



## SECTION 5

# Flood Damage History

Documentation about historic flooding and stormwater drainage pathways is an important tool in the attempt to reduce flood hazards. Flood history data and accounts of existing problems in Grays Harbor County were used to identify potential flood hazards and to make recommendations about ways to minimize these hazards. This section presents the record of historic events, damage cost estimates by land use type, prior flood control investigations, a list of current and past problem areas, and potential problems associated with projected land development and resource utilization trends.

## Record of Historic Events

Grays Harbor County is subject to chronic flooding. Floods that caused significant damage occurred in November 1949, February 1951, November 1954, November 1955, October 1962, December 1964, January 1968, January 1971, January 1972, December 1975, December 1977, December 1979, January 1990, November 1990, October-December 1994, November-December 1995, January-February 1996, December 1996-February 1997, March 1997, and December 1999. Two of the highest recorded peak flow events occurred during the 1990s. The stream gauge flow data presented in this section illustrate the 10 highest recorded peak flows along the Wynoochee, Satsop, and Humptulips Rivers.

## Wynoochee River Basin

The U.S. Geological Survey (USGS) has operated a streamflow gauge on the Wynoochee River upstream of Black Creek near Montesano (see Figure 3-8) continuously since 1956. According to the USGS, flooding occurs in the Wynoochee River at this location when streamflow reaches 16,000 cfs (15.5 feet gauge datum), a flood level that corresponds to a less-than-1-year event. Events of this magnitude occurred 11 times in the 16 years before the Wynoochee Dam became operational in 1970; such events have occurred 10 times since then. The magnitude of the post-dam peak flow events is generally less than that of the pre-dam events. Tables 5-1 and 5-2 show the 10 highest recorded peak flow events and the associated return frequency for the pre- and post-dam period.

**TABLE 5-1**  
Ten Largest Flood Events Recorded at USGS Gauge 12037400, Wynoochee River  
Upstream of Black Creek near Montesano – Pre Dam (1956 – 1973)

Rank	Discharge (cfs)	Stage (feet)	Date	Flood Frequency <sup>1</sup>
1	25,500	20.19	12/10/1956	6
2	24,500	20.54	12/10/1956	5
3	23,300	20.12	01/16/1961	4
4	23,200	20.06	11/20/1962	4

**TABLE 5-1**

Ten Largest Flood Events Recorded at USGS Gauge 12037400, Wynoochee River  
Upstream of Black Creek near Montesano – Pre Dam (1956 – 1973)

Rank	Discharge (cfs)	Stage (feet)	Date	Flood Frequency <sup>1</sup>
5	21,900	19.57	11/20/1959	4
6	21,500	19.2	12/13/1966	4
7	18,400	18.13	04/30/1959	2
8	18,100	17	12/26/1972	2
9	16,800	16.34	01/20/1972	< 2
10	16,800	16.34	01/20/1972	< 2

<sup>1</sup> Flood frequency based on revised ACOE frequency analysis (2000)

**TABLE 5-2**

Ten Largest Flood Events Recorded at USGS Gauge 12037400, Wynoochee River  
Upstream of Black Creek near Montesano – Post Dam (1973 to Present)

Rank	Discharge (cfs)	Stage (feet)	Date	Flood Frequency <sup>1</sup>
1	25,600	20.21	03/19/1997	50
2	25,000	20.00	12/19/1999	42
3	21,500	18.16	11/24/1990	16
4	20,700	17.75	12/10/1993	12
5	18,900	16.86	11/23/1986	7
6	18,300	16.46	12/19/1994	6
7	17,700	16.11	11/29/1995	2
8	17,400	16.63	12/15/1979	< 2
9	17,100	15.79	12/28/1998	< 2
10	16,400	16.11	12/03/1975	< 2

<sup>1</sup> Flood frequency based on revised ACOE frequency analysis (2000)

## Satsop River Basin

The USGS has operated a streamflow gauge on the Satsop River near Satsop (see Figure 3-8) continuously since 1929. According to the USGS, flooding occurs in the Satsop River basin when streamflow reaches 25,000 cfs (34.0 feet gauge datum) at the gauge location, a flood level that corresponds to a 2-year event. Events of this magnitude have occurred 37 times during the 70-year recording period. The highest peak flows were recorded in the 1990s, when two 100-year or greater events occurred. Table 5-3 shows the 10 highest recorded peak flow events and the associated return frequency.

**TABLE 5-3**  
**Ten Largest Flood Events Recorded at USGS Gauge 12035000, Satsop River Near Satsop**

Rank	Discharge (cfs)	Stage (feet)	Date	Flood Frequency <sup>1</sup>
1	63,600	38.87	03/19/1997	> 100
2	54,500	37.88	12/15/1999	100
3	50,600	37.28	12/20/1994	63
4	46,600	38.9	01/22/1935	34
5	43,100	36.43	01/19/1968	20
6	39,600	36.91	02/09/1951	11
7	39,300	35.93	11/23/1986	11
8	38,200	35.75	11/24/1990	10
9	37,700	35.54	12/18/1979	9
10	35,900	35.23	12/26/1972	8

<sup>1</sup> Flood frequency based on FEMA 1985 Flood Insurance Study

### Humptulips River Basin

Major flooding was reported in the Humptulips River basin by area residents in March 1997 and December 1999. The USGS operated a streamflow gauge on the Humptulips River near Humptulips from 1930 through 1979 (see Figure 3-6). Table 5-4 shows the 10 highest recorded peak flow events and the associated return frequency.

**TABLE 5-4**  
**Ten Largest Flood Events Recorded at USGS Gauge 12039000, Humptulips River Near Humptulips**

Rank	Discharge (cfs)	Stage (feet)	Date	Flood Frequency
1	33,000	12.7	01/22/1935	21
2	32,900	12.68	12/09/1956	20
3	29,300	13.7	11/19/1962	12
4	27,700	13.03	01/19/1968	9
5	27,100	12.87	12/26/1972	8
6	26,300	13.1	02/21/1961	7
7	26,200	13.17	11/20/1959	7
8	25,500	11.24	02/09/1951	6
9	25,000	11.09	11/03/1955	6
10	24,500	11.02	02/07/1945	5

## Damage Cost Estimates by Land Use Type

There are approximate damage cost estimates for the March 1997 and December 1999 floods, two of the largest recorded flood events in Grays Harbor County. As a result of the March 1997 flood, the following areas were considered major damage areas: Wynoochee Valley, Satsop River Valley, Brady Loop Road Area, Humptulips River Valley, and Johns River. The 1997 flood event was a federally declared event. There were 32 rescues: which included 2 rescues in which the rescuer swam to the person in need, 23 boat rescues, and 7 helicopter rescues. In addition, there were numerous rescues in the Quinalt Lake area carried out by the U.S. Forest Service, including 11 in Wynoochee Valley, 9 in Brady Bottoms, 2 in Satsop Riviera, 3 in Brady, 3 in the Minkler Road area, 2 in West Satsop, and 2 near the Humptulips River Bridge on SR 109. Preliminary losses as a result of the March 1997 flood are shown in Table 5-5.

**TABLE 5-5**  
Preliminary Losses Due to March 1997 Flood Event (Grays Harbor Emergency Management Office)

Sector	Approximate Loss
Grays Harbor County PUD	\$500,000
U.S. Forest Service	\$7,000
Grays Harbor County	\$700,000
Department of Transportation	\$100,000
Private Sector	\$1,203,500

The December 15, 1999, flood event caused major flooding, but did not qualify as a federally declared disaster. Table 5-6 shows the approximate reported loss as a result of the event.

**TABLE 5-6**  
Approximate Reported Losses Due to December 1999 Flood Event (Grays Harbor Emergency Management Office)

Sector	Approximate Loss
Grays Harbor County	\$50,000
Residential	\$1,300,000

Grays Harbor County has the third highest number of flood insurance policies in the State of Washington. The insurance statistics for unincorporated Grays Harbor County and its cities are shown in Table 5-7. The Quinalt Tribe was not included in the statistics. The Cities of Aberdeen and Hoquiam have the first and second highest number of insurance policies, respectively, of all the cities in the state. In addition, the average insurance premium is \$423, which is much greater than the state average of \$390.

**TABLE 5-7**

Insurance Statistics for Grays Harbor County (FEMA)

Community	Date of Current Effective Map	Number of Policies	Amount of Insurance Coverage	Average Coverage	Total Premium	Average Premium	Number of Claims since 1978	Amount Paid since 1978	Average Claim
Grays Harbor County Unincorporated	02/16/1990	434	\$47,528,100	\$109,512	\$218,550	\$438	84	\$1,338,013	\$15,929
Aberdeen	07/16/1984	1,085*	\$72,446,300	\$66,771	\$552,292	\$443	166	\$487,820	\$2,939
Cosmopolis	11/03/1982	27	\$1,825,200	\$67,970	\$10,789	\$348	2	\$1,066	\$533
Elma	08/19/1985	15	\$1,238,800	\$82,587	\$8,873	\$515	14	\$117,857	\$8,418
Hoquiam	06/15/1979	985**	\$57,293,700	\$58,166	\$478,400	\$423	36	\$111,161	\$3,088
McCleary	08/16/1982	3	\$506,000	\$168,667	\$871	\$252	0	0	0
Montesano	10/13/81 (M)	13	\$1,704,200	\$131,092	\$10,154	\$679	7	\$82,949	\$11,850
Oakville	6/19/85 (M)	8	\$902,200	\$112,775	\$2,503	\$272	1	\$8,105	\$8,105
Ocean Shores	03/01/1978	262	\$44,412,900	\$169,515	\$89,459	\$297	10	\$128,273	\$12,827
Westport	05/05/1981	109	\$12,534,900	\$114,999	\$58,715	\$469	4	\$3,757	\$939
<b>Total</b>		<b>2,941</b>	<b>\$240,392,300</b>	<b>\$81,738</b>	<b>\$1,430,606</b>	<b>\$486</b>	<b>324</b>	<b>\$2,279,001</b>	<b>\$7,034</b>

## Prior Flood Control Investigations

This document is the fifth phase of a planning effort undertaken by Grays Harbor County. Several flood hazard management plans have been developed for more localized areas throughout the County (see Section 2, Figure 2-1). In 1994, the County prepared the Vance Creek Drainage Evaluation in and around the City of Elma. In 1995, the County prepared the Grayland Flood Hazard Reduction Plan for the southern portion of the area, extending from Salt Aire Shores to a natural drainage boundary east of Grayland Beach Park. In 1997, the County prepared the South Coastal Flood Hazard Reduction Plan, which covered an area from Salt Aire Shores north to Westport. In 1999, the County prepared the North Beach Flood Hazard Management Plan.

## List of Current and Past Problem Areas

Many residential properties, commercial and industrial properties, and roadways in Grays Harbor County are flooded during large storm events. The following sources were used to identify the extent of flooding within Grays Harbor County, with emphasis on the Wynoochee, Satsop, and Humptulips River Basins:

- FEMA flood insurance rate maps
- FEMA repetitive loss list
- Grays Harbor County Emergency Management repetitive loss list
- Community input from public meetings
- Grays Harbor County maintenance staff

Figure 5-1 (oversize map in sleeve) shows the compilation of flood problem areas identified from these sources.

There are numerous areas throughout the County that are subject to flooding; however, this plan focuses on the Wynoochee, Satsop, and Humptulips River Basins. Other problem areas have been identified in the Flood Hazard Management Plans mentioned previously. The following areas within these basins were identified as subject to chronic flooding:

- Repetitive loss properties
- Wynoochee Tracts-approximately 5 homes have flooded in the last 10 years, one home has been elevated
- Geissler Road-1 basement and 2 outbuildings have flooded twice in the last 30 years
- Satsop Riviera-numerous homes have been flooded
- Monte-Elma Road near Brady-approximately 5 homes have been flooded about 4 times in last 15 years, 2 homes have been elevated
- Humptulips Dike Road-some homes and properties have been flooded
- Walker Bottom-some homes and properties have been flooded

The Federal Emergency Management Agency (FEMA) has a list of properties that are considered repetitive loss. Repetitive loss is defined as "two or more flood insurance claims for more than \$1,000 for the same structure over a 10-year period." These claims represent fewer than 2 percent of the policy base, but more than 35 percent of the claim payments. In addition to the FEMA list, the Grays Harbor Emergency Management Office (GHEMO) has

compiled a list of people who have suffered losses as a result of flooding from 1994 to the present. The GHEMO defines these properties as repetitive loss also, although they do not meet the strict definition of repetitive loss given by FEMA. The majority of the estimates of flood damage that resulted from the December 1999 flood were between \$2,500 and \$35,000. Figure 5-1 shows the location of the GHEMO repetitive loss properties. The County and GHEMO office have a copy of this database.

The extent of flooding throughout the river basins became apparent at four public meetings that were conducted during the CFHMP process. Community members were asked to draw on maps to show where and when their properties were flooded. Figure 5-1 shows the areas that community members identified as having flooding and erosion problems. The County has a full description of the extent of the flooding.

County maintenance officials were another source that was used to identify flood-prone areas were. They helped identify flood areas by personal recollection and other records (e.g., maps and survey information). The flood areas identified by maintenance officials are shown in Figure 5-1. Because the primary focus of maintenance officials is within County right-of-way areas, the majority of the problem areas they identified are typically roadways. Figure 5-2 shows many of the roadways that are subject to road closures during flood events. During the March 1997 event, many people in the City of Montesano were stranded because Highway 12 was inaccessible. During the December 1999 event, the Humptulips Dike Road was closed for 3 months because the dike failed. During both events, numerous residents with homes along the Wynoochee, Satsop, and Humptulips Rivers were stranded.

A study has recently been conducted to identify areas that will be inundated as a result of a tsunami. Figure 5-3 shows the important roadways that have been identified as evacuation routes in case a tsunami occurs.

## **Projected Problems Due to Projected Land Development and Resource Utilization Trends**

Future growth is expected to be minimal during the design life of these CFHMP recommendations. Problems due to land development and resource utilization trends are not anticipated, assuming that existing land use and zoning codes are maintained and continue to be enforced.

There are no large transportation projects planned in the near future within Grays Harbor County that are expected to impact flooding. Roadway capacity is currently at 25%-30%.

Of specific interest, the PDA/Satsop Power Plant employees use Lambert-Wakefield Road during flood events, which is designed to accommodate 5,000 vehicles. Currently 300 people work at the site with a predicted growth of 100 people for Boise Cascade and 100 people for the construction of the gas turbine plant. It is not anticipated that growth will impact the area with respect to flooding.



# Comprehensive Flood Hazard Management Plan

## Flood Problem Areas

**LEGEND**

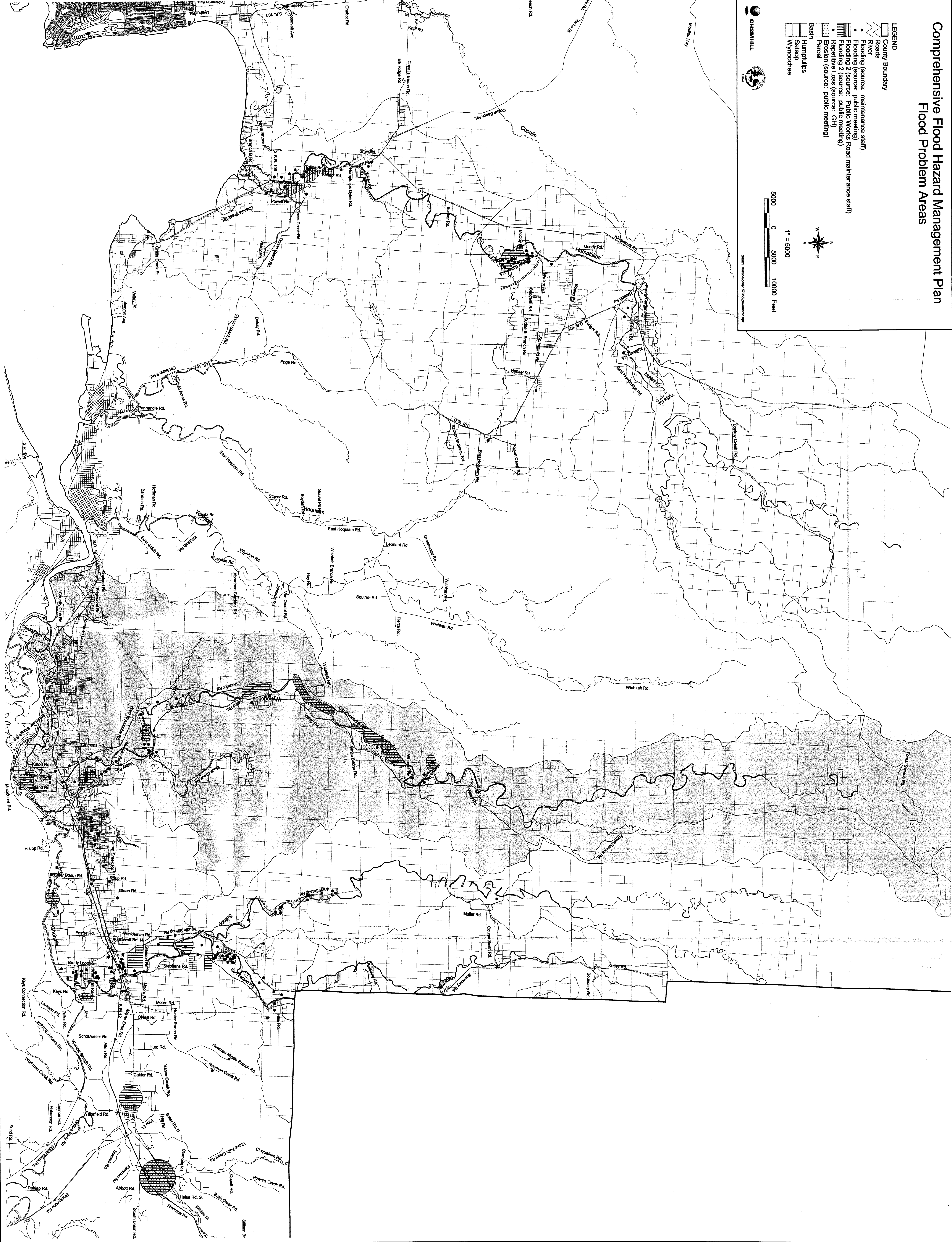
- County Boundary
- Roads
- River
- Flooding (source: maintenance staff)
- Flooding (source: public meeting)
- Flooding 2 (source: Public Works Road maintenance staff)
- Repetitive Loss (source: GH)
- Erosion (source: public meeting)
- Parcel
- Basin
- Humphilips
- Salsop
- Wynoclee

Scale: 1" = 5000'

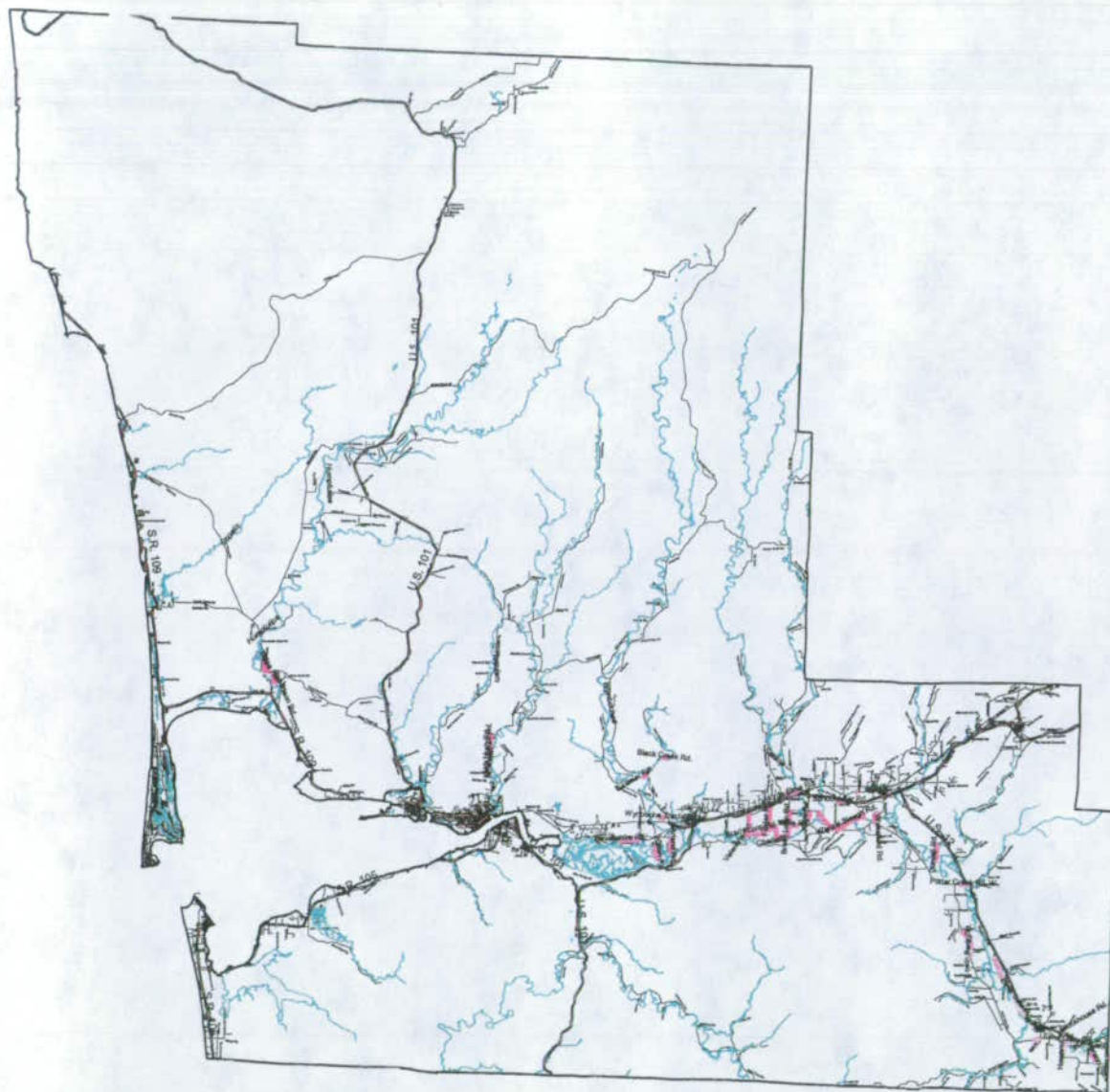
5000 0 5000 10000 Feet

North Arrow

Scale: 3000' 1:50000







Comprehensive Flood Hazard Management Plan  
Typical Road Closures Due to Flooding

Figure 5-2

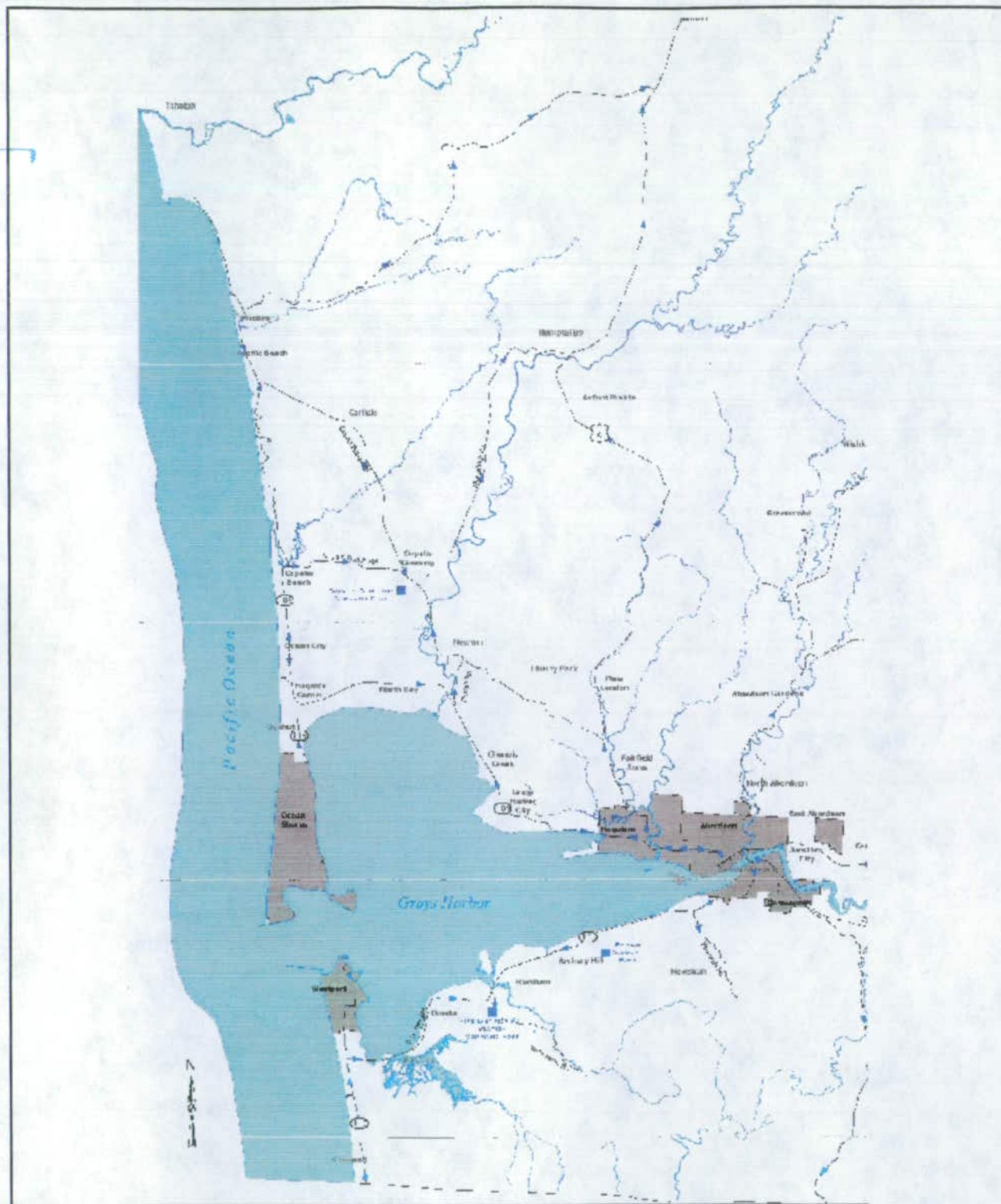
LEGEND  
 Closed Roads  
 Highway  
 River  
 Roads



1" = 30,000'

15000 0 15000 30000 Feet





Comprehensive Flood Hazard Management Plan  
Tsunami Evacuation Routes

Figure 5-3

