sediment that had been transported downstream from the debris jam, reconnaissance of Plympton Creek in the vicinity of Westport was done. Additionally, a rough estimate of the discharge of Plympton Creek at the Ferry Bridge in Westport was made.

The relative abundance of fine sediment in the deposition area within Westport indicates significant removal of this size fraction of sediment from the debris jam. Given that significant fine sediment is required to facilitate damming, it is likely that insufficient fine sediment remains in the debris jam to form the laterally and vertically continuous wall of low hydraulic conductivity material required for dam formation.

Approximate discharge of Plympton Creek at approximately 3:00 p.m. was 100 cubic feet per second. The stream was running clear.

The most compelling evidence that no dam is present within the debris jam is in the form of an aerial photograph taken on December 12, 2007, which clearly shows continuity of stream flow through the jam.

The preponderance of available evidence at this time indicates that risk from a dam-burst type failure from the debris jam on Plympton Creek located in SW 1/16 of the SW ¼ of Section 2 of Township 7 North, Range 6 West is low. It should be understood that because several headwall areas within the Plympton Creek basin upstream of the debris jam did not fail in the recent high intensity rainfall event. As such, they remain possible debris slide initiation sites. Should a future high intensity rainfall event occur in this basin, it is possible that a debris slide could occur. Due to the increased roughness coefficient and friction factor that the debris jam presents relative to the same channel without the debris jam, a somewhat higher likelihood of a sediment dam formation from debris slides that originate upstream of the existing debris jam exists.

Special Assessment of Westport Railroad Trestle Crossing over West Creek

The referenced railroad crossing was evaluated for adequacy in the context of the Oregon Forest Practices Act (FPA). Although not a crossing that is regulated by the FPA the evaluation provides some objective measure of the suitability of the crossing.

In accordance with the FPA, a minimally suitable bridge crossing with a width of 72 ft. would need to pass a minimum of 368 cubic feet per second (cfs) while maintaining a freeboard of 3 ft. Based on an FPA Guidance estimate of 150 cfs/square mile of contributing for the location of Westport the 50 year flood event was estimated at 368 cfs. In order for this crossing to be considered in compliance with the Oregon FPA, the contributing area above Westport would need to be no greater than approximately 2.5 square miles. Because the contributing area above Westport is greater than 2.5 square miles, the bridge crossing would be considered inadequate were it part of a forest operation.

Columbia County

Storm damages on forestland in Columbia County are primarily related to flood damage to forest road systems. Heavy rainfall in a short time period caused heavy runoff which plugged culverts and exceeded road drainage design capabilities. The county did not receive widespread damaging winds like the coastal strip. Minimal timber loss occurred due to wind. Most timber damage was attributed to flooding, soil saturation combined with moderate wind, and timber present on, or picked up by landslides.

The heaviest damages exist in the western half of Columbia County. Three general areas that were hardest hit by the storm include the Nehalem River valley (Vernonia), the Mist/Birkenfeld area, and Highway 30 west and south of Clatskanie.

The Nehalem River Valley experienced heavy flooding and had associated road failures. In-river/stream debris deposits consisting of logs/trees, silt, and human related belongings and refuse are located throughout the system. All deposits that we have viewed so far have been free flowing and do not pose an immediate eminent public safety concern.

The Mist/Birkenfeld areas also experienced heavy flooding along with some debris flows, slides and road failures. Specific information and assessment on the Fishhawk Lake area is detailed later in this report.

The Highway 30 area and specifically the streams south of the highway west of Clatskanie experienced debris flows that seriously damaged private property, homes, highways, railways and forest road systems. Debris deposits exist in most stream channels. Again, the deposits that were found (by air and ground reconnaissance) are free flowing and do not pose an immediate eminent public safety concern. That said, future rain events could certainly cause more slope failures and debris movement in the system. Specific information and assessment on the Eilertsen Creek incident is detailed later in this report.

Geotechs and Stewardship Foresters assessed many sites and documented their findings on assessment forms. Many of the sites assessed need further attention by the landowner and a site visit from the local Stewardship Forester. Copies of assessment forms have been given to the Columbia City Oregon Department of Forestry (ODF) office.

Public Lands

Oregon Department of Forestry Lands:

Contact Person: Erik Marcy 503-357-2191
Roads: Minor road failures, ongoing assessment
Blow down: No info, ongoing assessment

Oregon Department of Fish and Wildlife:

Contact Person: (no contact yet)
Roads:
Blow down:
Structures:

Columbia County Parks:

Contact Person: (no contact yet)
Roads:
Blow down:
Structures:

Industrial Forestlands

Five large industrial forestland owners with holdings in Columbia County were contacted. Landowners provided information on their respective assessment of their properties with some additional information gathered by ODF Stewardship Foresters and Geotechs. As stated earlier, blowdown was not as severe in Columbia County as was found in the neighboring counties to the west. The blowdown on industrial forestlands was described as “minimal” and “scattered.” No volume estimates are available at this time.

Most of the storm related damage on the industrial forestlands was from high water and flooding. Damage to bridge abutments occurred in several locations, (some has already been repaired), many plugged culverts caused associated road damage, and ditches were cut through some roads to alleviate ponding behind. Multiple road “slumps,” road failure/washouts, and minor debris slides blocking roads were reported from several landowners. Many repairs have already been initiated or will start soon.

Small Woodland Owners:

Limited information on damage to small woodland owners is available. Many small woodland owners that suffered damage have been dealing with flood related damage.

One historic slide (movement 25 years ago, also in 1996) was reported. The slide moved again with this storm. The slide (100’ X 300’ long) originated from a historic road grade.

The Columbia County Branch spent a large amount of time dealing with emergency assessments above homes and communities, working with the media and other agency officials.

Eilertsen Creek Road Fill Failure Special Assessment

The Eilertsen Creek road fill failure is the “mudslide” that made TV news headlines and the cover of major newspapers. It is located at and above Woodson, a locale between Clatskanie and Westport. Apparently, the canyon at the site was formerly spanned by a high railroad trestle constructed in the early 1900’s (<http://www.vannatabros.com/histlog4.html>), which was subsequently abandoned and filled for use as a road. The first signs of a problem were identified by the land owner of the road on Thursday December 6, after the weekend storm of December 2 and 3. The landowner notified downslope residents and the local ODF forester, who in turn notified the ODF area geotechnical specialist.

The road fill site was investigated by geotechnical specialists (professional engineering geologists) before, during, and after the event occurred. It is believed that a chain of events led to the dramatic failure of the road fill. Two separate landslides occurred in weak geologic materials and covered by young forest stands (2- to 15-year-old trees) within adjacent headwalls. The mobilized material traveled several hundred feet down the two stream channels draining the headwalls before depositing behind the trestle-road fill, likely plugging the drainage structure. Without drainage, the fill functioned as an earthen dam. As heavy rains fell, stream levels increased, and the water that accumulated behind the fill quickly reached a depth of nearly forty feet.

On Tuesday, December 11 the landowner of the road tried to lower the water level by excavating a relief channel. The geotechnical specialist returned to the site and determined that a catastrophic failure was highly likely. As the situation deteriorated, eminent failure became evident. ODOT and the Sheriff were informed, U.S. Highway 30 was closed and residents evacuated. The fill at the site failed shortly thereafter at 11:50 a.m. and moved down the channel as a large, very fluid debris flow.

This was an unusual, compound failure. The small debris slides above the trestle-road fill would normally not have resulted in such large effects to the populated areas and property below. However, in this case the initial slides were contained at the old railroad fill and the drainage structure was blocked. The fill, which had become a dam, was not intended to function as an earthen dam, and the depth of the accumulated water prevented the ability to open the obstructed drainage structure. At this point it appears that water was seeping through the fill, which weakened the fill and led to a slope failure on the face of the “dam,” extending into the top of the fill. The massive quantity of water and debris stored behind the saturated fill material, once mobilized, turned into a large debris flow. As it progressed downstream it eroded streambanks and accumulated more trees and woody debris. Fill failures of this magnitude are rare because at least two separate events (the slides plugging the drainage structure and the intense rainfall) occurred to create the situation. Predicting such circumstances would have been very difficult. Deep fills can be vulnerable, and should be a priority for quick inspection after landslide producing storms. The fact that the landowner notified ODF, and technical expertise was dispatched to the site was key to minimizing the danger to residents and the public prior to the failure.

ODF Forest and Debris Recovery Team

Special Assessment of Fishhawk Lake

12-16-07 (Fishhawk Lake is in Clatsop County, but the survey was conducted by the Columbia County branch.

Overview

At the governor’s request, the Oregon Department of Forestry formed a Forest and Debris Recovery Team to assess storm impacts to Columbia, Clatsop, and Tillamook Counties. As part of the region, the Fishhawk Lake area was assessed by the ODF Team. While the area experienced flooding and landslides and significant related impacts, no significant immediate threats were identified. Flood and landslide hazards are inherent to the area though and similar impacts may be expected during future storms of this magnitude.

Reconnaissance Flights

The ODF Team has flown over Fishhawk Lake at least twice in the past week. Those flights did not identify very many sites for field review. Those flights identified a lot more sites to the north.

Field Investigations

Fishhawk Lake has been investigated over several days of field work. Field work was guided by:

- flight information
- information provided by citizens
- information provided by the local Mist and Birkenfeld Fire Department
- information provided by ODF personnel
- ODF Team road surveys

Observations and Recommendations

Fishhawk Creek above the Lake

Landowners along Fishhawk Creek, Wes Lubbes and Steve Wilson, notified the ODF Team of several log jams along the creek. The most significant log jam is located just upstream from the

Lubbes residence and may have diverted stream flow towards a neighbor's barn during the flood. No significant erosion was observed. The jam spans the channel and is anchored by a dozen alders with rootwads that apparently fell in from the bank. The deposit is about three to five feet high above the water, but water is flowing through. The logjam might cause local erosion and flooding issues in the future and may need to be removed. The other log jams do not appear to span the channel and water is flowing through and around them as well.

Home on Lakeview Drive

A home appears to have been impacted by a debris flow that crossed the residential road at the northeast end of the lake. The debris flow originated in a headwall with mature timber, flowed down a draw, across the road and into the yard of the home. Mud and debris covered the road and yard and likely came up against the front of the house. The site has been cleaned up and no structural damage was observed. There is a debris fan at the mouth of the draw indicating that the draw has experienced debris flows before. Debris flow impacts to the home should be expected in the future.

Boxler Creek

Boxler Creek flows into the northeast corner of the lake. No significant impacts were identified from the air or on the ground. The stream crossing on the residential road along the lake did not appear to be impacted by the storm.

Northern Unnamed Stream

A significant unnamed stream flows into Fishhawk Lake from the north. The stream flooded and carried a lot of sediment downstream plugging a culvert for the residential road and impacting several homes. Mud and debris covered the road and yards and came up against three of the homes. The site has been cleaned up and no structural damage to homes was observed. A portion of the roadfill was washed out, but the road is passable. The channel has been cleaned out and reestablished above and below the road. A slide occurred upstream on a side-slope of the channel and along the edge of a 10-year-old reprod unit. The deposit is about 12 feet deep and water is flowing over it. Mostly sediment and debris are behind the deposit. No significant amount of water is impounded. There are two five-foot-high channel-spanning log jams in between the slide and the road. Water is flowing through these jams and no significant amount of water is impounded. Due to the topography and geology, flooding, landslides, and a lot of sediment can be expected in the future. A more comprehensive mitigation plan for the road and homes should be considered.

Southern Unnamed Stream

A significant unnamed stream flows into Fishhawk Lake from the northwest corner of the lake. The stream flooded and carried a lot of sediment downstream blowing out the crossing for the residential road and impacting several homes. Mud and debris covered the yards and came up against at least two of the homes. The site has been cleaned up and the road fill has been replaced along with the culvert. The channel has been cleaned out and reestablished above and below the road. A slide occurred several hundred feet upstream on a side-slope of the channel in mature timber. The deposit is 10 to 15 feet deep and the stream is down-cutting through it. Mostly sediment and debris are behind the deposit. There is some minimal ponding of water a couple feet deep behind the deposit. There are two less significant slides upstream. One slide occurred

about 300 feet upstream, originating in a draw along the edge of a recent harvest unit. The deposit appeared to be 5 to 10 feet deep and water was flowing over and around it. The other slide was similar and located another 600 feet upstream. Due to the topography and geology, flooding, landslides, and a lot of sediment can be expected in the future. A more comprehensive mitigation plan for the road and homes should be considered.

Fishhawk Creek below the Lake (in Clatsop County but surveyed by the Columbia branch)

There is a debris jam spanning the channel of Fishhawk Creek several hundred feet below the lake. It appears to be comprised of a lot of woody debris, trash, and floating material. It appears to be two to three feet high. It is not expected to remain in place for long. There appears to be minimal risk downstream.

Basin: Olsen Creek

Lat/Long: N46 06 9.2 W123 21 21.68

Private Industrial

Site Visit

Stream crossing (culvert plugged). Potential was there for a small scale event (road failure) but a relief ditch was dug by landowner and the water was effectively drained.

Basin: Olsen Creek

Legal: T7N R5W S7 SENE

Private Industrial

Site Visit

Approx. 500' wide debris flow. Football size to sandy silt, large wood delivered in flow. Indications of previous debris flow event upstream from fill. Date unknown.

40' section of road obliterated. It is likely that material deposited on the up-channel side of fill effectively blocking the culvert. This in turn overtopped the road, eroding the fill, exposing an old fill consisting of logs. Now flowing over partial roadway. There are bank slides both upstream and downstream of the incident. With further movement, additional material could be delivered to Olsen Creek.

Basin: Olsen Creek

Legal: T7N R5W S7 SWNE

Private Industrial

Site Visit

Debris flow (size 75'x75'x8'). Potential reactivation of a deep-seated slope failure. Current area of movement on steep slope above stream.

Basin: Olsen Creek

Lat/Long: N46 6 5.3 W123 21 8.9

Private Industrial

Site Visit

Large, typical coast range log jam. Size 150'x50'x25'. There is an additional 300 feet of sediment behind the jam.

Basin: South Olsen Creek

Lat/Long: N46 5 46.3 W123 20 28.9

Private Industrial

Debris flow with at least two sources contributing. Unknown distance above. Potential is there for more movement.

Basin: South Olsen Creek

Lat/Long: N46 5 30.9 W123 20 8.9

Private Industrial

Site Visit

Similar to 2003 event. There was potential but a relief ditch was dug and water was drained.

Basin: South Olsen Creek

Legal: T7N R5W S8 SENW

Private Industrial

Site Visit

Debris flow...Size 100'x50'x2'. Mostly soil with minimal woody material and brush. 95% soil. This small slide traveled approximately 200' and deposited on a bench above South Olsen Creek.

Basin: Eilertsen Creek

Legal: T7N R5W S17 SENE

Private Industrial

Site Visit

Material from debris flow/torrent backed up behind a RR grade. At this crossing, the fill had been mostly removed at some prior date. Roughly 10 years...maybe 1996. The "new" culvert is still flowing water, however, inlet is buried by material from slide. The slide originated in a stand of reproduction roughly 15 years old.

Recommendations: Access may not be possible. Bring in equipment to clean inlet of pipe.

Basin: Eilertsen Creek

Legal: T7N R5W S17 NWNE

Private Industrial

Site Visit/Aerial Survey

Deep seated failure involving an abandoned road. It appears, due to the size of trees in the road bed, that this road has not been in use for 20+ years. Dimensions of slide are approx 200'x100'x15'. This slide traveled into a tributary of Eilertsen Creek and we were unable to see its ending point. Further field work would be necessary to determine if this material made it into the main Eilertsen slide. Slide material was composed of approximately 90% soil and 10% forest vegetation.

Basin: Eilertsen Creek

Legal: T7N R5W S17 SWNE

Private Industrial

Site Visit

A 100' section of road was obliterated due to a failure above the road, including the cut bank. Slide with approximate dimensions of 100'x75'x10' moved approximately 100' and deposited on an old RR grade. A small amount of material continued down slope and entered Eilertsen Creek. Slide was made up of roughly 90% soil and 10% woody debris/forest vegetation.

Basin: Eilertsen Creek

Legal: T7N R5W S17 SWNE

Private Industrial

Site Visit

Old railroad "trestle" fill failed on 12/11/07 likely due to ponding of water behind fill. Ponding consisted of 40,000 cubic yards of mud, water and forest debris. Material traveled down Eilertsen Creek through the community of Woodson to Highway 30. Debris Torrent.

Basin: Ross Creek

Lat/Long: N46 6 28.1 W123 21 31.0

Landowner Type: Unknown

Site Visit

Roughly a 15' fill covering a 30" pipe. A small side slope failure immediately above pipe inlet partially blocked drainage. Indicators of water ponding above fill that has since drained. The fill has eroded on the downstream side.

Recommendations: This site will require further review. Can be accomplished with local stewardship forester or geo-tech.

Basin: Ross Creek

Lat/Long: N46 7 7.3 W123 21 14.6

Landowner Type: Unknown

Site Visit

Deep seated side slope failure (100'x65'x12') pushed Ross Creek to west side of drainage. The slide did not block the stream, but moved stream to impact houses below. Landowner took action to re-channel the stream and reduce impact to homes.

Basin: Tandy Creek

Lat/Long: N46 5 5.0 W123 18 10

Landowner Type: Unknown

Site Visit

Numerous in-unit slides within recent clearcut harvest. One extends out of the unit and down canyon into the timber.

Basin: Graham Creek

Lat/Long: N46 4 46.4 W123 17 46

Landowner Type: Unknown

Site Visit

Sidecast failure of approximately 30' in length. Road is narrow but open and passable.

Recommendations: Pass on to landowner for routine road maintenance activities.

Basin: Graham Creek

Lat/Long: N46 4 52.86 W123 16 44.1

Private Industrial

Site Visit

Slump below road...approximately 40'x25'x65' to the toe. Road fill was saturated and liquefied below road. Running surface not impacted but could be in near future. No culvert involved. Seems to be at the head of the drainage.

Basin: Graham Creek

Lat/Long: N46 5 50.04 W123 17 20.94

Private Industrial

Site Visit

Old scarp with some new activity. Very steep, almost a cliff. Very flat below scarp and no more movement anticipated.

Basin: Graham Creek

Lat/Long: N46 5 20.0 W123 16 36.4

Private Industrial

Site Visit

Landslide (450'x20'x4') in steep "V" Channel. The slide made it all the way to Graham Creek. The slide stopped at the creek bottom. There is no log jam or any blockage. There is nothing to

fix or repair. Approximately 2,500 cubic feet of material (90% dirt and 10% forest wood debris). Scoured down to bedrock

Basin: Graham Creek

Lat/Long: N46 5 12.3 W123 17 11.1

Private Industrial

Site Visit

A landslide occurred and took out approximately 100 feet of road. The slide took out material above and below the road. Graham creek is approximately 175' below slide and the material went all the way to the creek. Does not appear to pose a immediate risk to public safety - low-medium potential. Another "V" type channel. Lots of alder in Graham cr. from slide.

Recommendations: Have GeoTech evaluation done. Monitor closely through winter. Repair option would be to re-route the road.

Basin: Graham Creek

Lat/long: N465 8 W123 17 15

Private Industrial

Site Visit

A slide blocked a 24" culvert for a period of time. There are 2 relief culverts about the main 24" culvert. The 24" culvert is open now. Evidence shows there was approximately a 15' pool of water but it is gone now. There is also an approx. 35' fill where the road crosses the stream. This has medium potential and would be difficult to repair. Monitor closely.

Basin: Graham Creek

Lat/Long: N46 5 2.2 W123 17 2.3

Private Industrial

Site Visit

Approximately 100' of stream bed that has collapsed into the stream. It is a "V" channel. There is approx. 35' fill with a 48" pipe at bottom. The pipe is flowing water. The material in stream is jack-strawed alder. Not an immediate threat, but could be at some point. Low potential.

Basin: Graham Creek

Lat/Long: N46 5 10 W123 16 36.8

Private Industrial

Site Visit

Plugged culvert on inlet and the road fill washed out. This is a low priority...a spur road that will need to be fixed at some point, not right away. No geotech evaluation needed. Material is approx 75% dirt and 25% forest debris and woody debris. Approx. 400' above stream was "slip-out" that caused the plugged culvert.

Location: Greasy Spoon Road (*in Clatsop County but surveyed by the Columbia branch*)

Lat/Long: N46 2 22.3 W123 24 32.9

State Forest

Site Visit

Slide entered road, blocking road at just past the 12 mile marker on Greasy Spoon road. There is also large cracks in road. Medium priority. Some timber on road as well.

Repair has been completed.

Location: Greasy Spoon Road (*in Clatsop County but surveyed by the Columbia branch*)

Lat/Long: N46 1 44.7 W123 22 44.8

State Forest

Site Visit

Part of cut bank slid onto road. Road is open and passable. Location is between 14 and 14.5 mile marker on Greasy Spoon Road. Low priority.

Basin: Beaver Creek

Lat/Long: N46 2 17.2 W123 18 23.5

Landowner unknown

Site Visit

Pipe needs some debris removal completed. Partially blocked. Alert landowner for routine maintenance.

Basin: Beaver Creek

Lat/Long: N46 2 14 W123 18 45

Landowner Unknown

Site Visit

Approximately 20+ foot fill washed out and exposed a natural gas line.

Basin: unnamed trib to Nehalem River

Lat/Long: N46 2 8.6 W123 17 2.7

Private Industrial

Site Visit

Apparently old RR grade with old slide deposition backed up behind it. A couple of smaller pipes were installed to drain the water, but the outlets are causing fill erosion. Some small ponding above fill and some water coming out under fill.

Have Geotech visit site for recommendation.

Basin: unnamed trib to Nehalem River

Lat/Long: N46 1 55.5 W123 17 45.1

Private Industrial

Site Visit

Apparently old RR grade. The fill is slumping on the downhill side. Approximately 40' in length.

Local Stewardship forester should look at this for potential fixes.

Basin: unnamed trib to Nehalem River

Lat/Long: N46 1 52.4 W123 17 32.2

Private Industrial

Site Visit

Sink hole in road. Some water flowing in bottom of hole. Potential to erode 15' fill.

Landowner is aware of situation. Make sure they are going to perform road maintenance activity.

Basin: Lindgren Creek

Lat/Long: N46 0 28.3 W123 15 55.5

Landowner Unknown

Site Visit

Two 10-12' diameter piped are partially blocked by woody debris.

Basin: McCoon Creek

Lat/Long: N46 3 55.7 W123 17 51.3

Private Industrial

Site Visit

Small in-unit slide plugged pipe and the overflow started to erode the road surface. The landowner brought in an excavator and unplugged pipe. Will require future monitoring.

Tillamook County

Municipalities

City of Manzanita - contact: City Manager Jerry Taylor 1- 503- 368-5343

Had a fairly heavy amount of blow down, his biggest concern was about leaning trees and if they all would have to be removed.

Have done a significant amount of clean up already.

Bay City - contact: Public Works Director David Pace cell 1-503-457-7050
Damage to city buildings, Public works shop, Fire Hall and others
Blow Down very heavy
Clean up of tree debris continues
Biggest concern was evaluating leaning trees.

City of Nehalem - Contact: City Manager Michael Nitzche 1- 503 368-5627
City proper was unscathed, minor damage to city hall roof.
Area immediately out of town was flooded by the Nehalem River
McDonald, Anderson, and McKinnen roads flooded and lost homes
No concerns this time.

Wheeler - Contact: City Manager Doug Hooper 1-503-368-5767
Rated wind throw damage as moderately heavy
Access to residences open, but further work is needed on cleaning up the full right-of-ways.
Needs assistance opening road to City water tanks, and clean up around tanks.
Concerned about leaning trees.

Rockaway Contact: Public Works Director Shawn Vincent 1-503-355-2982
Rated tree damage as fairly heavy
Concerned with leaning trees, how do we evaluate?
What do people do with down trees?
City has a Natural area, (Nature Conservancy?) 20 acres, need assistance to evaluate the clean up?

Pacific City - Information from Aerial Survey 12/12/07

Sand dunes encroaching on 35 homes from wind blown sand. Damage to homes range from less than one foot of sand blown against homes, to home being buried by several (+6 feet) of sand.

Continue debris and sand cleanup. There was 4 excavators, 2 backhoes, and one front-end loader that was on scene and working to pull sand away from structures. It appeared that approximately 6 homes had been cleared at the time of the December 12 flight.

City of Tillamook- No contact

Garibaldi - Contact: City Manager Kevin Greenwood 1-503-322-3327

City of Garibaldi had fairly heavy damage to personal and commercial real estate property (damage estimates at 1.5 million). Tree wind throw damage was moderate. Public works has kept up with the tree debris clean up and had no tree issues at this time.

Private-Industrial

Contact was made with 4 different industrial landowners in Tillamook county. A fifth landowner could not be reached. Information was gathered from each of the landowners, with

some additional information gathered by ODF staff. Salvage volume estimates across the private industrial landowners are reported at < 5 MMBF. Blowdown occurred over concentrated areas totaling 200 – 300 acres across the landowners, with considerably more acreage of “scattered” blowdown. Most of the salvage work will be taken care of within their respective harvest plans with some addition of the concentrated areas.

Only one landowner sustained “extensive” road damage. All other road damage on the private industrial forestlands appear to be minor blockages of debris and blowdown.

State Ownership

Board of Forestry and Common School Lands in Tillamook County

The BOF lands managed by ODF in the Tillamook District have been under extensive assessment since the storm. Preliminary data recorded from 3 reconnaissance flights and ground-based assessment efforts have located several areas of significant wind damage to the forest resource and multiple areas of significant water damage to drainages, drainage structures, and to the forest roads.

It is estimated that there is approximately 15 MMBF of blow down over approximately 500 acres in 35 specific areas. Of the estimated 15 MMBF of blowdown on the Tillamook District, approximately 10 MMBF of it is in our God’s Valley Block near the Tillamook/Clatsop County line. The largest area of blowdown in God’s Valley is in our Rackheep MMMA, a rough estimate is about 170 acres in size, although the blowdown is not contiguous across the 170 acres. (Due to the amount of blowdown blocking the roads in God’s Valley a full assessment has not been completed, the roads are currently under contract to be opened.) The remaining estimated 5 MMBF is in scattered blocks including Coal Creek, Bay City, Minich Creek, Simmons (above Munson Creek Falls) and the Foley Ridge/Firebreak 3 area. Most of the scattered areas are smaller areas, 5-20 acres in size. In general for the district, the majority of the windthrow is within 10-12 miles of the coast, very little to no blowdown has been found inland of 12 miles.

The areas of the most severe road damage include the Salmonberry River, the upper Cook Creek drainage, the North Fork of the West Fork of the Wilson River, and the North Fork of Wilson River. These areas had up to 15” of snow accumulation in the headwaters and higher elevations, when the storm approached. Preliminary road damage and repair cost estimates are currently at over \$1.3 million.

These estimated damages are recorded on a GIS map, which is maintained at the Tillamook office & the IMT GIS Unit. There are a significant amount of roads that are closed with salvageable saw-logs that are going to be opened as appropriate equipment becomes available and will likely pinpoint more locations and detailed information.

ODF managed BOF and CSL lands within Tillamook County, that are managed by the Forest Grove District received no significant damage related to wind or rain to the forest resources there. An aerial reconnaissance flight was conducted by ODF Staff from the Forest Grove

district on December 13, 2007 and ground reconnaissance efforts have been underway since the storm. There has been no significant amounts of wind throw or blow down reported.

There has been water damage to roads and drainages recorded from the ground-based reconnaissance on the Forest Grove district portion of Tillamook County. The preliminary estimate is approximately \$2 million in damages to the road and drainage infrastructure. These include one complete bridge failure, 6+ major road blowouts, and many other significant impacts mainly focused in the upper Salmonberry River drainage. These locations are recorded on a GIS map, which is maintained at the FG office & the IMT GIS Unit.

In addition to the forest roads the TSF is covered with an extensive recreation trail system, consisting of 16 non-motorized trail miles, and over 260+ OHV trail miles. During December 15, 2007 an organized volunteer trail assessment was conducted in the Diamond Mill and Jordan Creek OHV areas, which identified many minor and moderate trail system impacts. Three areas of the most significant damage were accessed by branch staff on December 16, and were determined not to be a significant hazard. Undoubtedly, the trail system has incurred some scattered blow down and water related damage, from the storm. Continue to assess the system, identify hazards, mitigate the impacts, and sign all areas that may pose a threat to a recreationists safety.

Common School Lands

Much of the ODF managed Common School Lands (CSL) within the management area of the Tillamook District have been reviewed from both the air and the ground. To date there is no significant damage reported from wind throw, blow down, or water damage to roads and drainages. There are scattered areas of wind related damage throughout the surrounding area to trees and roads, and there is likely some minor damage on these lands. Many access roads to these lands are blocked with debris, and so access to fully assess these lands is limited and further assessment will continue to pinpoint areas of significance.

ODF Overview

On all ODF managed lands in Tillamook County the preliminary estimate for road and drainage infrastructure is estimated between \$3 – \$3.5 million in damages. Wind damage has been estimated to be responsible for damage to approximately 15 MMBF.

Oregon State Parks

State Parks Contact: Amy Gillette - Natural Resources Manager 1-503-986-0768

On the 7 state parks in Tillamook County assessed, the majority fared extremely well, with only scattered blow down throughout all of the parks.

Access roads to the parks were mostly open and passable, though many were initially covered with minor debris. Munson Cr. Park had a minor sluff beside the main waterfall that came down into the creek, and the road system seemed to still be under blow down. Nehalem Bay State Park had approx. 3-5 acres of shore pine toppled on the east side of the park, next to the bay.

Cape Lookout State Park had approximately 3 acres of shore pine blown over on the spit, and other minor blowdown. Cape Lookout had 2 slides on the south side of the cape that slid recently, with minor debris deposited to the ocean.

The trail system on all the parks are likely still covered with scattered debris, and are expected to have minor water related damage. This assessment was done by aerial survey by ODF personnel on 12/12/07.

Oregon Department of Fish and Wildlife

ODFW Contact: Keith Braun, Fisheries Biologist , Tillamook 1-503-842-2741

Boat ramps in Tillamook County have been impacted by sediment and drifting material, mostly cleaned up at this time. Information from briefing given by Dave Plawman and Keith Braun at

Tillamook ODF office on 12/12/07

Contact: Joe Watkins 1-503-368-6828 (Nehalem Fish Hatchery)

Trask River Fish Hatchery - Impacted by high water and sediment. Water intake rack and out flow pipe clogged with debris, water intake canal impacted by debris slides. There was damage to the residence roof and chimney. Water quality is essential and repairs to the water intake system are critical and was done immediately. (ODF&W Trask River Fish Hatchery)

Tillamook County Parks and Recreation

Contact: Del Schleichert, Tillamook County Parks and Recreation Superintendent 1-503-322-3477

Tillamook County has five parks. The largest and the one with the heaviest damaged was Barview Jetty County Park with 357 trees blown over, the other parks, Kilchis, Trask, Whalen Island, and Webb Parks each had trees down ranging from couple trees to about nine trees.

Tillamook County Public Works

Contact: Liane Welch, Director 1-503-842-3419

It is estimated to have incurred \$6-8 million in damages to county roads and infrastructure. The largest ticket item being the Foss road county bridge estimated to be 3-5 million to repair. The department has been busy repairing numerous washouts, slides, sunken grades, plugged culverts, restoring guardrails, road cracks, downed power-lines, and shoulder failures. The county has spent a tremendous amount of time addressing hundreds of debris cleanup and removal locations.

The Wilson River downstream of Kansas Creek has a large debris deposit approximately 500' long, 30' wide, and 30' tall. The deposit is in a historic debris depositing location and does not appear to be a down stream threat. There is a new county bridge approximately 0.25 miles down stream, but is approx. 12' above the crest mark from the recent storm.

Port of Tillamook County

Contact: Bob VanBossum 503-842-2413

The Port of Tillamook has sustained major damage to the entire railroad system in the Salmonberry drainage. The railroad tracks are suspended in the air along major portions of the line. In these sections the entire base structure has been completely washed out.

Initial estimates were in the 20-30 million dollar range, although repairs may run into the \$100+ millions.

Over the Trask River at the Port of Tillamook Rail Road trestle, there is a log jam, that spans approximately 200' feet upstream and spans the width of the river. This log jam could pose a potential threat to the crossing if not removed prior to the next heavy rainfall event in the area. Historically, the material, while affected by tidal cycles has broken up and continued downstream not causing any negative impacts.

Tillamook People's Utility District (PUD)

Contact: Barbara Johnson, 503-842-7811

Damages include: Down Power Lines, Broken Poles, Materials, and Man Power.
Estimated expenses: 2 million dollars.

Fiber Optic lines

Contact: Brad Lejeune 503-706-6552

3 Fiber optic companies
WCI cable
VSNL cable
Trans Pacific Express

There are 3 fiber optic lines running along the railroad tracks through the Salmonberry drainage. The lines have been completely severed in at least 3 places. Repairs will require a new line to be run the entire distance.

Estimated damage: 3-5 million dollars.

Appendix 2 – Urban Forestry Assessment

The ODF Urban Forestry work group (Paul Ries, Kristin Ramstad, and Katie Lompa; also assisted by Stu Otto in Tillamook County) assessed the December 2007 storm-related tree damage inside all incorporated cities in Columbia, Clatsop, and Tillamook Counties, and in county-owned park facilities. All four of these individuals hold the credential of Certified Arborist from the International Society of Arboriculture (ISA). To complete this task, staff conducted telephone and email interviews with municipal and county employees (mostly Public Works staff and City Managers), and visited some individual cities and parks where there was a request or need for an on-site assessment.

There are 19 incorporated cities in the three northwestern Oregon counties, ranging in population from 9,970 (Astoria) to 60 (Prescott). These cities have varying levels of staff to deal with land management issues and natural resource concerns. The urban forest of these cities encompasses public rights-of-way, local government owned park land, and private ownerships. Although individual home ownerships experienced significant damage, those trees were beyond the purview of this assessment. This assessment did not include utility right-of-way trees, which were handled by the respective public utility districts and the main investor-owned electric service provider, Pacific Power. Field observations were made in several cities, however, a detailed damage assessment of individual trees was not part of this procedure.

Summary of Storm Damage By County and City

The following summary lists storm damage assessment information self-reported by each city, supplemented by some visits from ODF urban forestry staff members.

Columbia County

Columbia County did not experience the winds that characterized the storm in Clatsop and Tillamook Counties, so there were few storm-related whole tree failures in this county. Assessment of this area consisted of observing flood-related effects on trees, such as debris and silt pile-up on tree roots, undercutting of riverbanks below trees by flood waters, and the significant exposure of tree roots due to eroded soil.

CLATSKANIE – Reported by Dave True, Public Works Dept.

No wind, some localized flooding, no specific storm related tree issues. Old issues include an eroding riverbank in the city park (near waterfront) that has some larger trees on it.

COLUMBIA CITY – Reported by Micah Rogers, PW-water and sewer

No significant tree damage.

PRESCOTT - Reported by Starr Sanders, City recorder and finance director

No significant tree damage.

RAINIER –

Although no one has spoken for Rainier, we suspect that it suffered very little damage from last week's storm, judging by responses by neighboring cities. On Sunday, December 16, an ODF urban forester visited the site, and observed three or four trees uprooted but could not ascertain if the trees were on public property.

SAINT HELENS - Reported by Skip Baker, City Planning Director

The city did have one or two trees fall - one in Godfrey Park and possibly one in McCormick Park. The one in Godfrey may have fallen on an adjacent house. No other issues with public trees that we are aware of at this time.

SCAPPOOSE – Reported by Terry Andrews, PW field supervisor

No significant damage or concerns. Whatever branches have come down were swept up with the street sweeper.

VERNONIA – Reported by Auldie Howard, Interim City Administrator

The city suffered significant flood damage, and has not had time to assess tree damage. An ODF urban forester visited the city on Sunday, December 16, to observe tree damage in Hawkins and Anderson Parks. In Hawkins Park, the river bank under one riverside tree has been undercut by the water, but it is unclear if this is a result of the flood. In Anderson Park, several red-cedar seedlings have been pushed over by flood waters. In two areas, the soil around the base of two Bigleaf maple clumps seems to have been washed away. Significant debris has piled up next to two trees along the river bank.

COLUMBIA COUNTY and STATE PARKS –

Minor damage in selected parks.

Clatsop County

ASTORIA – Reported by City Parks staff Kevin Beck and Dick Magathan

ODF staff met with Ken Nelson, PW Superintendent, Mike Barnes, consulting forester working with Astoria and Glenn Ahrens, OSU Extension Forester for Clatsop and Tillamook Counties. Parks Department stated that parks lost approximately 125 trees. Contractors were hired to fell and haul scalable logs. ODF South Fork crews cut some up and left for folks to pick up for firewood. There are 40-50 damaged trees along two park trails (Cathedral tree trail and Shivley Park trail) which the city does not have the finances to rectify at this time. Staff seemed to feel their main issue is property boundaries.

CANNON BEACH - information supplied by the Parks Director

Damage includes the following losses: Numerous street trees -15-20" DBH conifers; Whale park – 3 shore pine 8" in diameter; Madison Park 60-ft poplars losing 2 trunks on

each (11" diam), one 18" pine down; Les Sherlie park – 2 damaged shore pine 10 DBH 25% lost. 36" DBH Spruce 150 ft Elk Run Park.

GEARHART – Reported by Dennis McNally, City Manager

City reports it lost hundreds of Shore pine in the Surf Pines residential community. Debris is being staged near highway, and the city plans to bring in a tub grinder to grind up the downed logs.

SEASIDE - Reported by Neal Wallace, Public Works Director

The city lost approximately 10-20 trees in parks, including big trees in Broadway park, Tijuana point, and Cartwright Park. Street trees recently planted in downtown fared quite well. Roads mostly open by Tuesday. Numerous private trees lost; fewer in public areas. Lost approximately 50 trees on high school and grade school grounds because the school sites are carved out of the forest. Neal arranged to have a large area of land slated for development near highway temporarily dedicated to staging debris. H&H recycling will grind it, shoot it into trucks, and haul away in January 2008.

WARRENTON - Reported by Preston Polocek, City Manager

Fort Stevens State Park within the city has a lot of trees down. Parks contact is Mike Stine. 100 trees down, close to 200 other trees with sprung roots, and limb damage. In town there are a number of trees in drainage areas, and across pathways. ODF staff met with Water Quality Supervisor, Terry Ager to visit 4-5 sites (10-12 trees) requiring urgent hazard assessments. All were coastal spruce on city property in danger of falling onto private homes.

CLATSOP COUNTY – Reported by Steve Meshke, Parks Director

The county park lands suffered moderate damage, except for Klootchey Creek County Park, where the damage was significant. More than 50 downed trees are blocking access to park facilities. Flooding occurred in the park, and many root systems were undermined. Significant woody debris, including numerous salvageable logs, are present. The historic National Co-Champion Sitka Spruce tree was heavily damaged, losing the majority of its crown. The deck surrounding the historic tree was destroyed.

Tillamook County

BAY CITY - Reported by Dave Pace, Public Works Director

The city stated that all the trees that they had concern about have been taken down. Roughly, he feels 50 trees fell and 50 trees were removed. He stated that they have taken care of all his earlier concerns.

MANZANITA - Reported by Jerry Taylor, City Manager

He stated that they had 20-30 trees down and 5-10 trees that they took down (private trees that were leaning over public right-of-way). ODF staff conducted a "windshield" assessment of city right-of-way trees. The city reports to have done a fair amount of clean-up already. He stated that most of their trees that fell were "polite trees," in that

they fell between buildings, not on them. Sent him our news release via email. He stated that he would like to place this in their January newsletter.

NEHALEM - Reported by Michael Nitzche, City Manager

City proper was unscathed, minor damage to city hall roof. Area immediately out of town was flooded by the Nehalem River. McDonald , Anderson, and McKinnen roads flooded and lost homes. No additional concerns this time.

ROCKAWAY BEACH - Shawn Vincent, Public Works Director

City report that approximately 100+ trees (both public and private trees) were damaged, with the hardest hit area being along N. Palisade St. on the eastern side of town. Leaning trees in the public right-of-way appear to be an issue.

TILLAMOOK –

No significant tree damage reported.

WHEELER - Reported by Tim Grossnickle, Public Works Director

The city reports that 40 - 60 trees were down along city streets. Debris has been cleared, but there are still many leaning trees that are threatening the public right-of-way, particularly along Hospital Road, the access route to the area health care facility. Other residential roads have significant amounts of damaged or leaning trees that should be the subject of further assessment. The city would like to have a local forester attend an upcoming city council meeting.

TILLAMOOK COUNTY –

Moderate damage to county parks, primary Barview Jetty park, which lost a number of Shore pine trees.

It should be noted that this assessment encompasses immediate public safety hazards from damaged trees, but was not extensive enough to address the long term consequences of potentially hazardous trees.

Appendix 3 – List of Partners and Cooperators

Clatsop County Commissioners
Clatsop County Emergency Operations
Clatsop County Sheriff's Office
Clatsop County Public Works
Columbia County Commissioners
Columbia County Emergency Operations
Columbia County Sheriff's Office
Columbia County Public Works
Tillamook County Commissioners
Tillamook County Emergency Operations
Tillamook County Sheriff's Office
Tillamook County Public Works
Tillamook County Parks and Recreation
Weyerhaeuser
Hampton
Longview Timber Company
Evenson Timberland Agency
Nygaard Logging
Stimson Lumber
Green Diamond Resources
Oregon Department of Forestry
Oregon Department of Transportation
Oregon Department of Fish and Wildlife
Oregon Department of State Lands
Oregon State University Extension Service
Oregon State Parks
Oregon National Guard – Camp Rilea
Cities and Communities of Tillamook, Clatsop, and Columbia Counties
United States Forest Service – Siuslaw National Forest
United States Bureau of Land Management – Salem District
United States National Park Service – Fort Clatsop

Appendix 4 – Current Policy and Practices

Watershed Research

The Trask River Watershed Study is part of a research cooperative including two other watershed studies in Oregon - Hinkle Creek (Cascades) and Alsea Revisited (Mid-Coast). This collaboration of three watershed studies under one research cooperative (Watersheds Research Cooperative or WRC) provides greater ecological context to address forest management effectiveness questions.

The three studies complement each other by conducting research using similar designs and methods, in different watersheds. These are integrated multi-disciplinary studies that will provide important information for adaptive management processes on state, private, and federal forests.

The general objectives of the Trask Study are to investigate:

- The effects of forest harvest on the physical, chemical and biological characteristics of small headwater streams.
- The extent to which alterations in stream conditions caused by harvest along headwater channels influences the physical, chemical and biological characteristics of downstream fish-bearing streams.

This is an integrated multi-disciplinary study that will provide important information for adaptive management processes on state, private, and federal forests. This research is being led by a Science Team comprised of scientists from multiple research organizations. Private, state, and federal landowners, and natural resource managers are participating in the planning and implementation. Several watershed processes are being researched. The research is conducted at two scales -- within the immediate area of harvest treatments and at downstream locations throughout the watershed.

Oregon Forest Practices Act Administration

The Oregon Forest Practices Act provides the rules and regulations for conducting commercial forest operations in the state. Included is a requirement for reforestation after salvage harvest operations. The Forest Practices Act and rules applies to all private and state forestlands in Oregon. The rules are primarily geared at protecting resources while allowing for (or encouraging) productive management practices. Forest practice rule compliance will be required during post-storm salvage and restoration activities that are part of commercial operations.

The forest practices rules regulate timber harvesting and road construction on high landslide hazard locations. These rules are intended to limit public safety risk, and to minimize the period or extent of increased landslide hazard on certain sites after road construction or timber harvesting.

Oregon Landslide and Debris Flow Action Plan

After the storms of 1996, the Governor's Office developed a landslide/debris flow action plan in early 1997. That led to continued research on the issues and development of action items for state and local government. These action items were further refined and codified into law by Senate Bill 12 (1999).

Oregon Plan for Salmon and Watersheds

The Oregon Plan for Salmon and Watersheds has developed *A Guide to Oregon Permits Issued by State and Federal Agencies with a focus on Permits for Watershed Restoration Activities*. This guide can be downloaded at <http://www.oregon.gov/OWEB/docs/pubs/permitguide.pdf>. Landowners, local government agencies, and other parties contemplating any of the restoration, salvage, or mitigation actions in response to the December 2007 storm are encouraged to consult this guide to identify any potential permitting requirements.

Salvage Activities on Oregon State Forest Lands

Policy for salvage activities on State Forests are stated in a series of "policy bulletins" which were developed by in 2007 in response to a damaging wind event that took place in late 2006. The policy documents are used by ODF field staff to employ a consistent and transparent process for conducting salvage activities. This same set of policy and guidance will likely be used to address salvage activities from damage that occurred from the December 2007 storm event. In addition to a "Salvage and Annual Harvest Objectives" policy bulletin, two other bulletins are used to address specific cases where threatened and endangered species may be of concern and where salvage activities are conducted in proximity to riparian management areas.

State Forests Road and Stream Assessments

Prior to the December 2007 storm, the Department of Forestry's State Forests Program had completed comprehensive road surveys for about 25 to 30 percent of state forests roads, all in five Northwest Oregon watersheds (Miami, Upper Nehalem, Wilson, Kilchis, and East Trask). Plans are in place to expand these surveys to other watersheds dominated by state-managed forests.

Hydrologic connectivity to streams is now becoming a measure of road system environmental effects in western North America. Older studies have reported a hydrologic connectivity of 57 percent to as high as 75 percent. More recently designed or improved roads have a hydrologic connectivity between 15 and 34 percent. Depending on the watershed, recent surveys indicate connectivity on state forests roads vary from 12 to 20 percent, with most slightly above the 15 percent target, but almost half of what they were when monitored ten years ago.

The Department of Forestry has developed state of the practice installation methods and limitations over the last ten years, and these are used to guide implementation of forest practices rules for installations of new stream crossing structures. Today, less than five percent of road crossings on state-managed forests result in fish passage blockages. This compares to 50 percent reported by the US Forest Service to Congress recently. This precision of this estimate may be low because there is often a lack of fish presence data on many smaller streams. However, it is believed that in the areas surveyed, the State Forests Program has addressed almost all the known barriers on salmon streams, and is now focusing on migration for cutthroat trout.

Forestry Program for Oregon

The *Forestry Program for Oregon* is the strategic plan established by the Oregon Board of Forestry. It sets forth the board's mission and vision for Oregon's forests and the values and strategies that will guide the board's decisions. The seven strategies of the Board of Forestry's *Forestry Program for Oregon* form a framework around which forest sustainability issues can be organized and discussed and to identify the outcomes the Board of Forestry wants to achieve from a statewide perspective. The Board has highlighted the actions need to achieve the *Forestry Program for Oregon* strategies. Many of these actions are relevant to recovery from the December 2007 storm.

Statewide Forest Road Risk Assessment Indicator Implementation

In 2007, the Board endorsed a set of 19 Oregon Indicators of Sustainable Forest management to serve as a quantitative feedback tool for implementation of the *Forestry Program for Oregon*. The indicators will provide the Oregon Board of Forestry, other policy-makers, and the public with information describing the environmental, economic and social conditions of Oregon's public and private forests and provide a cost-effective way to consistent collect important data needed to monitor changes in these conditions over time.

Three of the 19 indicators address the *Forestry Program for Oregon* strategy to *protect, maintain, and enhance the soil and water resources of Oregon's Forests*. One of these indicators is *forest road risks to soil and water resources*. This indicator is designed to answer questions such as: How are Oregon forest roads affecting water quality and fish passage in streams? To what extent has the construction of roads converted forestland to non-forest condition?

In the late 1990s, similar statewide monitoring was planned as part of the Oregon Plan for Salmon and Watersheds' Road Hazard Identification and Risk Reduction Project, but has had only limited implementation on state-managed forestland. Since then thousands of miles of forest roads have been inspected and repaired under the Oregon Plan Road Hazard Identification and Risk Reduction Project. This indicator will attempt to fulfill the Oregon Plan commitment on forestlands by implementing the statewide rapid road survey sampling protocol on public and private lands. The sampling protocol for this indicator needs further development and funding for full implementation.

Board of Forestry Dynamic Forest Ecosystems Work Plan

The goal of the Board of Forestry's Dynamic Forest Ecosystems Work Plan is to promote the science, information acquisition, and analysis systems that are essential for developing sound natural resource policies that sustain the health of Oregon's forest ecosystems, watersheds, and airsheds within a context of natural disturbance and active management.

One objective of the Work Plan is to promote dialogue and greater understanding among scientists, decision makers, and stakeholders about dynamic ecosystem processes and their interactions with forest policies.

To assist the Board in meeting this objective, the Oregon Institute for Natural Resources (INR) is examining experiences with various approaches to integrating ecosystem dynamics into forest

management in order to identify successes, drawbacks, and unintended consequences. The ultimate objective is to use the results of the project to frame forest management policies that embody current and future understanding of forest ecosystem dynamics.

In 2008, INR will produce a synthesis report on lessons learned about ecosystem dynamics and their effects on current management. The report will contain all relevant and available case studies of actual experiences with forest managers trying to apply new scientific understanding to forest management, including studies from the literature and the experience of the investigators. Cases developed from the literature and the researchers' experience across four key themes: "protection" concept, fire and fuels, flooding/aquatics, climate change and adaptation.

Appendix 5 – Storm Details

Based on compelling data, the National Weather Service (NWS) felt there was a need to issue a “Hurricane Force Wind Warning,” which had never been issued along the west coast since it was established as a public danger notification five years ago. The gale of December 2007, as it has been referred to by the Oregon Climate Service (OCS), lived up to that warning. It was of sufficient size and force, to compare with noteworthy storms of the recent past. But it was also unique, in that it not only brought gale force winds, but it followed with intense rainfall, both of which were distinctly focused in different geographic locales.

According to the OCS, the maximum peak wind gust, which was recorded at Bay City, Oregon reached 129 mph. Peak gusts of 96 mph and 125 mph were recorded at Astoria and Lincoln City respectively, and at Cape Mears a speed of 114 mph was recorded before the power went out. Inland, peak gusts generally ranged between 50 and 60 mph. These velocities were slightly higher than last year’s peaks recorded in the December 2006 storm (peak of 114 mph at Mt. Hebo). The NWS suggests that wind speeds of 85 mph or greater correlate roughly to at least a 50-year storm.

In comparison, the peak gusts were notably lower than those reported for the Columbus Day storm of 1962. Data obtained from Wikipedia.org indicates that peak gusts along the coast during the Columbus Day storm recorded 145 mph at Camp Blanco, 160 in the Willapa Hills of southwest Washington, and are estimated to have exceeded 170 mph at other locations lacking instrumentation. Inland, various municipalities in the Willamette Valley and Portland all recorded peak gusts over 115 mph.

The Columbus Day storm may be associated with the greatest recorded peak gusts on the west coast, but the gale of December 2007 is set apart by the duration of its sustained winds. Data compiled by OCS suggests that the 2007 gale may be the longest-lasting high-wind event on record for the west coast. The Columbus Day storm lasted only about two to three hours in most locations, but winds of 58 mph or higher lasted nearly two days during the 2007 gale except for a few brief lulls. The high, long-duration winds were focused primarily to a 20-mile wide strip along the northern Oregon coast, compared to the Columbus Day storm which affected a much larger region from San Francisco north to British Columbia, including entire western Oregon.

According to data obtained from the Western Regional Climate Center’s remote automated weather stations (RAWS), total precipitation recorded during the 48-hour period between December 2 and 3 ranged from as low as 3.37 inches in Tillamook to 12.25 near Hebo. Lee’s Camp (about 15 miles east of Tillamook) reported 14.5 inches, with at least 10 inches falling during one day.

Rainfall for the December 2007 gale compares to that of the 1964 and 1996 flood events, but at a more localized scale. Both the 1964 and 1996 floods were characterized as rain-on-snow events, and affected stream flow across a much greater extent of western Oregon. The December 2007 gale generated rainfall slightly less than the record amounts that fell during last year’s November event, which contributed to the highest stage on record for the Wilson River. Based upon the observed flood and landslide impacts, the greatest rainfall intensities for the three north coast

counties considered here was focused primarily in the headwaters of the fast-responding rivers of the Nehalem, Salmonberry, Trask, and Wilson drainages. Additionally, there was a light mantle of snow (2-8 inches) covering the highest elevations which contributed somewhat to the rapid runoff.

As a result of the intense rains, Coast Range Rivers reached flood stage rapidly. According to initial USGS data, the Nehalem flow exceeded the 25-year recurrence interval and crested at the third highest stage on record, slightly lower than the 1964 and 1996 floods. The Wilson was just shy of the 25-year recurrence interval and crested at the second highest recorded stage, just below last November's flood event. The Trask station hasn't been rated for recurrence intervals but it crested at the fourth highest stage of record. Other principle Oregon Coast Range rivers with gages crested above flood stage too, including the Alsea, Luckiamute, Mary's, Siletz, Siuslaw, Tualatin, and Yamhill.

The combination of high, long duration winds, followed by intense rains and flash flooding were the primary factors that made the gale of December 2007 such a damaging storm event. Based on the data, it will be considered one of the top weather events of Oregon, particularly in the last two decades. Its distinct characteristic of two low-pressure centers crossing the coast at different times resulted in damaging winds on the coast, followed by intense precipitation in the interior coastal mountains, followed by catastrophic flooding to valleys downstream. As a result, damage to forest land and forest resources is significant in Clatsop, Columbia, and Tillamook Counties.

COASTAL RIVERS

<u>RIVER/GAUGE NAME</u>	<u>FLOOD STAGE</u>	<u>RIVER CREST</u>	<u>PEAK FLOW (CFS)</u>	<u>DATE/TIME OF CREST</u>
WILLAPA NR WILLAPA	21.0 FT	26.6 FT	15,000	5 PM DEC 3 **
NASELLE NR NASELLE	15.5 FT	14.7 FT	7,200	8 AM DEC 3
GRAYS NR ROSBURG	12.0 FT	16.5 FT	20,100	1 PM DEC 3 **
NEHALEM NR FOSS	14.0 FT	24.4 FT	52,200	12 PM DEC 3 **
WILSON NR TILLAMOOK	12.0 FT	20.5 FT	33,300	11 AM DEC 3 **
TRASK NR TILLAMOOK	16.5 FT	20.8 FT	20,400	10 AM DEC 3
SILETZ AT SILETZ	16.0 FT	19.0 FT	25,800	2 PM DEC 3
ALSEA NR TIDEWATER	18.0 FT	21.8 FT	27,500	10 PM DEC 3
SIUSLAW NR MAPLETON	18.0 FT	21.5 FT	30,200	9 PM DEC 3

WILLAMETTE VALLEY

<u>RIVER/GAUGE NAME</u>	<u>FLOOD STAGE</u>	<u>RIVER CREST</u>	<u>PEAK FLOW (CFS)</u>	<u>DATE/TIME OF CREST</u>
JOHNSON CK IN PORTLAND	11.0 FT	11.9 FT	1,300	10 AM DEC 3
CLACKAMAS NR ESTACADA	20.0 FT	20.3 FT	24,200	11 PM DEC 3
TUALATIN AT DILLEY	17.5 FT	19.0 FT	9,700	9 PM DEC 3
TUALATIN NR FARMINGTON	32.0 FT	32.6 FT	11,100	7 PM DEC 5
MARYS NR PHILOMATH	20.0 FT	21.0 FT	13,000	9 PM DEC 3 **
LUCKIAMUTE AT SUVER	27.0 FT	29.0 FT	11,000	4 PM DEC 3
S YAMHILL AT MCMINN.	50.0 FT	55.9 FT	31,000	4 PM DEC 4

Source: National Weather Service. In: The Great Coastal Gale. Wolf, R., C. Hale, G. Taylor. December, 2007. Oregon Climate Service, Corvallis, OR. website: <http://www.ocs.oregonstate.edu/index.htm>