Scenario: M 7.4 South Whidbey Island Fault
Island County

Casualties Summary Report

	Injury Severity Level														
	Severity 1			Severity 2			Severity 3			Severity 4			Total		
	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM
Commuting	0	0	1	0	0	3	0	0	3	0	0	1	0	0	8
Commercial	3	201	174	1	57	49	0	9	8	0	18	15	4	285	246
Educational	0	63	4	0	18	1	0	3	0	0	6	0	0	90	5
Hotels	6	1	2	2	0	1	0	0	0	1	0	0	9	1	3
Industrial	3	21	13	1	6	4	0	1	1	0	2	1	4	30	19
Other-Residential	95	22	34	20	5	7	1	0	1	3	1	1	119	28	43
Single Family	64	16	24	8	2	3	1	0	0	1	0	0	74	18	27
Total Island	**171**	**324**	**252**	**32**	**88**	**68**	**2**	**13**	**13**	**5**	**27**	**18**	**210**	**452**	**351**

Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
Severity Level 2: Injuries will require hospitalization but are not considered life-threatening.
Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
Severity Level 4: Victims are killed by the earthquake

Number of Buildings Damaged by General Occupancy Class

	Number of Buildings					
	None	Slight	Moderate	Extensive	Complete	Total
Agriculture	22	34	38	25	14	133
Commercial	207	246	430	313	156	1,352
Education	11	13	17	12	7	60
Government	8	8	12	9	4	41
Industrial	65	81	159	129	70	504
Religion	19	22	25	16	7	89
Other Residential	948	1,608	1,828	1,361	661	6,406
Single Family	7,665	11,682	5,229	431	59	25,066

Structural damage states vary by building type. See HAZUS Technical Manual Vol. I. “Complete damage” indicates structural collapse or is in imminent danger of collapse.

Direct Economic Losses For Buildings

Capital Stock Losses				Income Losses					
Cost Structural Damage	Cost Non-structural Damage	Cost Contents Damage	Inventory Loss	Loss Ratio %	Relocation Loss	Capital Loss	Wages Losses	Rental Income Loss	Total Loss
$99,448,000	$411,231,000	$159,319,000	$3,127,000	8.33	$64,509,000	$25,474,000	$33,441,000	$28,097,000	$824,647,000

Hospital Functionality

		At Day 1		At day 3		At day 7		At day 30		At day 90	
	Total Number of Beds	Number of Beds	%	Number of Beds	%	Number of Beds	%	Number of Beds	%	Number of Beds	%
Large											
Medium	51	1	2	2	3	18	35	48	94	49	97
Small	26	14	55	14	56	25	94	26	100	26	100
Total	**77**	**15**	**—**	**16**	**—**	**43**	**—**	**74**	**—**	**75**	**—**

Large Hospital: > 150 beds
Medium Hospital: 50-150 beds
Small Hospital: < 50 beds

Highway Bridge Damage

Average Number for Damage State					
Total Number of Bridges	None	Slight	Moderate	Extensive	Complete
6 (7*)	4	1	0	1	1

* values in parentheses include rounding error.

Scenario: M 7.4 South Whidbey Island Fault
Island County

Fire Following Analysis Summary Report

Number of Ignitions	Population Exposed	Value Exposed
8	108	$8,955,000

Potable Water System Performance

	Number of Households Without Water									
Total Households	At day 1		At day 3		At day 7		At day 30		At day 90	
	Count	%	Count	%	Count	%	Count	%	Count	%
30,319	23,626	78	21,978	73	16,988	56	0	0	0	0

Electrical Power System Performance

	Number of Households Without Power									
Total Households	At day 1		At day 3		At day 7		At day 30		At day 90	
	Count	%	Count	%	Count	%	Count	%	Count	%
30,319	11,482	38	7,670	25	3,618	12	848	2.8	15	0

Debris Summary Report

Brick, Wood & Others (tons)	Concrete & Steel (tons)	Total (tons)	Number of Truckloads
97,000	153,000	250,000	10,000

Shelter Summary Report

Number of Displaced Households	Number of People Needing Short Term Shelter
759	444

Essential Facilities Functionality

	Count	Functionality (%)
		At Day 1
Emergency Operation Center	1	6
Fire Station Facilities	26	30
Police Station Facilities	4	40
School	32	33

Scenario: M 7.4 South Whidbey Island Fault
King County

Casualties Summary Report

	Injury Severity Level														
	Severity 1			Severity 2			Severity 3			Severity 4			Total		
	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM
Commuting	0	1	44	0	1	71	0	2	106	0	0	21	0	4	242
Commercial	15	865	657	3	155	125	0	18	16	1	36	30	19	1074	828
Educational	0	192	27	0	41	5	0	6	1	0	11	1	0	250	34
Hotels	6	1	2	1	0	0	0	0	0	0	0	0	7	1	2
Industrial	24	177	111	5	38	24	1	5	3	1	10	6	31	230	144
Other-Residential	250	38	92	36	5	14	3	0	1	5	1	2	294	44	109
Single Family	235	34	88	20	3	8	1	0	0	2	0	1	258	37	97
Total King	**530**	**1308**	**1021**	**65**	**243**	**247**	**5**	**31**	**127**	**9**	**58**	**61**	**609**	**1640**	**1456**

Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
Severity Level 2: Injuries will require hospitalization but are not considered life-threatening.
Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
Severity Level 4: Victims are killed by the earthquake

Number of Buildings Damaged by General Occupancy Class

	Number of Buildings					
	None	Slight	Moderate	Extensive	Complete	Total
Agriculture	1,315	347	187	57	14	1,920
Commercial	24,547	7,248	4,165	979	175	37,114
Education	896	247	149	42	8	1,342
Government	388	98	56	12	1	555
Industrial	6,171	1,935	1,366	393	79	9,944
Religion	1,650	409	209	52	10	2,330
Other Residential	62,713	15,207	5,876	1,784	320	85,900
Single Family	361,722	77,933	8,012	751	153	448,571

Structural damage states vary by building type. See HAZUS Technical Manual Vol. I. “Complete damage” indicates structural collapse or is in imminent danger of collapse.

Direct Economic Losses For Buildings

Capital Stock Losses				Income Losses					
Cost Structural Damage	Cost Non-structural Damage	Cost Contents Damage	Inventory Loss	Loss Ratio %	Relocation Loss	Capital Loss	Wages Losses	Rental Income Loss	Total Loss
$462,114,000	$2,185,948,000	$975,960,000	$23,484,000	1.66	$263,102,000	$160,577,000	$180,156,000	$160,086,000	$4,411,427,000

Hospital Functionality

		At Day 1		At day 3		At day 7		At day 30		At day 90	
	Total Number of Beds	Number of Beds	%	Number of Beds	%	Number of Beds	%	Number of Beds	%	Number of Beds	%
Large	4,943	4,015	81	4,035	82	4,843	98	4,937	100	4,938	100
Medium	684	561	82	564	82	667	98	682	100	683	100
Small	100	97	97	97	97	100	100	100	100	100	100
Total	**5,727**	**4,673**	**—**	**4,696**	**—**	**5,610**	**—**	**5,719**	**—**	**5,721**	**—**

Large Hospital: > 150 beds
Medium Hospital: 50-150 beds
Small Hospital: < 50 beds

Highway Bridge Damage

Average Number for Damage State					
Total Number of Bridges	None	Slight	Moderate	Extensive	Complete
1,043 (1,044*)	909	52	31	31	21

* values in parentheses include rounding error.

Scenario: M 7.4 South Whidbey Island Fault
King County

Fire Following Analysis Summary Report

Number of Ignitions	Population Exposed	Value Exposed
77	10,760	$923,908,000

Potable Water System Performance

	Number of Households Without Water									
Total Households	At day 1		At day 3		At day 7		At day 30		At day 90	
	Count	%	Count	%	Count	%	Count	%	Count	%
745,853	69,051	9	56,147	8	33,162	4	0	0	0	0

Electrical Power System Performance

	Number of Households Without Power									
Total Households	At day 1		At day 3		At day 7		At day 30		At day 90	
	Count	%	Count	%	Count	%	Count	%	Count	%
745,853	14,222	2	8,883	1	3,819	1	836	0.1	20	0

Debris Summary Report

Brick, Wood & Others (tons)	Concrete & Steel (tons)	Total (tons)	Number of Truckloads
379,000	611,000	990,000	39,600

Shelter Summary Report

Number of Displaced Households	Number of People Needing Short Term Shelter
5,793	3,031

Essential Facilities Functionality

	Count	Functionality (%)
		At Day 1
Emergency Operation Center	18	83
Fire Station Facilities	164	82
Police Station Facilities	52	82
School	721	80

Scenario: M 7.4 South Whidbey Island Fault
Pierce County

Casualties Summary Report

	Injury Severity Level														
	Severity 1			Severity 2			Severity 3			Severity 4			Total		
	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM
Commuting	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
Commercial	0	7	5	0	0	0	0	0	0	0	0	0	0	7	5
Educational	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0
Hotels	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Industrial	0	2	1	0	0	0	0	0	0	0	0	0	0	2	1
Other-Residential	5	1	2	0	0	0	0	0	0	0	0	0	5	1	2
Single Family	2	0	1	0	0	0	0	0	0	0	0	0	2	0	1
Total Pierce	**7**	**11**	**9**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**7**	**11**	**10**

Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
Severity Level 2: Injuries will require hospitalization but are not considered life-threatening.
Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
Severity Level 4: Victims are killed by the earthquake

Number of Buildings Damaged by General Occupancy Class

	Number of Buildings					
	None	Slight	Moderate	Extensive	Complete	Total
Agriculture	732	19	4	0	0	755
Commercial	11,691	373	68	2	0	12,134
Education	421	9	2	0	0	432
Government	219	6	1	0	0	226
Industrial	3,622	145	37	2	0	3,806
Religion	878	17	3	0	0	898
Other Residential	49,467	2,139	387	9	0	52,002
Single Family	185,150	1,216	8	0	0	186,374

Structural damage states vary by building type. See HAZUS Technical Manual Vol. I. “Complete damage” indicates structural collapse or is in imminent danger of collapse.

Direct Economic Losses For Buildings

Capital Stock Losses				Income Losses					
Cost Structural Damage	Cost Non-structural Damage	Cost Contents Damage	Inventory Loss	Loss Ratio %	Relocation Loss	Capital Loss	Wages Losses	Rental Income Loss	Total Loss
$6,137,000	$50,052,000	$27,578,000	$1,359,000	0.11	$2,790,000	$1,600,000	$1,853,000	$2,081,000	$93,450,000

Hospital Functionality

		At Day 1		At day 3		At day 7		At day 30		At day 90	
	Total Number of Beds	Number of Beds	%	Number of Beds	%	Number of Beds	%	Number of Beds	%	Number of Beds	%
Large	2,873	2,863	100	2,863	100	2,870	100	2,870	100	2,870	100
Medium	397	395	100	395	100	397	100	397	100	397	100
Small											
Total	**3,270**	**3,258**	**—**	**3,258**	**—**	**3,267**	**—**	**3,267**	**—**	**3,267**	**—**

Large Hospital: > 150 beds
Medium Hospital: 50-150 beds
Small Hospital: < 50 beds

Highway Bridge Damage

Average Number for Damage State					
Total Number of Bridges	None	Slight	Moderate	Extensive	Complete
404	400	4	0	0	0

Scenario: M 7.4 South Whidbey Island Fault
Pierce County

Fire Following Analysis Summary Report

Number of Ignitions	Population Exposed	Value Exposed
22	2,012	$132,611,000

Potable Water System Performance

	Number of Households Without Water									
Total Households	At day 1		At day 3		At day 7		At day 30		At day 90	
	Count	%	Count	%	Count	%	Count	%	Count	%
282,052	0	0	0	0	0	0	0	0	0	0

Electrical Power System Performance

	Number of Households Without Power									
Total Households	At day 1		At day 3		At day 7		At day 30		At day 90	
	Count	%	Count	%	Count	%	Count	%	Count	%
282,052	0	0	0	0	0	0	0	0	0	0

Debris Summary Report

Brick, Wood & Others (tons)	Concrete & Steel (tons)	Total (tons)	Number of Truckloads
8,000	6,000	13,000	520

Shelter Summary Report

Number of Displaced Households	Number of People Needing Short Term Shelter
1	1

Essential Facilities Functionality

	Count	Functionality (%)
		At Day 1
Emergency Operation Center	5	98
Fire Station Facilities	86	99
Police Station Facilities	26	99
School	299	99

Scenario: M 7.4 South Whidbey Island Fault
San Juan County

Casualties Summary Report

	Injury Severity Level														
	Severity 1			Severity 2			Severity 3			Severity 4			Total		
	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM
Commuting	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0
Educational	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hotels	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Industrial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other-Residential	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Single Family	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total San Juan	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**

Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
Severity Level 2: Injuries will require hospitalization but are not considered life-threatening.
Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
Severity Level 4: Victims are killed by the earthquake

Number of Buildings Damaged by General Occupancy Class

	Number of Buildings					
	None	Slight	Moderate	Extensive	Complete	Total
Agriculture	63	6	2	0	0	71
Commercial	450	47	12	1	0	510
Education	22	2	1	0	0	25
Government	26	3	1	0	0	30
Industrial	196	24	8	0	0	228
Religion	34	3	1	0	0	38
Other Residential	1,528	268	81	2	0	1,879
Single Family	7,672	408	7	0	0	8,087

Structural damage states vary by building type. See HAZUS Technical Manual Vol. I. “Complete damage” indicates structural collapse or is in imminent danger of collapse.

Direct Economic Losses For Buildings

Capital Stock Losses				Income Losses					
Cost Structural Damage	Cost Non-structural Damage	Cost Contents Damage	Inventory Loss	Loss Ratio %	Relocation Loss	Capital Loss	Wages Losses	Rental Income Loss	Total Loss
$769,000	$6,450,000	$3,428,000	$102,000	0.4	$331,000	$234,000	$264,000	$241,000	$11,818,000

Hospital Functionality (There are no hospitals for San Juan County in the HAZUS database.)

		At Day 1		At day 3		At day 7		At day 30		At day 90	
	Total Number of Beds	Number of Beds	%	Number of Beds	%	Number of Beds	%	Number of Beds	%	Number of Beds	%
Large											
Medium											
Small											
Total	**0**	**0**	**—**	**0**	**—**	**0**	**—**	**0**	**—**	**0**	**—**

Large Hospital: > 150 beds
Medium Hospital: 50-150 beds
Small Hospital: < 50 beds

Highway Bridge Damage

Average Number for Damage State					
Total Number of Bridges	None	Slight	Moderate	Extensive	Complete
9	9	0	0	0	0

Scenario: M 7.4 South Whidbey Island Fault
San Juan County

Fire Following Analysis Summary Report

Number of Ignitions	Population Exposed	Value Exposed
1	0	$62,000

Potable Water System Performance

	Number of Households Without Water									
Total Households	At day 1		At day 3		At day 7		At day 30		At day 90	
	Count	%	Count	%	Count	%	Count	%	Count	%
7,076	0	0	0	0	0	0	0	0	0	0

Electrical Power System Performance

	Number of Households Without Power									
Total Households	At day 1		At day 3		At day 7		At day 30		At day 90	
	Count	%	Count	%	Count	%	Count	%	Count	%
7,076	0	0	0	0	0	0	0	0	0	0

Debris Summary Report

Brick, Wood & Others (tons)	Concrete & Steel (tons)	Total (tons)	Number of Truckloads
1,000	1,000	2,000	80

Shelter Summary Report

Number of Displaced Households	Number of People Needing Short Term Shelter
0	0

Essential Facilities Functionality

	Count	Functionality (%)
		At Day 1
Emergency Operation Center	1	92
Fire Station Facilities	16	92
Police Station Facilities	1	92
School	16	94

Scenario: M 7.4 South Whidbey Island Fault
Skagit County

Casualties Summary Report

	Injury Severity Level														
	Severity 1			Severity 2			Severity 3			Severity 4			Total		
	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM
Commuting	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
Commercial	0	9	6	0	1	1	0	0	0	0	0	0	0	10	7
Educational	0	2	0	0	0	0	0	0	0	0	0	0	0	2	0
Hotels	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Industrial	0	2	1	0	0	0	0	0	0	0	0	0	0	2	1
Other-Residential	6	1	2	1	0	0	0	0	0	0	0	0	7	1	2
Single Family	4	1	1	0	0	0	0	0	0	0	0	0	4	1	1
Total Skagit	**10**	**15**	**10**	**1**	**1**	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**11**	**16**	**12**

Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
Severity Level 2: Injuries will require hospitalization but are not considered life-threatening.
Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
Severity Level 4: Victims are killed by the earthquake

Number of Buildings Damaged by General Occupancy Class

	Number of Buildings					
	None	Slight	Moderate	Extensive	Complete	Total
Agriculture	272	40	16	3	0	331
Commercial	2,025	364	130	11	0	2,530
Education	67	9	4	0	0	80
Government	43	7	3	0	0	53
Industrial	670	121	55	7	0	853
Religion	147	20	7	1	0	175
Other Residential	9,261	1,605	576	56	2	11,500
Single Family	28,687	2,081	41	6	2	30,817

Structural damage states vary by building type. See HAZUS Technical Manual Vol. I. “Complete damage” indicates structural collapse or is in imminent danger of collapse.

Direct Economic Losses For Buildings

Capital Stock Losses				Income Losses					
Cost Structural Damage	Cost Non-structural Damage	Cost Contents Damage	Inventory Loss	Loss Ratio %	Relocation Loss	Capital Loss	Wages Losses	Rental Income Loss	Total Loss
$8,643,000	$42,923,000	$21,759,000	$981,000	0.64	$4,562,000	$2,667,000	$3,190,000	$2,688,000	$87,412,000

Hospital Functionality

		At Day 1		At day 3		At day 7		At day 30		At day 90	
	Total Number of Beds	Number of Beds	%	Number of Beds	%	Number of Beds	%	Number of Beds	%	Number of Beds	%
Large	159	148	93	149	94	159	100	159	100	159	100
Medium											
Small	78	74	95	74	95	78	100	78	100	78	100
Total	**237**	**222**	**—**	**223**	**—**	**237**	**—**	**237**	**—**	**237**	**—**

Large Hospital: > 150 beds
Medium Hospital: 50-150 beds
Small Hospital: < 50 beds

Highway Bridge Damage

Average Number for Damage State					
Total Number of Bridges	None	Slight	Moderate	Extensive	Complete
212 (211*)	199	6	4	2	0

* values in parentheses include rounding error.

Scenario: M 7.4 South Whidbey Island Fault
Skagit County

Fire Following Analysis Summary Report

Number of Ignitions	Population Exposed	Value Exposed
5	59	$4,347,000

Potable Water System Performance

	Number of Households Without Water									
Total Households	At day 1		At day 3		At day 7		At day 30		At day 90	
	Count	%	Count	%	Count	%	Count	%	Count	%
42,003	15	0	0	0	0	0	0	0	0	0

Electrical Power System Performance

	Number of Households Without Power									
Total Households	At day 1		At day 3		At day 7		At day 30		At day 90	
	Count	%	Count	%	Count	%	Count	%	Count	%
42,003	0	0	0	0	0	0	0	0	0	0

Debris Summary Report

Brick, Wood & Others (tons)	Concrete & Steel (tons)	Total (tons)	Number of Truckloads
8,000	9,000	17,000	680

Shelter Summary Report

Number of Displaced Households	Number of People Needing Short Term Shelter
206	132

Essential Facilities Functionality

	Count	Functionality (%)
		At Day 1
Emergency Operation Center	1	92
Fire Station Facilities	37	94
Police Station Facilities	9	91
School	59	93

Scenario: M 7.4 South Whidbey Island Fault
Snohomish County

Casualties Summary Report

	Injury Severity Level														
	Severity 1			Severity 2			Severity 3			Severity 4			Total		
	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM
Commuting	0	3	105	0	4	155	1	7	244	0	1	48	1	15	552
Commercial	41	2,430	1,981	11	680	559	2	110	91	4	215	174	58	3435	2805
Educational	0	681	81	0	197	23	0	33	4	0	64	8	0	975	116
Hotels	17	3	5	5	1	1	1	0	0	1	0	0	24	4	6
Industrial	76	559	349	22	162	101	4	26	16	7	51	32	109	798	498
Other-Residential	1,078	206	402	261	50	98	30	6	12	56	11	22	1425	273	534
Single Family	436	76	165	54	9	21	4	1	1	7	1	3	501	87	190
Total Snohomish	**1,648**	**3,958**	**3,088**	**353**	**1,103**	**958**	**42**	**183**	**368**	**75**	**343**	**287**	**2118**	**5587**	**4701**

Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
Severity Level 2: Injuries will require hospitalization but are not considered life-threatening.
Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
Severity Level 4: Victims are killed by the earthquake

Number of Buildings Damaged by General Occupancy Class

	Number of Buildings					
	None	Slight	Moderate	Extensive	Complete	Total
Agriculture	271	214	190	103	52	830
Commercial	2,099	2,006	3,048	1,900	902	9,955
Education	82	80	92	58	31	343
Government	41	40	61	37	16	195
Industrial	791	691	1,112	771	397	3,762
Religion	169	162	175	101	46	653
Other Residential	8,338	9,547	9,101	5,824	2,844	35,654
Single Family	59,777	67,284	26,796	1,567	146	155,570

Structural damage states vary by building type. See HAZUS Technical Manual Vol. I. “Complete damage” indicates structural collapse or is in imminent danger of collapse.

Direct Economic Losses For Buildings

Capital Stock Losses				Income Losses					
Cost Structural Damage	Cost Non-structural Damage	Cost Contents Damage	Inventory Loss	Loss Ratio %	Relocation Loss	Capital Loss	Wages Losses	Rental Income Loss	Total Loss
$810,350,000	$3,341,078,000	$1,321,575,000	$53,185,000	8.81	$476,162,000	$220,099,000	$267,233,000	$259,485,000	$6,749,166,000

Hospital Functionality

		At Day 1		At day 3		At day 7		At day 30		At day 90	
	Total Number of Beds	Number of Beds	%	Number of Beds	%	Number of Beds	%	Number of Beds	%	Number of Beds	%
Large	738	209	28	218	30	605	82	736	100	737	100
Medium	72	15	21	16	22	53	73	68	94	69	97
Small	48	43	90	43	90	48	100	48	100	48	100
Total	**858**	**267**	**—**	**277**	**—**	**706**	**—**	**852**	**—**	**854**	**—**

Large Hospital: > 150 beds
Medium Hospital: 50-150 beds
Small Hospital: < 50 beds

Highway Bridge Damage

Average Number for Damage State					
Total Number of Bridges	None	Slight	Moderate	Extensive	Complete
466	326	33	28	42	37

Scenario: M 7.4 South Whidbey Island Fault
Snohomish County

Fire Following Analysis Summary Report

Number of Ignitions	Population Exposed	Value Exposed
48	7,150	$475,160,000

Potable Water System Performance

	Number of Households Without Water									
Total Households	At day 1		At day 3		At day 7		At day 30		At day 90	
	Count	%	Count	%	Count	%	Count	%	Count	%
245,054	95,765	39	87,376	36	69,474	28	0	0	0	0

Electrical Power System Performance

	Number of Households Without Power									
Total Households	At day 1		At day 3		At day 7		At day 30		At day 90	
	Count	%	Count	%	Count	%	Count	%	Count	%
245,054	87,577	36	59,715	24	28,605	12	6553	2.7	111	0

Debris Summary Report

Brick, Wood & Others (tons)	Concrete & Steel (tons)	Total (tons)	Number of Truckloads
707,000	1,514,000	2,221,000	88,840

Shelter Summary Report

Number of Displaced Households	Number of People Needing Short Term Shelter
8,142	4,824

Essential Facilities Functionality

	Count	Functionality (%)
		At Day 1
Emergency Operation Center	3	22
Fire Station Facilities	75	46
Police Station Facilities	23	49
School	248	39

Scenario: M 7.4 South Whidbey Island Fault
Whatcom County

Casualties Summary Report

	Injury Severity Level														
	Severity 1			Severity 2			Severity 3			Severity 4			Total		
	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM	2:00 AM	2:00 PM	5:00 PM
Commuting	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial	0	1	1	0	0	0	0	0	0	0	0	0	0	1	1
Educational	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hotels	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Industrial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other-Residential	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Single Family	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Whatcom	**1**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**1**

Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
Severity Level 2: Injuries will require hospitalization but are not considered life-threatening.
Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
Severity Level 4: Victims are killed by the earthquake

Number of Buildings Damaged by General Occupancy Class

	Number of Buildings					
	None	Slight	Moderate	Extensive	Complete	Total
Agriculture	497	12	2	0	0	511
Commercial	4,009	116	17	0	0	4,142
Education	168	4	1	0	0	173
Government	81	3	0	0	0	84
Industrial	1,348	44	8	0	0	1,400
Religion	279	6	1	0	0	286
Other Residential	18,983	781	98	0	0	19,862
Single Family	46,959	292	2	0	0	47,253

Structural damage states vary by building type. See HAZUS Technical Manual Vol. I. “Complete damage” indicates structural collapse or is in imminent danger of collapse.

Direct Economic Losses For Buildings

Capital Stock Losses				Income Losses					
Cost Structural Damage	Cost Non-structural Damage	Cost Contents Damage	Inventory Loss	Loss Ratio %	Relocation Loss	Capital Loss	Wages Losses	Rental Income Loss	Total Loss
$1,389,000	$13,419,000	$7,781,000	$327,000	0.1	$587,000	$411,000	$484,000	$481,000	$24,879,000

Hospital Functionality

		At Day 1		At day 3		At day 7		At day 30		At day 90	
	Total Number of Beds	Number of Beds	%	Number of Beds	%	Number of Beds	%	Number of Beds	%	Number of Beds	%
Large	270	267	99	267	99	270	100	270	100	270	100
Medium											
Small	47	47	100	47	100	47	100	47	100	47	100
Total	**317**	**314**	**—**	**314**	**—**	**317**	**—**	**317**	**—**	**317**	**—**

Large Hospital: > 150 beds
Medium Hospital: 50-150 beds
Small Hospital: < 50 beds

Highway Bridge Damage

	Average Number for Damage State				
Total Number of Bridges	None	Slight	Moderate	Extensive	Complete
279 (276*)	273	3	0	0	0

* values in parentheses include rounding error.

Scenario: M 7.4 South Whidbey Island Fault
Whatcom County

Fire Following Analysis Summary Report

Number of Ignitions	Population Exposed	Value Exposed
9	1,038	$87,528,000

Potable Water System Performance

	Number of Households Without Water									
Total Households	At day 1		At day 3		At day 7		At day 30		At day 90	
	Count	%	Count	%	Count	%	Count	%	Count	%
71,691	0	0	0	0	0	0	0	0	0	0

Electrical Power System Performance

	Number of Households Without Power									
Total Households	At day 1		At day 3		At day 7		At day 30		At day 90	
	Count	%	Count	%	Count	%	Count	%	Count	%
71,691	0	0	0	0	0	0	0	0	0	0

Debris Summary Report

Brick, Wood & Others (tons)	Concrete & Steel (tons)	Total (tons)	Number of Truckloads
2,000	1,000	3,000	120

Shelter Summary Report

Number of Displaced Households	Number of People Needing Short Term Shelter
0	0

Essential Facilities Functionality

	Count	Functionality (%)
		At Day 1
Emergency Operation Center	2	99
Fire Station Facilities	51	99
Police Station Facilities	9	99
School	91	99

HAZUS-MH: Earthquake Event Report

Region Name: SWIF_NewMR4M74

Earthquake Scenario: SWIF7.4

Print Date: March 10, 2010

Totals only reflect data for those census tracts/blocks included in the user's study region.

Table of Contents

General Description of the Region

HAZUS is a regional earthquake loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of HAZUS is to provide a methodology and software application to develop earthquake losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from earthquakes and to prepare for emergency response and recovery.

The earthquake loss estimates provided in this report was based on a region that includes 23 county(ies) from the following state(s):

Washington

Note:
Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 36,495.82 square miles and contains 1,084 census tracts. There are over 2,043 thousand households in the region and has a total population of 5,283,432 people (2005 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 1,877 thousand buildings in the region with a total building replacement value (excluding contents) of 402,081 (millions of dollars). Approximately 92.00 % of the buildings (and 0.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 151,145 and 21,726 (millions of dollars) , respectively.

Building and Lifeline Inventory

Building Inventory

HAZUS estimates that there are 1,877 thousand buildings in the region which have an aggregate total replacement value of 402,081 (millions of dollars) . Appendix B provides a general distribution of the building value by State and County.

In terms of building construction types found in the region, wood frame construction makes up 81% of the building inventory. The remaining percentage is distributed between the other general building types.

Critical Facility Inventory

HAZUS breaks critical facilities into two (2) groups: essential facilities and high potential loss (HPL) facilities. Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 75 hospitals in the region with a total bed capacity of 14,258 beds. There are 2,254 schools, 938 fire stations, 226 police stations and 55 emergency operation facilities. With respect to HPL facilities, there are 450 dams identified within the region. Of these, 146 of the dams are classified as 'high hazard'. The inventory also includes 839 hazardous material sites, 0 military installations and 0 nuclear power plants.

Transportation and Utility Lifeline Inventory

Within HAZUS, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data are provided in Tables 1 and 2.

The total value of the lifeline inventory is over 172,871.00 (millions of dollars). This inventory includes over 9,562 kilometers of highways, 4,996 bridges, 286,170 kilometers of pipes.

Table 1: Transportation System Lifeline Inventory

System	Component	# locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	4,996	90,051.60
	Segments	3,454	53,323.90
	Tunnels	29	67.00
		Subtotal	**143,442.50**
Railways	Bridges	77	20.00
	Facilities	68	181.10
	Segments	1,407	2,642.40
	Tunnels	0	0.00
		Subtotal	**2,843.50**
Light Rail	Bridges	0	0.00
	Facilities	38	101.20
	Segments	48	203.90
	Tunnels	0	0.00
		Subtotal	**305.00**
Bus	Facilities	45	54.00
		Subtotal	**54.00**
Ferry	Facilities	45	59.90
		Subtotal	**59.90**
Port	Facilities	486	970.50
		Subtotal	**970.50**
Airport	Facilities	62	660.40
	Runways	74	2,809.30
		Subtotal	**3,469.70**
		Total	**151,145.10**

Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	2,861.70
	Facilities	41	1,501.80
	Pipelines	0	0.00
		Subtotal	**4,363.50**
Waste Water	Distribution Lines	NA	1,717.00
	Facilities	146	10,696.00
	Pipelines	0	0.00
		Subtotal	**12,413.00**
Natural Gas	Distribution Lines	NA	1,144.70
	Facilities	56	67.10
	Pipelines	0	0.00
		Subtotal	**1,211.80**
Oil Systems	Facilities	15	1.70
	Pipelines	0	0.00
		Subtotal	**1.70**
Electrical Power	Facilities	78	9,438.00
		Subtotal	**9,438.00**
Communication	Facilities	196	21.60
		Subtotal	**21.60**
		Total	**27,449.60**

Earthquake Scenario

HAZUS uses the following set of information to define the earthquake parameters used for the earthquake loss estimate provided in this report.

Scenario Name	SWIF7.4
Type of Earthquake	User-defined
Fault Name	NA
Historical Epicenter ID #	NA
Probabilistic Return Period	NA
Longitude of Epicenter	NA
Latitude of Epicenter	NA
Earthquake Magnitude	7.40
Depth (Km)	NA
Rupture Length (Km)	NA
Rupture Orientation (degrees)	NA
Attenuation Function	NA

Building Damage

HAZUS estimates that about 97,791 buildings will be at least moderately damaged. This is over 5.00 % of the total number of buildings in the region. There are an estimated 6,258 buildings that will be damaged beyond repair. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the HAZUS technical manual. Table 3 below summaries the expected damage by general occupancy for the buildings in the region. Table 4 summaries the expected damage by general building type.

Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	6,857	0.44	749	0.34	472	0.64	196	1.12	81	1.29
Commercial	74,710	4.80	11,253	5.05	8,310	11.22	3,310	18.91	1,251	20.00
Education	2,726	0.18	393	0.18	278	0.38	116	0.66	46	0.74
Government	1,954	0.13	186	0.08	146	0.20	61	0.35	22	0.36
Industrial	22,449	1.44	3,352	1.50	2,926	3.95	1,347	7.70	554	8.85
Other Residential	312,250	20.05	37,112	16.64	20,714	27.98	9,522	54.40	3,877	61.96
Religion	5,480	0.35	695	0.31	447	0.60	177	1.01	64	1.03
Single Family	1,130,596	72.61	169,246	75.90	40,738	55.03	2,774	15.85	362	5.78
Total	**1,557,021**		**222,985**		**74,031**		**17,502**		**6,258**	

Table 4: Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	1,280,409	82.23	188469	84.52	44,510	60.12	2,808	16.04	456	7.28
Steel	30,898	1.98	3996	1.79	3,640	4.92	1,554	8.88	480	7.67
Concrete	30,716	1.97	4157	1.86	3,016	4.07	1,229	7.02	451	7.21
Precast	21,456	1.38	3052	1.37	2,801	3.78	1,308	7.47	478	7.64
RM	58,284	3.74	4852	2.18	4,356	5.88	1,891	10.81	432	6.91
URM	9,631	0.62	2528	1.13	1,770	2.39	834	4.77	614	9.81
MH	125,628	8.07	15931	7.14	13,939	18.83	7,878	45.01	3,347	53.48
Total	**1,557,021**		**222,985**		**74,031**		**17,502**		**6,258**	

*Note:
RM Reinforced Masonry
URM Unreinforced Masonry
MH Manufactured Housing

Essential Facility Damage

Before the earthquake, the region had 14,258 hospital beds available for use. On the day of the earthquake, the model estimates that only 12,358 hospital beds (87.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 97.00% of the beds will be back in service. By 30 days, 100.00% will be operational.

Table 5: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on day 1
Hospitals	75	1	0	67
Schools	2,254	0	0	2,002
EOCs	55	0	0	50
PoliceStations	226	0	0	209
FireStations	938	0	0	864

Transportation and Utility Lifeline Damage

Table 6 provides damage estimates for the transportation system.

Table 6: Expected Damage to the Transportation Systems

System	Component		Number of Locations			
		Locations/ Segments	With at Least Mod. Damage	With Complete Damage	With Functionality > 50 %	
					After Day 1	After Day 7
Highway	Segments	3,454	0	0	3,454	3,454
	Bridges	4,996	69	7	4,932	4,954
	Tunnels	29	0	0	29	29
Railways	Segments	1,407	0	0	1,407	1,407
	Bridges	77	0	0	77	77
	Tunnels	0	0	0	0	0
	Facilities	68	0	0	68	68
Light Rail	Segments	48	0	0	48	48
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	38	2	0	38	38
Bus	Facilities	45	5	0	42	45
Ferry	Facilities	45	5	0	41	45
Port	Facilities	486	9	0	484	486
Airport	Facilities	62	4	0	60	62
	Runways	74	0	0	74	74

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 7-9 provide information on the damage to the utility lifeline systems. Table 7 provides damage to the utility system facilities. Table 8 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, HAZUS performs a simplified system performance analysis. Table 9 provides a summary of the system performance information.

Table 7 : Expected Utility System Facility Damage

System	# of Locations				
	Total #	With at Least Moderate Damage	With Complete Damage	with Functionality > 50 %	
				After Day 1	After Day 7
Potable Water	41	5	0	32	41
Waste Water	146	9	0	122	145
Natural Gas	56	6	0	50	54
Oil Systems	15	0	0	14	15
Electrical Power	78	6	0	69	78
Communication	196	4	0	194	196

Table 8 : Expected Utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (kms)	Number of Leaks	Number of Breaks
Potable Water	143,085	4530	1864
Waste Water	85,851	3583	1474
Natural Gas	57,234	3830	1576
Oil	0	0	0

Table 9: Expected Potable Water and Electric Power System Performance

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	2,043,617	188,457	165,501	119,624	0	0
Electric Power		115,230	77,363	36,429	8,302	149

Induced Earthquake Damage

Fire Following Earthquake

Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. HAZUS uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 185 ignitions that will burn about 7.56 sq. mi 0.02 % of the region's total area.) The model also estimates that the fires will displace about 22,148 people and burn about 1,705 (millions of dollars) of building value.

Debris Generation

HAZUS estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 3.570 million tons of debris will be generated. Of the total amount, Brick/Wood comprises 35.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 142,960,000 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

Social Impact

Shelter Requirement

HAZUS estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 13,948 households to be displaced due to the earthquake. Of these, 8,106 people (out of a total population of 5,283,432) will seek temporary shelter in public shelters.

Casualties

HAZUS estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 10 provides a summary of the casualties estimated for this earthquake

Table 10: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	60	15	2	4
	Commuting	0	1	1	0
	Educational	0	0	0	0
	Hotels	31	8	1	2
	Industrial	104	28	4	9
	Other-Residential	1,465	322	34	64
	Single Family	756	83	5	10
	Total	**2,416**	**456**	**48**	**90**
2 PM	Commercial	3,555	902	138	271
	Commuting	4	6	9	2
	Educational	948	258	41	81
	Hotels	6	1	0	0
	Industrial	766	207	32	63
	Other-Residential	274	61	7	13
	Single Family	131	14	1	2
	Total	**5,683**	**1,449**	**229**	**432**
5 PM	Commercial	2,855	740	116	221
	Commuting	152	232	356	71
	Educational	113	30	5	9
	Hotels	9	2	0	1
	Industrial	479	129	20	39
	Other-Residential	544	121	13	24
	Single Family	285	32	2	4
	Total	**4,438**	**1,286**	**513**	**369**

Economic Loss

The total economic loss estimated for the earthquake is 15,585.84 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 12,538.79 (millions of dollars); 18 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 54 % of the total loss. Table 11 below provides a summary of the losses associated with the building damage.

Table 11: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Loses							
	Wage	0.00	29.12	428.14	23.81	21.90	502.97
	Capital-Related	0.00	12.36	391.46	14.16	5.74	423.72
	Rental	61.39	150.64	233.12	8.94	10.14	464.24
	Relocation	225.14	142.39	340.99	43.44	80.83	832.79
	Subtotal	**286.53**	**334.51**	**1,393.71**	**90.36**	**118.60**	**2,223.71**
Capital Stock Loses							
	Structural	447.13	269.55	471.71	136.24	96.19	1,420.81
	Non_Structural	2,623.05	1,427.41	1,429.88	468.60	266.88	6,215.82
	Content	1,084.99	358.67	711.50	301.59	137.39	2,594.13
	Inventory	0.00	0.00	19.73	61.37	3.21	84.31
	Subtotal	**4,155.17**	**2,055.63**	**2,632.81**	**967.80**	**503.67**	**10,315.07**
	Total	**4,441.70**	**2,390.14**	**4,026.52**	**1,058.17**	**622.26**	**12,538.79**

Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, HAZUS computes the direct repair cost for each component only. There are no losses computed by HAZUS for business interruption due to lifeline outages. Tables 12 & 13 provide a detailed breakdown in the expected lifeline losses.

HAZUS estimates the long-term economic impacts to the region for 15 years after the earthquake. The model quantifies this information in terms of income and employment changes within the region. Table 14 presents the results of the region for the given earthquake.

Table 12: Transportation System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	53,323.90	$79.31	0.15
	Bridges	90,051.61	$1768.28	1.96
	Tunnels	66.98	$0.29	0.43
	Subtotal	**143442.50**	**1,847.90**	
Railways	Segments	2,642.42	$4.54	0.17
	Bridges	19.99	$0.06	0.31
	Tunnels	0.00	$0.00	0.00
	Facilities	181.08	$14.39	7.95
	Subtotal	**2843.50**	**19.00**	
Light Rail	Segments	203.85	$1.74	0.85
	Bridges	0.00	$0.00	0.00
	Tunnels	0.00	$0.00	0.00
	Facilities	101.19	$13.62	13.46
	Subtotal	**305.00**	**15.40**	
Bus	Facilities	53.96	$6.07	11.24
	Subtotal	**54.00**	**6.10**	
Ferry	Facilities	59.90	$7.48	12.49
	Subtotal	**59.90**	**7.50**	
Port	Facilities	970.54	$112.26	11.57
	Subtotal	**970.50**	**112.30**	
Airport	Facilities	660.36	$50.92	7.71
	Runways	2,809.34	$8.76	0.31
	Subtotal	**3469.70**	**59.70**	
	Total	**151145.10**	**2,067.70**	

Table 13: Utility System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.00	$0.00	0.00
	Facilities	1,501.80	$109.92	7.32
	Distribution Lines	2,861.70	$27.70	0.97
	Subtotal	**4,363.54**	**$137.62**	
Waste Water	Pipelines	0.00	$0.00	0.00
	Facilities	10,696.00	$375.42	3.51
	Distribution Lines	1,717.00	$21.91	1.28
	Subtotal	**12,412.98**	**$397.32**	
Natural Gas	Pipelines	0.00	$0.00	0.00
	Facilities	67.10	$3.11	4.63
	Distribution Lines	1,144.70	$23.42	2.05
	Subtotal	**1,211.83**	**$26.53**	
Oil Systems	Pipelines	0.00	$0.00	0.00
	Facilities	1.70	$0.07	4.51
	Subtotal	**1.65**	**$0.07**	
Electrical Power	Facilities	9,438.00	$417.18	4.42
	Subtotal	**9,438.00**	**$417.18**	
Communication	Facilities	21.60	$0.62	2.86
	Subtotal	**21.56**	**$0.62**	
	Total	**27,449.55**	**$979.34**	

Table 14. Indirect Economic Impact with outside aid

(Employment as # of people and Income in millions of $)

LOSS		Total	%
First Year			
	Employment Impact	2,153,720	119.64
	Income Impact	6,470	7.25
Second Year			
	Employment Impact	826,046	45.89
	Income Impact	3,424	3.84
Third Year			
	Employment Impact	19,373	1.08
	Income Impact	683	0.77
Fourth Year			
	Employment Impact	1,092	0.06
	Income Impact	(301)	-0.34
Fifth Year			
	Employment Impact	63	0.00
	Income Impact	(356)	-0.40
Years 6 to 15			
	Employment Impact	0	0.00
	Income Impact	(359)	-0.40

Appendix A: County Listing for the Region

Chelan,WA

Clallam,WA

Clark,WA

Cowlitz,WA

Grays Harbor,WA

Island,WA

Jefferson,WA

King,WA

Kitsap,WA

Kittitas,WA

Klickitat,WA

Lewis,WA

Mason,WA

Pacific,WA

Pierce,WA

San Juan,WA

Skagit,WA

Skamania,WA

Snohomish,WA

Thurston,WA

Wahkiakum,WA

Whatcom,WA

Yakima,WA

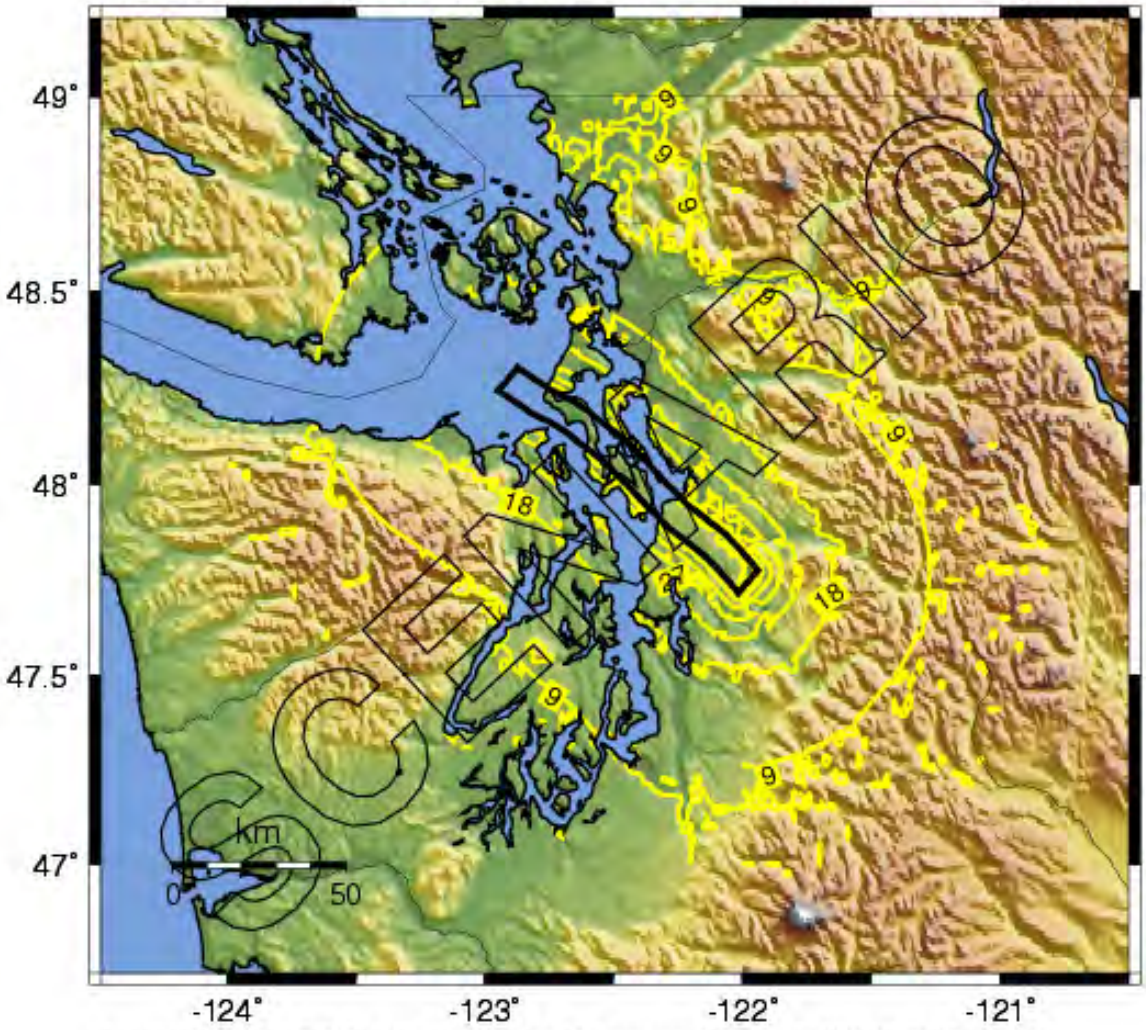
Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Washington					
	Chelan	68,646	3,915	1,524	5,439
	Clallam	68,232	3,789	1,128	4,917
	Clark	395,707	21,358	5,081	26,439
	Cowlitz	96,113	5,167	1,575	6,742
	Grays Harbor	69,881	3,866	1,228	5,095
	Island	78,149	5,289	842	6,132
	Jefferson	28,169	1,741	517	2,258
	King	1,828,516	123,492	35,829	159,322
	Kitsap	245,278	14,460	2,974	17,435
	Kittitas	37,701	2,087	539	2,627
	Klickitat	20,162	908	287	1,195
	Lewis	70,750	3,424	1,286	4,711
	Mason	53,236	3,094	593	3,687
	Pacific	20,855	1,443	384	1,828
	Pierce	757,734	42,208	10,185	52,394
	San Juan	15,413	1,454	350	1,805
	Skagit	111,356	6,119	1,896	8,015
	Skamania	10,300	551	118	670
	Snohomish	661,444	38,562	8,570	47,132
	Thurston	226,721	12,793	3,286	16,080
	Wahkiakum	3,900	204	62	267
	Whatcom	185,545	10,528	3,715	14,244
	Yakima	229,624	9,899	3,738	13,637
Total State		**5,283,432**	**316,351**	**85,707**	**402,071**
Total Region		**5,283,432**	**316,351**	**85,707**	**402,071**

-- Earthquake Planning Scenario --

Peak Accel. Map (in %g) for Swif7.4 Scenario

Scenario Date: Mon Apr 27, 2009 12:00:00 GMT M 7.4 N48.05 W122.47 Depth: 0.0km

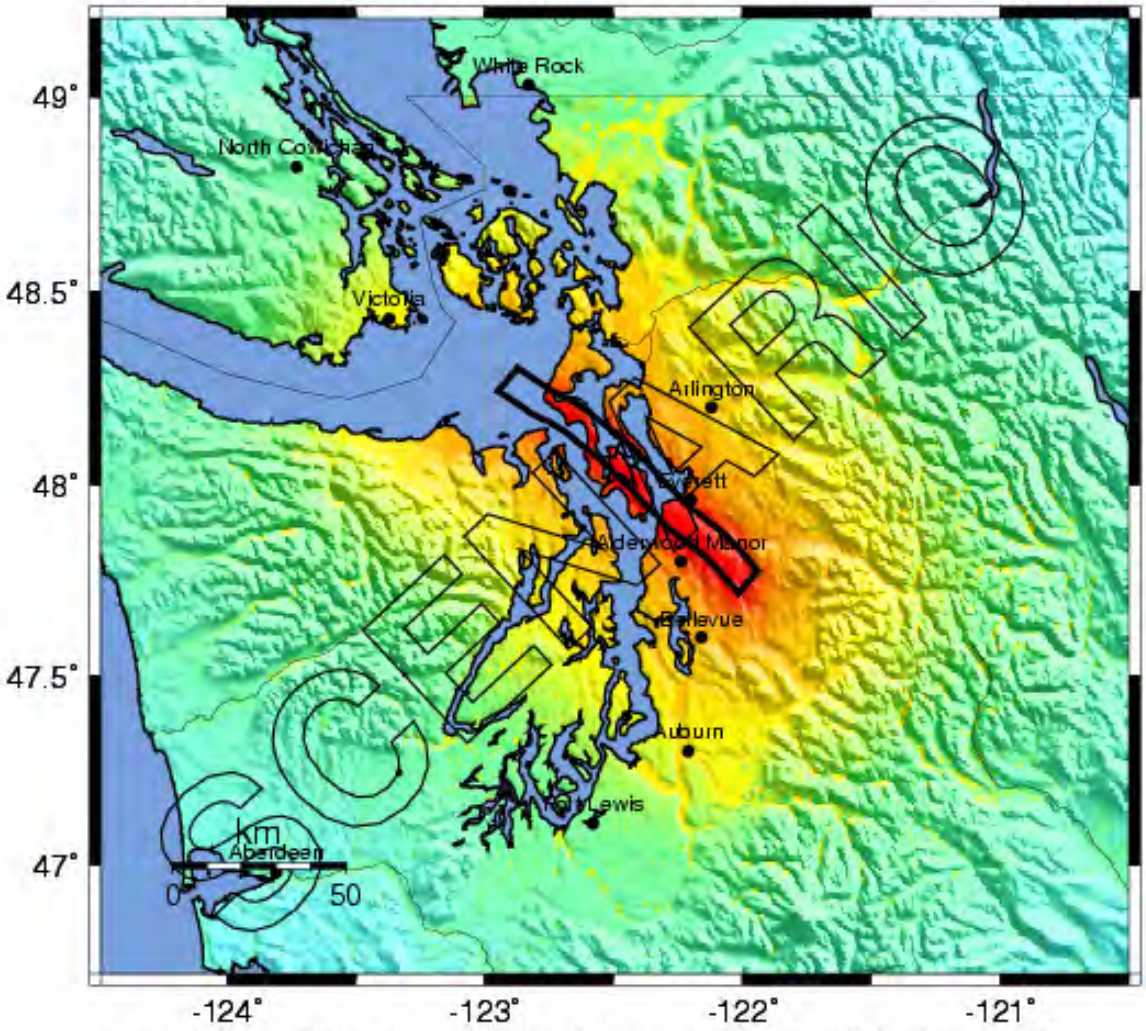


PLANNING SCENARIO ONLY -- Map Version 10 Processed Thu May 7, 2009 03:50:25 AM MDT

-- Earthquake Planning Scenario --

ShakeMap for Swif7.4 Scenario

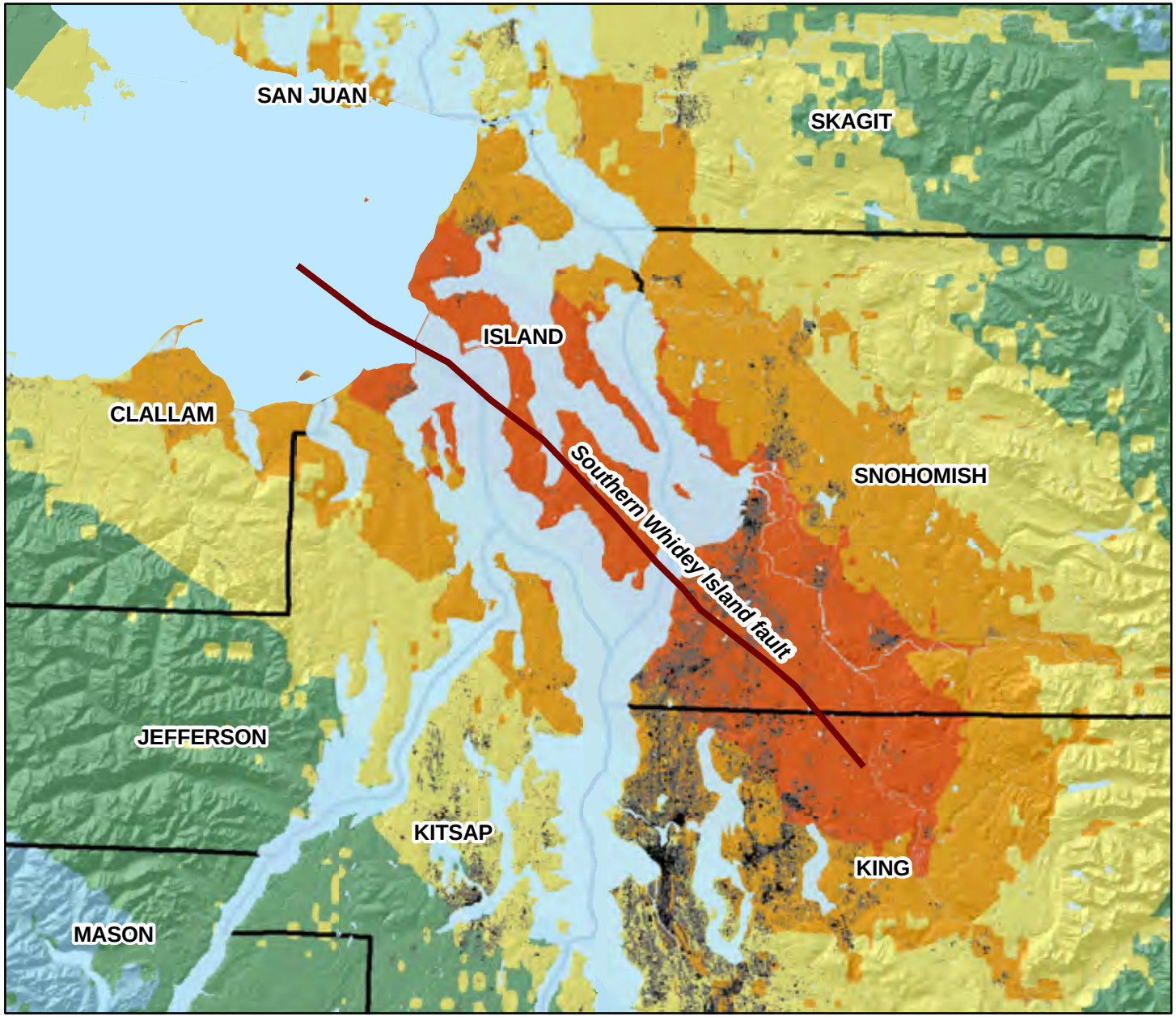
Scenario Date: Mon Apr 27, 2009 12:00:00 GMT M 7.4 N48.05 W122.47 Depth: 0.0km



PLANNING SCENARIO ONLY -- Map Version 10 Processed Thu May 7, 2009 03:50:25 AM MDT

PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	*<.17*	*.17-1.4*	*1.4-3.9*	*3.9-9.2*	*9.2-18*	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	*8.1-16*	*16-31*	*31-60*	*60-116*	*>116*
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

Population Density and Ground Shaking Intensities - Earthquake Scenario: Washington



M 7.4 Southern Whidbey Island Fault

Population Density

People

- 0 - 4
- 4 - 20
- 20 - 40
- 40 - 50
- > 50

Counties

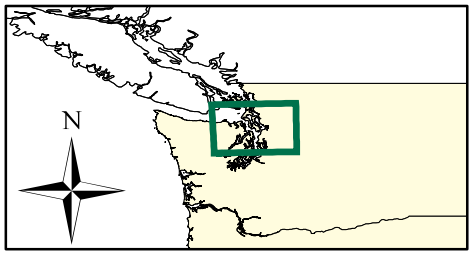
Fault source

MM Intensity

- IV Light
- V Moderate
- VI Strong
- VII Very Strong
- VIII Severe

0 2 4 8 12 16 20 24 Miles

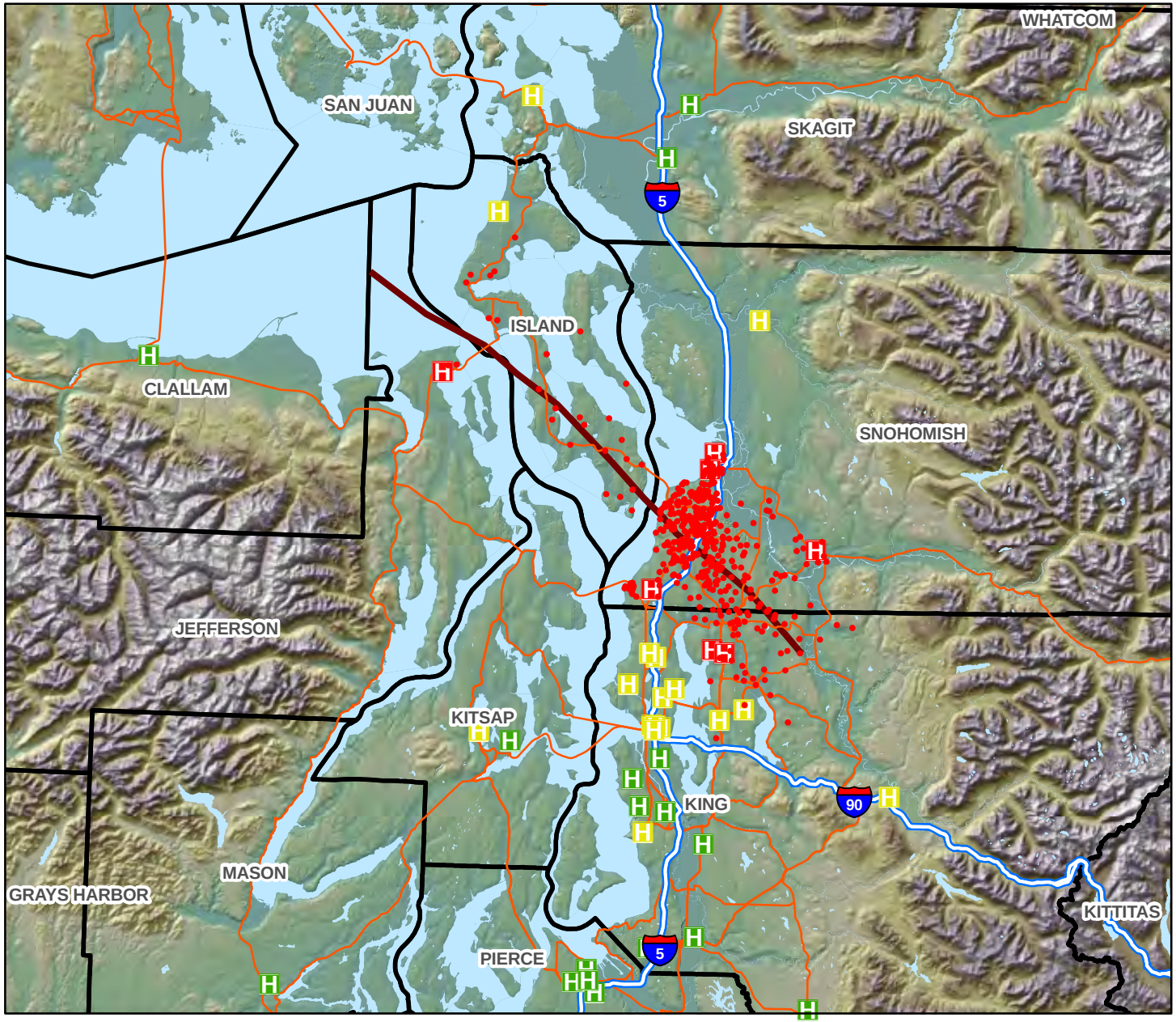
10-26-09 Fabia Terra, URS Corporation



Sources: 2009 HAZUS runs by URS Corporation, MMI Map USGS 2009
Projection: NAD83 Harn State Plane Washington 4602 (feet)

Figure 1

Deaths (2 pm) and Impaired Hospitals (Day 1) - Earthquake Scenario: Washington



M 7.4 Southern Whidbey Island Fault

1 Dot = 1 Death
(Severity Level 4 delineated by census tract)

Roads
Interstate
Highway

Counties
Fault source

Impaired Hospitals at Day 1

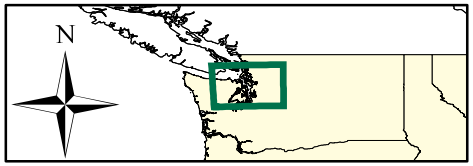
Damage is expressed as the probability that a given hospital will be functional at Day 1.

< 50%
50 - 90%
> 90%

County	Injuries Requiring Hospital Treatment (2 PM)	Fatalities (2 PM)
Clallam	10	0
Island	426	27
Jefferson	50	2
King	1,584	58
Kitsap	16	0
Pierce	12	0
Skagit	15	0
Snohomish	5,244	344
Total	**7,357**	**431**

0 2.5 5 10 15 20 25 30
Miles

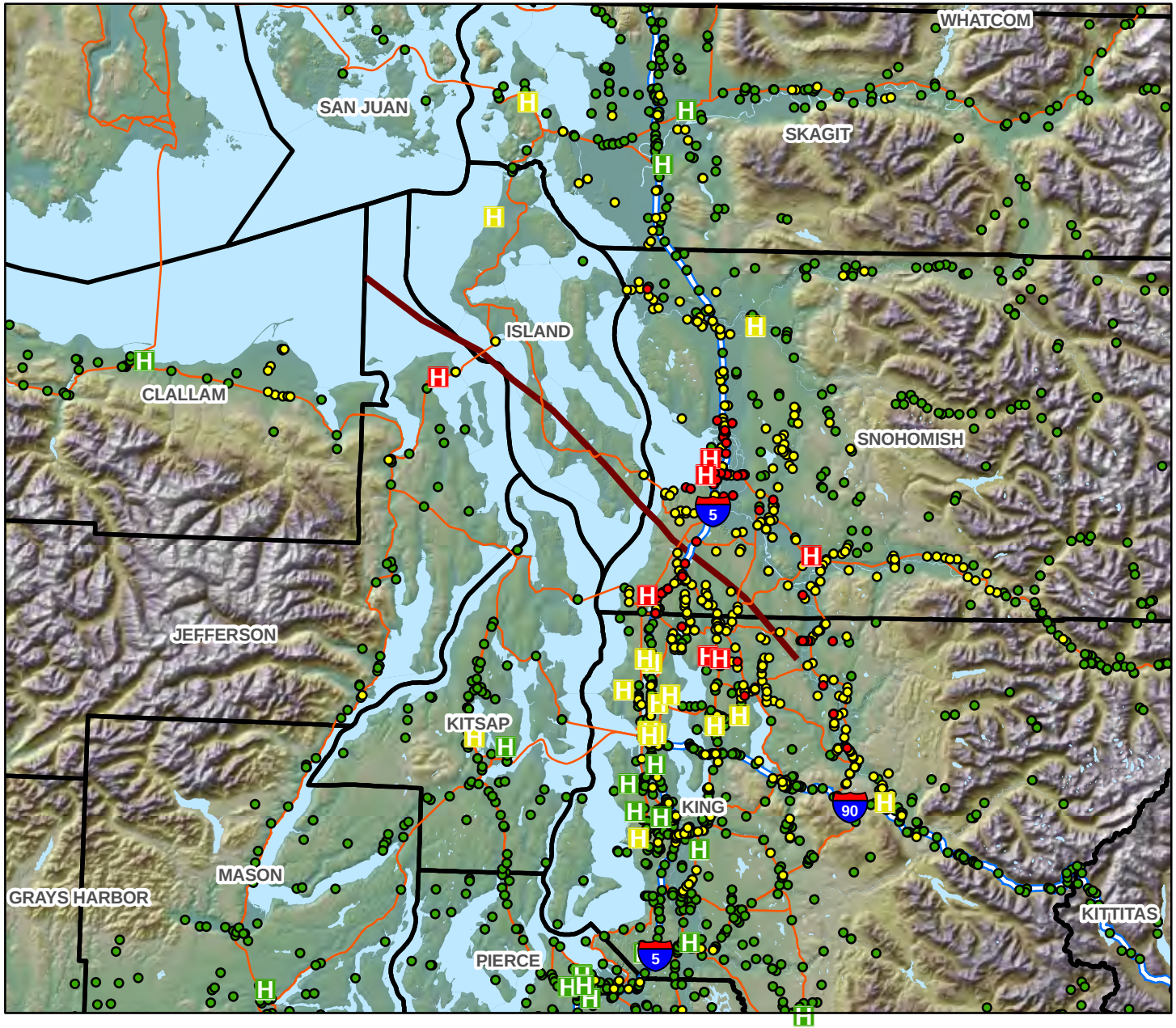
10-26-09 Fabia Terra, URS Corporation



Sources: 2009 HAZUS runs by URS Corporation, Highways HSIP Gold 2007
Projection: NAD83 Harn State Plane Washington 4602 (feet)

Figure 2

Impaired Hospitals (Day 1), Hospital Bed Availability, & Bridge Functionality - Earthquake Scenario: Washington



M 7.4 Southern Whidbey Island Fault

Highway Bridge Functionality (Day 1)

Damage is expressd as the probability that a given bridge segment will be functional at Day 1.

Bridge Seg.
- < 50%
- 50% - 90%
- > 90%

Counties

Fault source

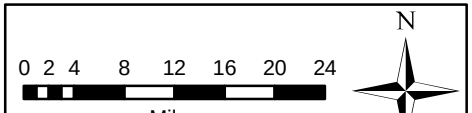
Roads
- Interstate
- Highway

Impaired Hospitals at Day 1

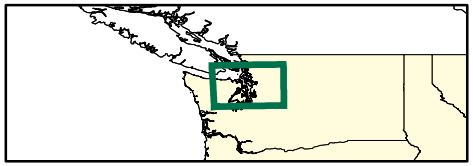
Damage is expressed as the probability that a given hospital will be functional at Day 1.

- < 50%
- 50 - 90%
- > 90%

County	Total # Hospital Beds	Hospital Beds Available	Injuries Requiring Hospital Treatment 2pm
Clallam	178	176	10
Island	77	22	426
Jefferson	43	8	50
King	5,727	4,959	1,584
Kitsap	352	287	16
Mason	68	68	0
Pierce	3,270	3,258	12
Skagit	237	223	15
Snohomish	858	398	5,244
Total	**10,810**	**9,399**	**7,357**



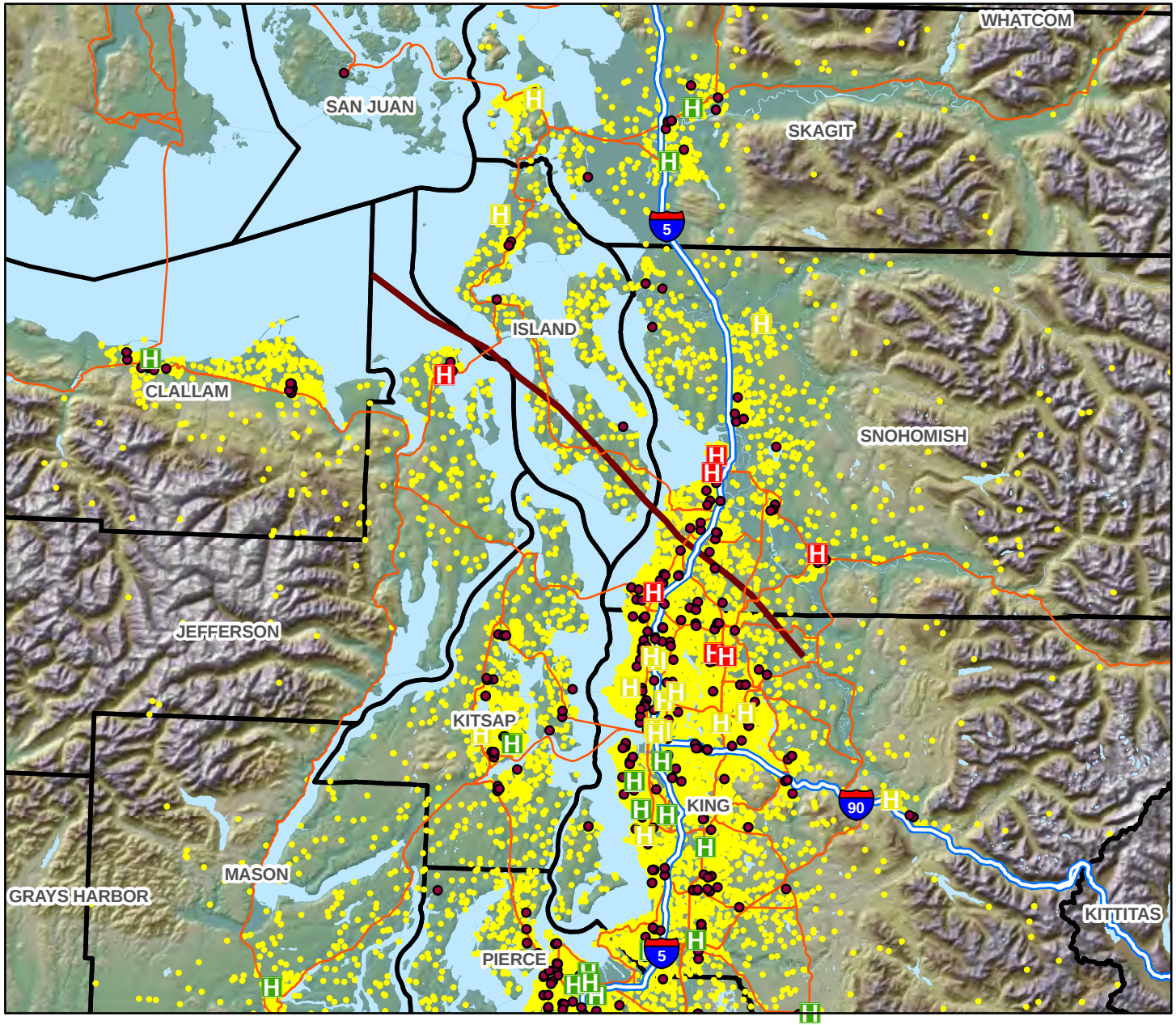
10-26-09 Fabia Terra, URS Corporation



Sources: 2009 HAZUS runs by URS Corporation, Highways HSIP Gold 2007
Projection: NAD83 Harn State Plane Washington 4602 (feet)

Figure 3

Distribution of Elderly, Impaired Hospitals (Day 1), & Hospital Bed Availability - Earthquake Scenario: Washington



M 7.4 Southern Whidbey Island Fault

1 Dot = 30 People over 65

Counties

Fault source

Nursing Home

Roads

Interstate

Highway

Impaired Hospitals at Day 1

Damage is expressed as the probability that a given hospital will be functional at Day 1.

H < 50%

H 50 - 90%

H > 90%

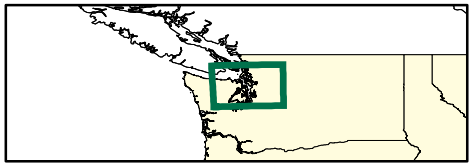
County	Total # Hospital Beds	Hospital Beds Available	Injuries Requiring Hospital Treatment 2pm
Clallam	178	176	10
Island	77	22	426
Jefferson	43	8	50
King	5,727	4,959	1,584
Kitsap	352	287	16
Mason	68	68	0
Pierce	3,270	3,258	12
Skagit	237	223	15
Snohomish	858	398	5,244
Total	**10,810**	**9,399**	**7,357**

N

0 2 4 8 12 16 20 24

Miles

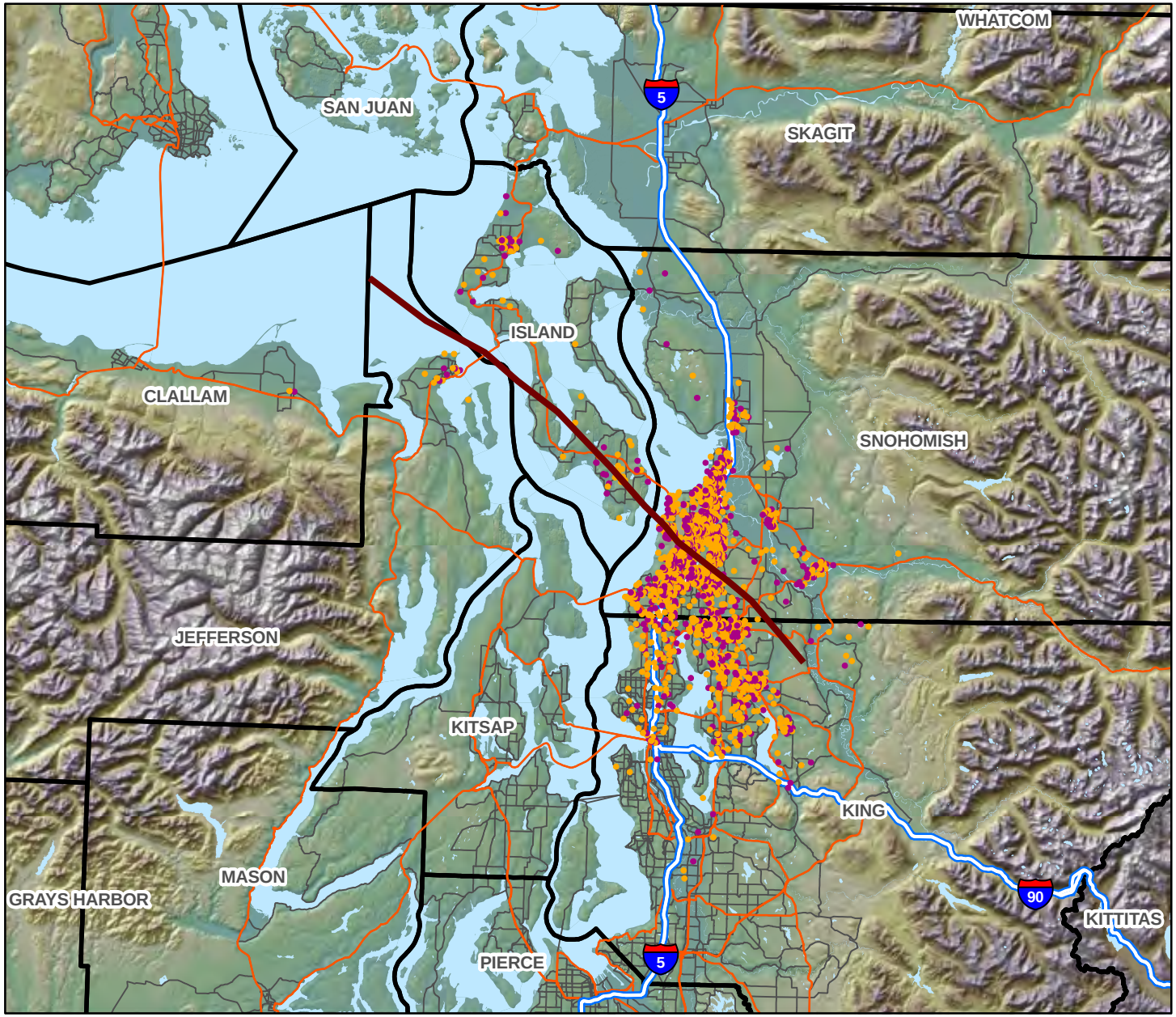
10-26-09 Fabia Terra, URS Corporation



Sources: 2009 HAZUS runs by URS Corporation, Highways and Nursing homes HSIP Gold 2007
Projection: NAD83 Harn State Plane Washington 4602 (feet)

Figure 4

Estimated Displaced Households & Short Term Public Shelter Needs - Earthquake Scenario: Washington



M 7.4 Southern Whidbey Island Fault

	Total #
Public Shelter Needs (Individuals)	8,106
Displaced Households	13,948

1 Dot = 10 Displaced Households*

1 Dot = 10 Public Shelter Needs (Individuals)*

* delineated by census tract

Counties

Fault source

Roads

Interstate

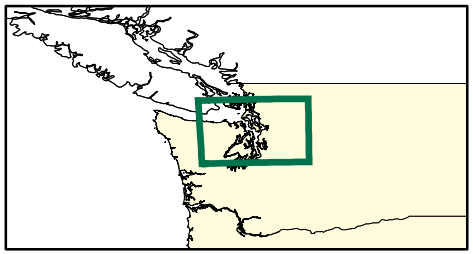
Highway

Major Road

N

0 4 8 12 16 20 24 Miles

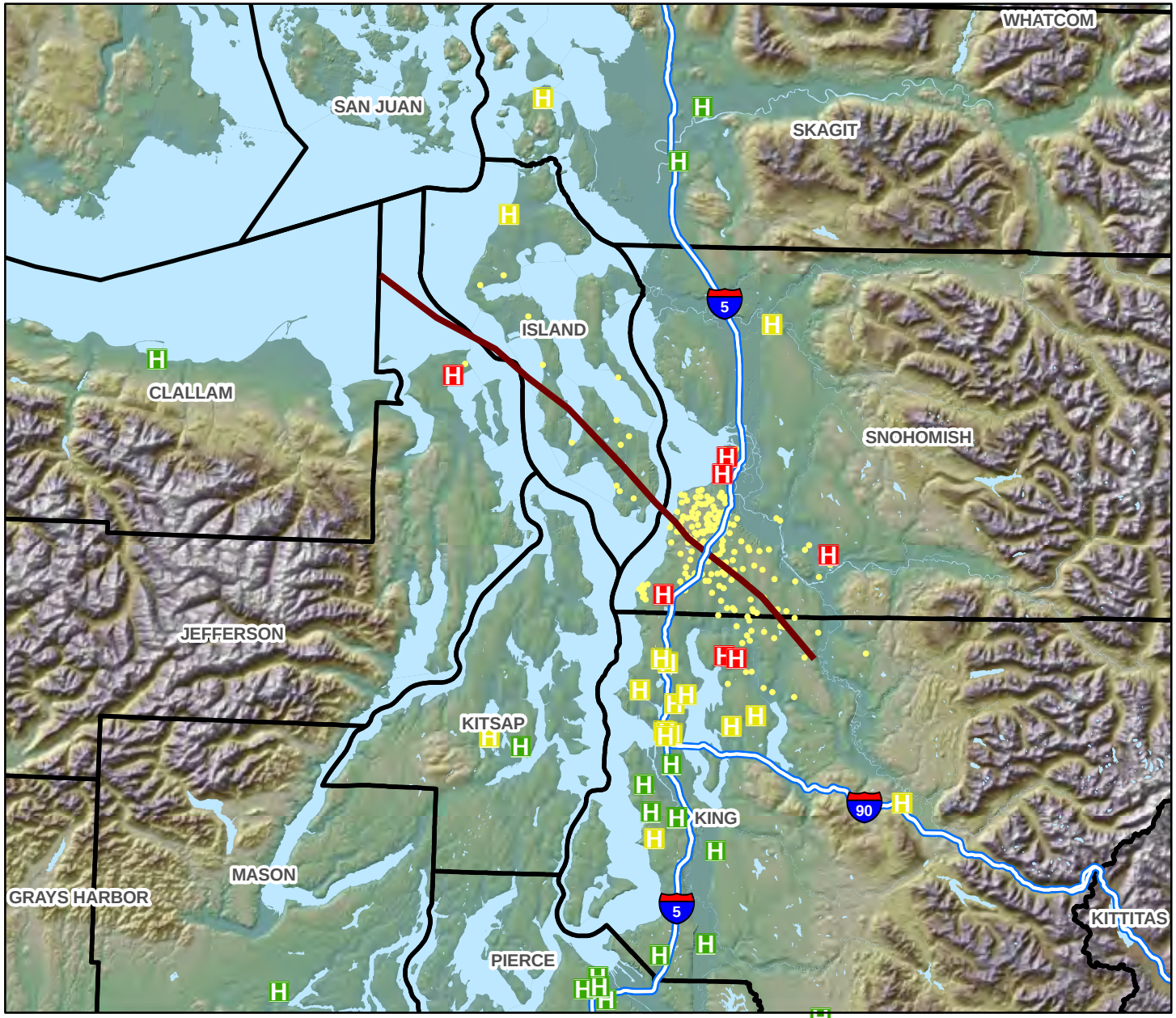
10-26-09 Fabia Terra, URS Corporation



Sources: 2009 HAZUS runs by URS Corporation, Highways HSIP Gold 2007
Projection: NAD83 Harn State Plane Washington 4602 (feet)

Figure 5

Injuries, Collapsed Structures, and Impaired Hospitals - Earthquake Scenario: Washington



M 7.4 Southern Whidbey Is. Fault Eq.

Impaired Hospitals (Day1)

H < 50%
H 50 - 90%
H > 90%

Damage is expressed as the probability that a given hospital will be functional on Day 1.

1 Dot = 1 Life Threatening Injury (Severtiy Level 3*)

*Severity Level 3 is defined as injuries that require hospitalization and can become life threatening if not promptly treated.

Requiring Hospital Treatment**	Immediate Life Threatening Injuries**
7,357	229

**Totals for counties in view extent.

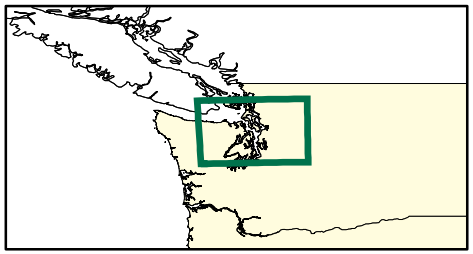
Structure Type	Red (Complete)	Collapse Rates for Complete Damage	Total Collapse
Wood	456	3%	14
Steel	480	6%	29
Concrete	451	10%	45
Precast	478	13%	62
Reinforced Masonry	432	10%	43
Unreinforced Masonry	614	15%	92
Manufactured Housing	3,347	3%	100
Total	6,258		385

Counties — Fault source

N

0 2 4 8 12 16 20 24 Miles

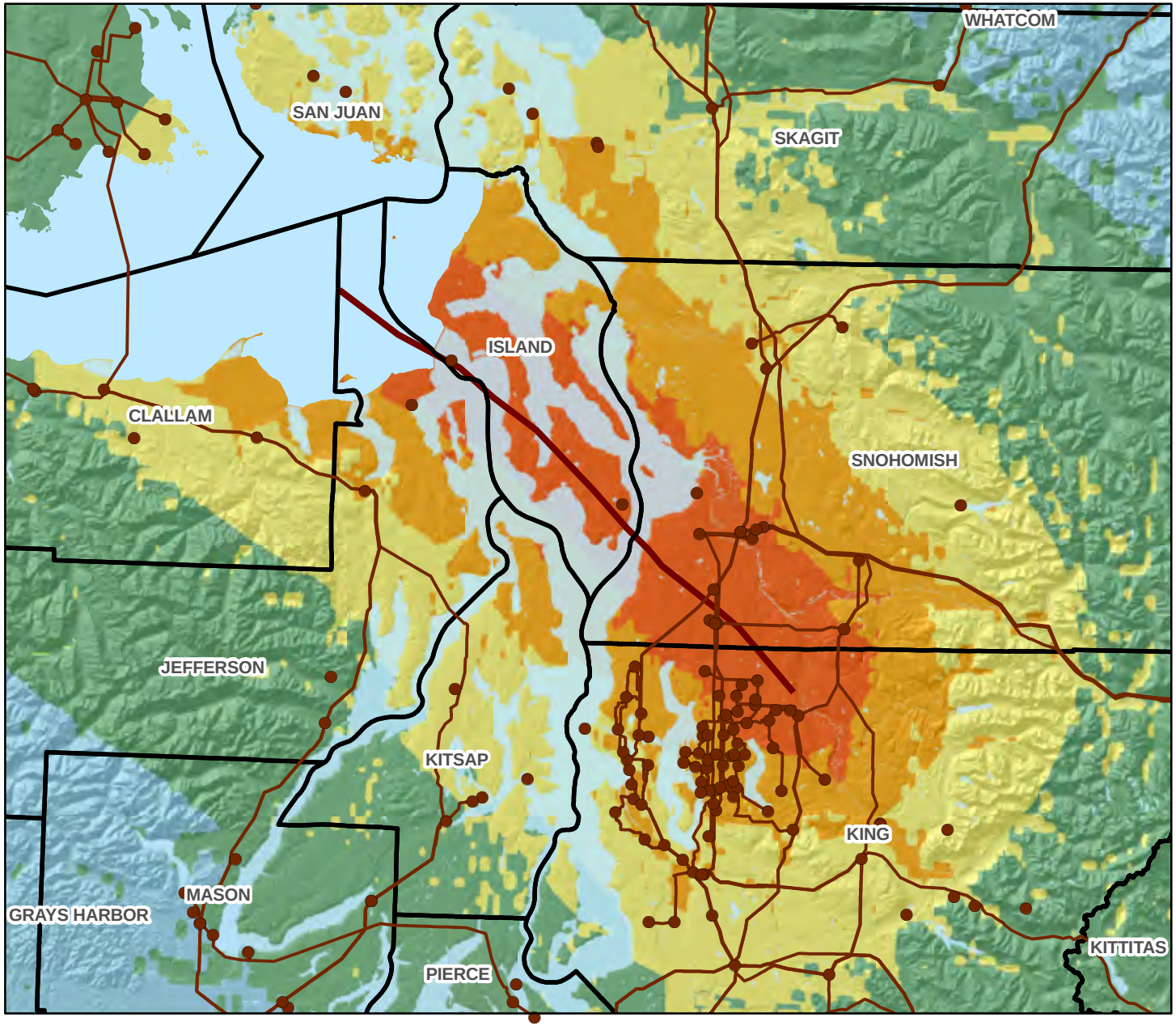
10-26-09 Fabia Terra, URS Corporation



Sources: 2009 HAZUS runs by URS Corporation, Highways HSIP Gold 2007
Projection: NAD83 Harn State Plane Washington 4602 (feet)

Figure 6

Power Lines and Facilities, Households Without Electricity, and Ground Shaking Intensities - Earthquake Scenario: Washington



M 7.4 Southern Whidbey Island Fault

Power Lines

Power Facilities

MM Intensity

IV Light

V Moderate

VI Strong

VII Very Strong

VIII Severe

Number of Households without Electricity

Island	11,482
Jefferson	1,949
King	14,222
Snohomish	87,577

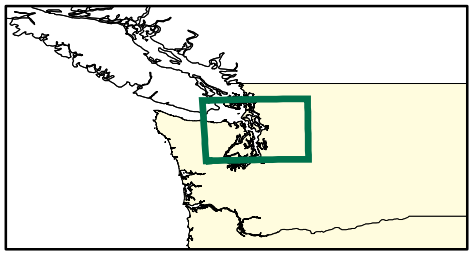
Counties

Fault source

N

0 2.5 5 10 15 20 25 30 Miles

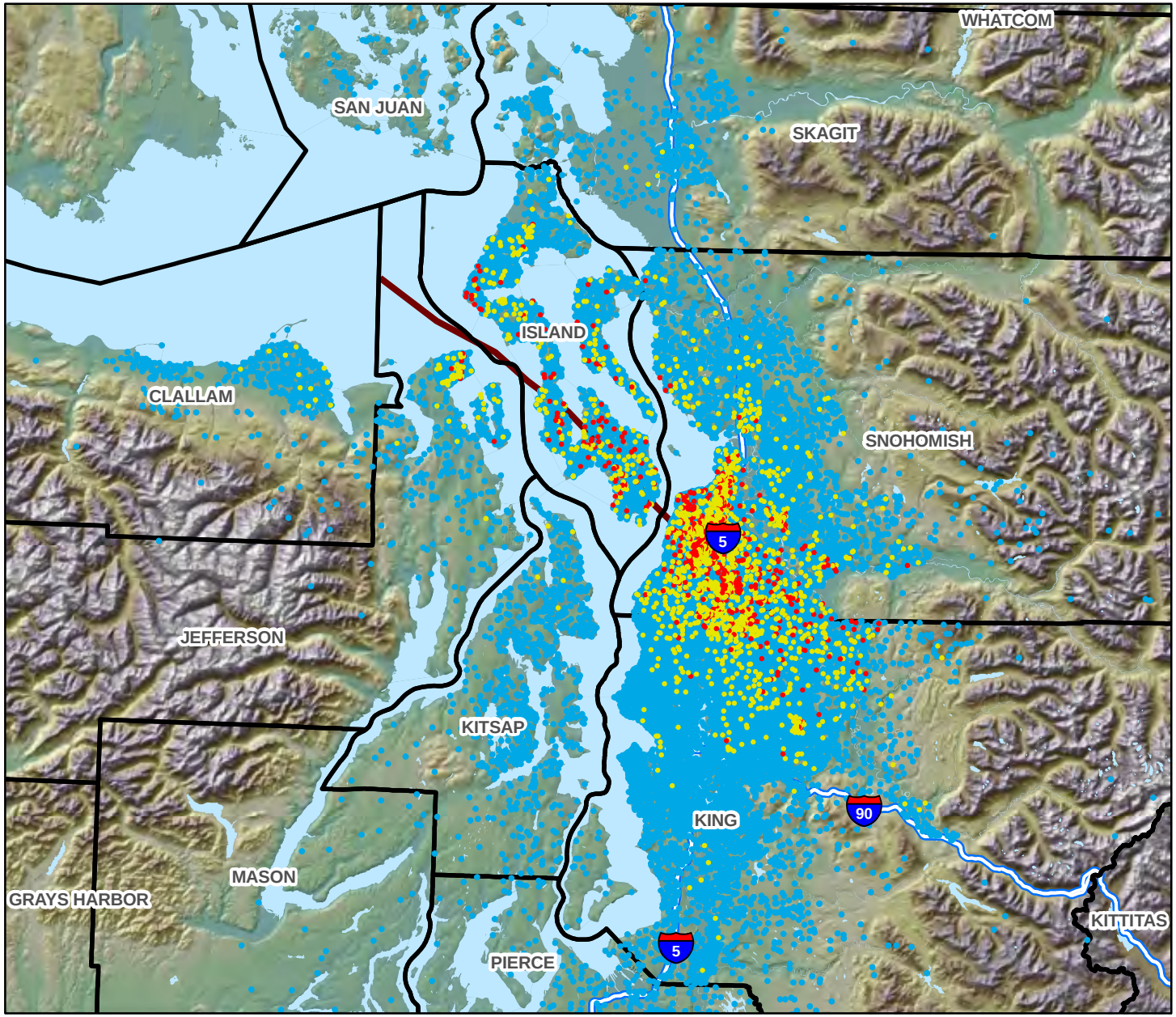
10-26-09 Fabia Terra, URS Corporation



Sources: 2009 HAZUS runs by URS Corporation, Power lines and facilities HSIP Gold 2007
Projection: NAD83 Harn State Plane Washington 4602 (feet)

Figure 7

Estimated Building Inspection Needs - Earthquake Scenario: Washington



M 7.4 Southern Whidbey Island Fault

	Estimated # of Structures	Estimated # of Inspectors Needed
Red (Complete)	6,258	42
Yellow (Extensive)	17,502	233
Light Blue (Slight/ Moderate)	297,019	1,980
Total	320,779	2,255

*Estimated number of inspectors needed to complete inspections in 30 days.

1 Dot = 10 buildings (by census tract)

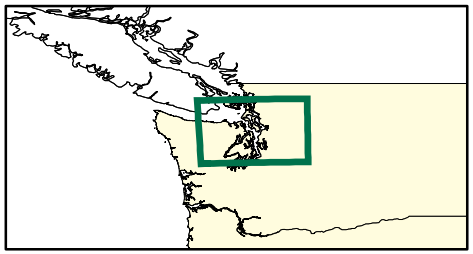
Red Tag (Complete Damage)
Yellow Tag (Extensive Damage)
Blue Tag (Slight/Moderate Damage)

N

Counties
Fault source

0 2 4 8 12 16 20 24 Miles

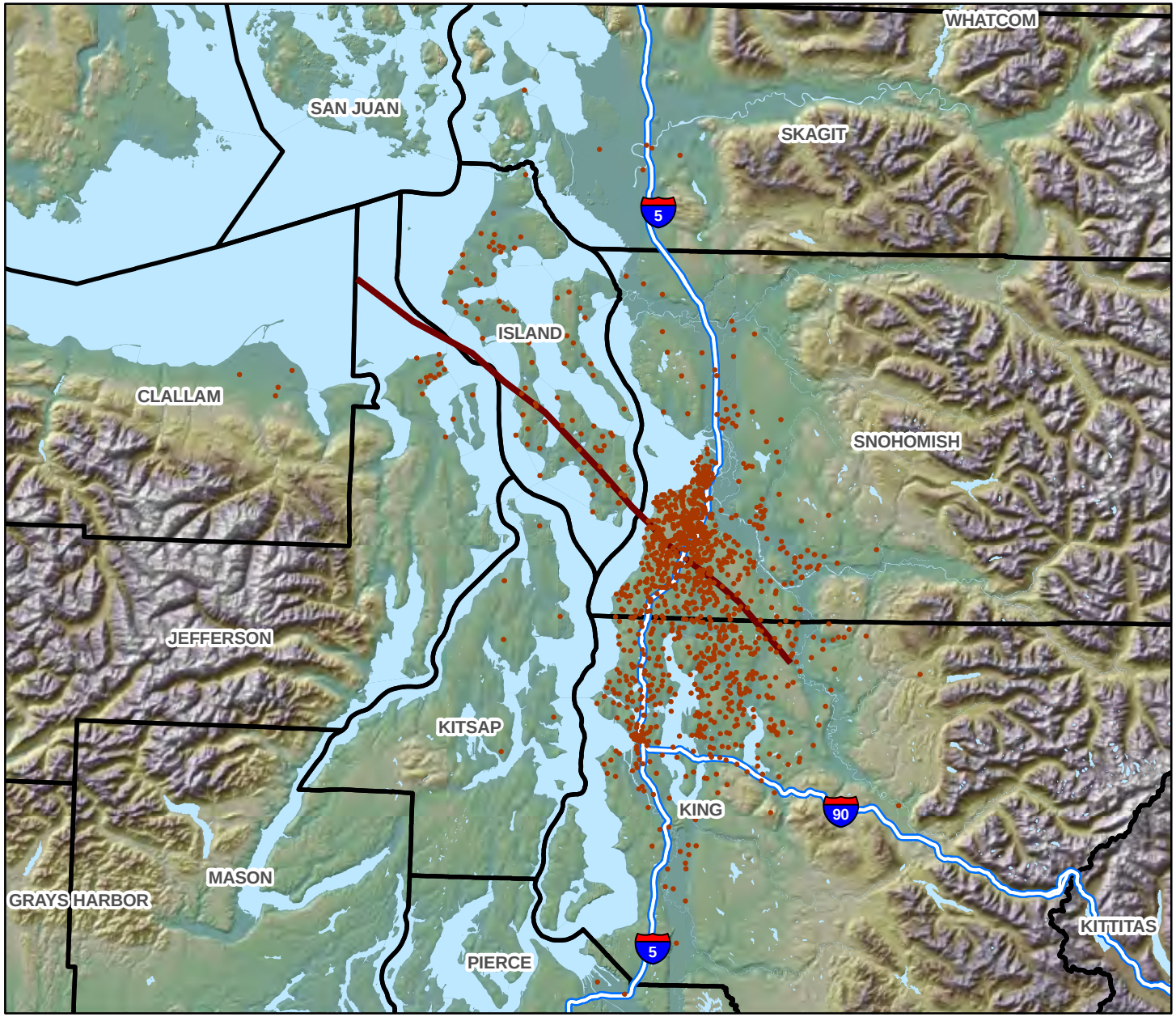
10-26-09 Fabia Terra, URS Corporation



Sources: 2009 HAZUS runs by URS Corporation, Highways HSIP Gold 2007
Projection: NAD83 Harn State Plane Washington 4602 (feet)

Figure 8

Direct Building Economic Loss - Earthquake Scenario: Washington



M 7.4 Southern Whidbey Island Fault

1 Dot = $10,000,000 worth of vulnerable building stock (by census tract)

County	Cost Strucutral Damage	Cost Non-Structural Damage	Total Loss (Including Contents)
Clallam	$6 M	$28 M	$46 M
Island	$99 M	$411 M	$670 M
Jefferson	$17 M	$68 M	$115 M
King	$462 M	$2,186 M	$3,624 M
Kitsap	$9 M	$63 M	$104 M
Mason	$0 M	$1 M	$2 M
Pierce	$6 M	$50 M	$84 M
San Juan	$1 M	$6 M	$11 M
Skagit	$9 M	$43 M	$73 M
Snohomish	$810 M	$3,341 M	$5,473 M
Total	**$1,419 M**	**$6,198 M**	**$10,201 M**

* All values are millions of dollars

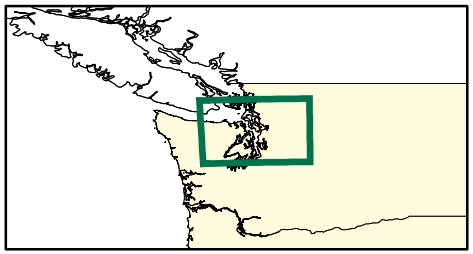
Counties

Fault source

N

0 5 10 15 20 25 30 Miles

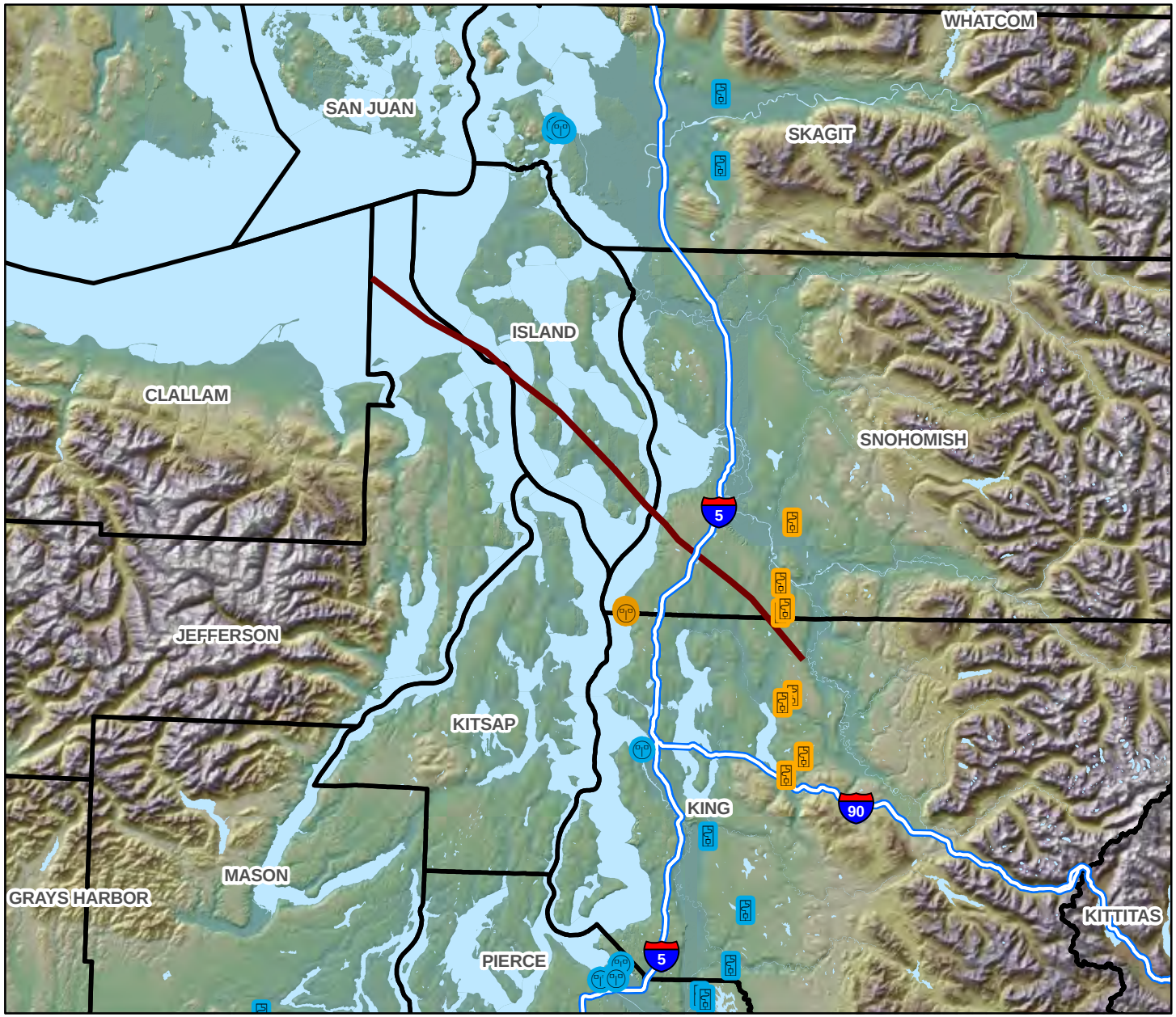
10-26-09 Fabia Terra, URS Corporation



Sources: 2009 HAZUS runs by URS Corporation, Highways HSIP Gold 2007
Projection: NAD83 Harn State Plane Washington 4602 (feet)

Figure 9

Natural Gas, and Oil Facility Damage - Earthquake Scenario: Washington



M 7.4 Southern Whidbey Island Fault

Utility Damage (at least moderate)

Damage is expressed as the percentage chance that a given Utility System will realize at least moderate damage.

Oil Facility

- < 20%
- 20% - 60%
- > 60%

Natural Gas Facility

- < 20%
- 20% - 60%
- > 60%

Counties

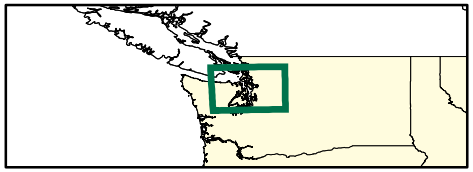
Fault source

N

0 5 10 15 20 25 30

Miles

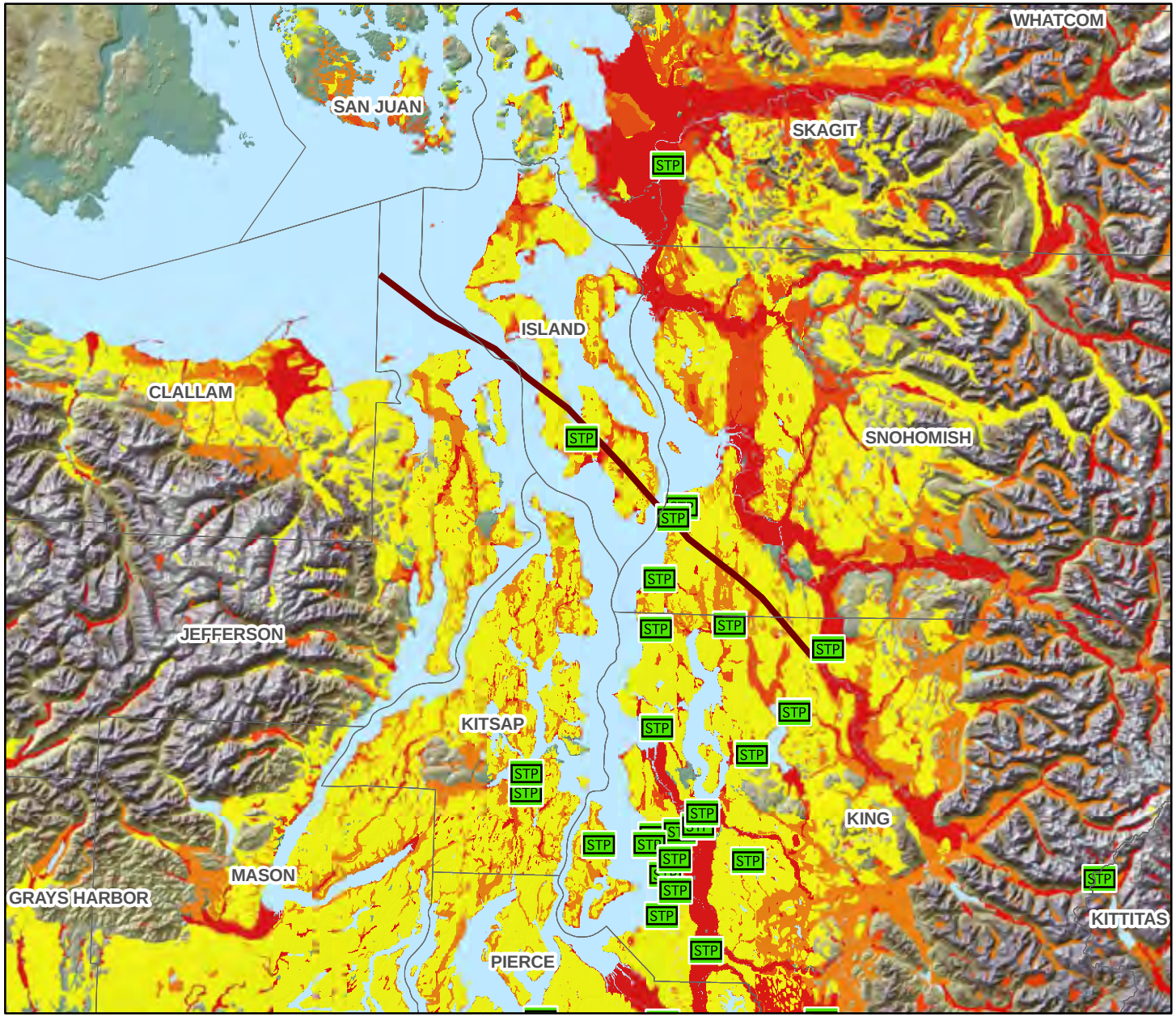
10-26-09 Fabia Terra, URS Corporation



Sources: 2009 HAZUS runs by URS Corporation, Highways HSIP Gold 2007
Projection: NAD83 Harn State Plane Washington 4602 (feet)

Figure 10

Sewage Treatment Facility Distribution, Households Without Potable Water, and Liquefaction Susceptibility - Earthquake Scenario: Washington



M 7.4 Southern Whidbey Island Fault

Liquefaction Susceptibility

- Low
- Moderate
- Low-Moderate
- High
- Sewage Treatment Facilities (STP)
- Counties
- Fault source

County	# Households without Potable Water (at Day 1)	Daily Potable Water Needs Per Person (Gallons/day)*	Number of Truckloads needed Daily
Island	23,626	70,878	15
King	69,051	207,153	44
Snohomish	95,765	287,295	60

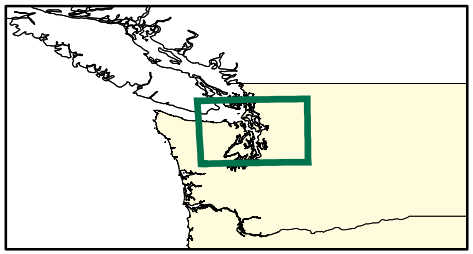
* Based on U.S. Army Corp Mission Guidebook
(Daily water is based on an esimated 3 people per household.
One truck can transport an esimated 5000 gallons of water.)

Note: Counties not listed had no potable water losses.

N

0 4 8 12 16 20 24 Miles

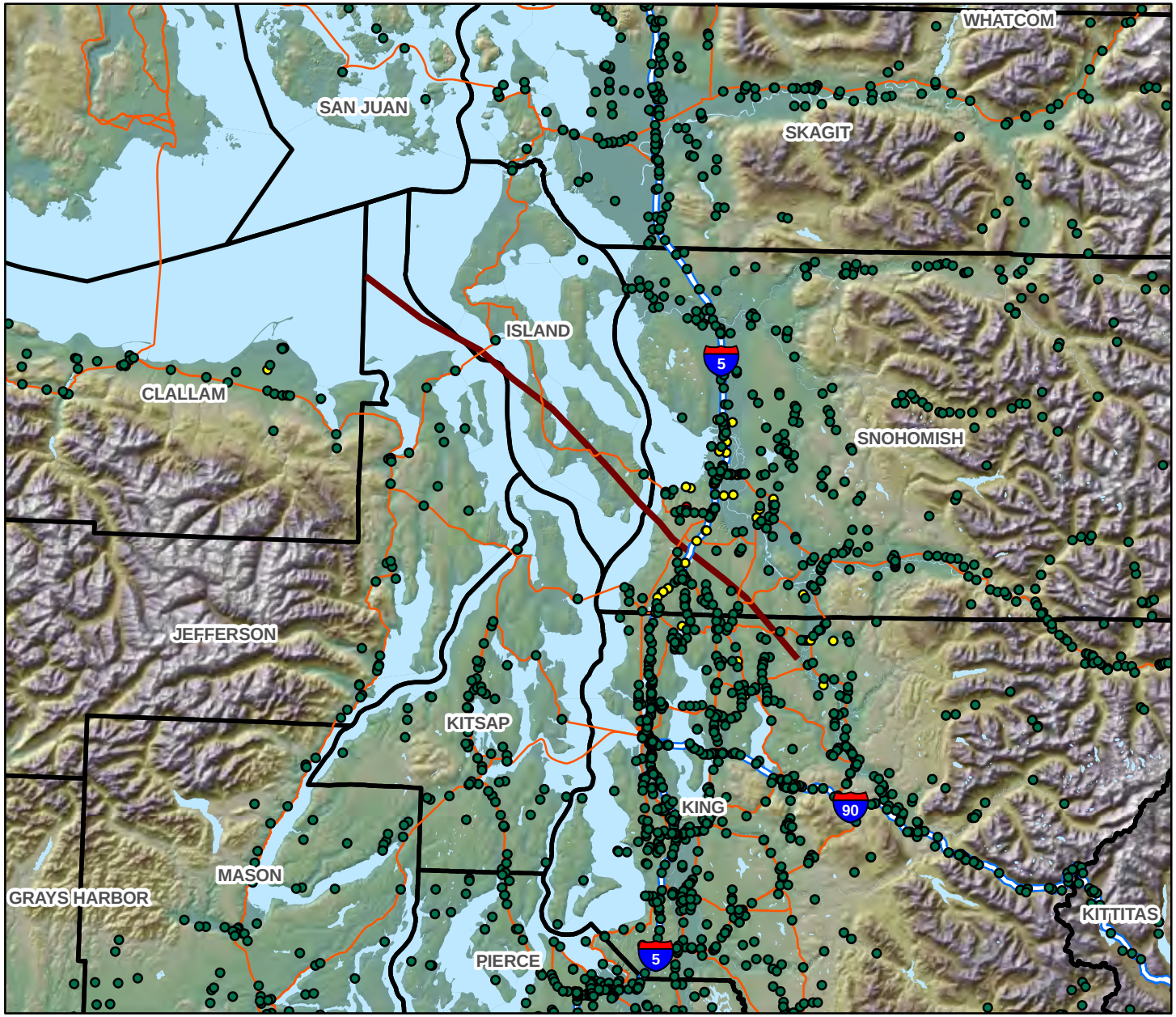
10-26-09 Fabia Terra, URS Corporation



Sources: 2009 HAZUS runs by URS Corporation, Sewage Treatment Faciiltes HSIP Gold 2007, Liquefaction The Wash State Geological Survey
Projection: NAD83 Harn State Plane Washington 4602 (feet)

Figure 11

Estimated Highway Bridge Damage - Earthquake Scenario: Washington



M 7.4 Southern Whidbey Island Fault

Highway Bridge Damage (at least moderate)

Damage is expressed as the probability that a given Bridge will realize at least moderate damage.

Counties
Fault source

Roads
Interstate
Highway

Major Roadway Bridge
- < 50%
- 50% - 90%
- > 90%

County	# of Bridges Needing Inspection	# of Bridge Engineers Needed*
Clallam	95	13
Island	6	2
Jefferson	54	7
King	1,033	138
Kitsap	83	11
Mason	92	12
Pierce	402	54
San Juan	9	1
Skagit	212	28
Snohomish	466	62
Total	**2,452**	**328**

* 2 engineers can inspect 5 bridges a day for 3 days

0 5 10 15 20 25 30

Miles

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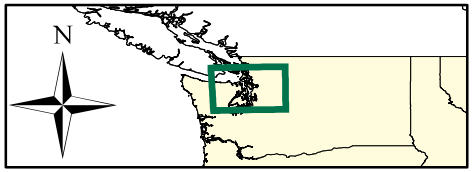
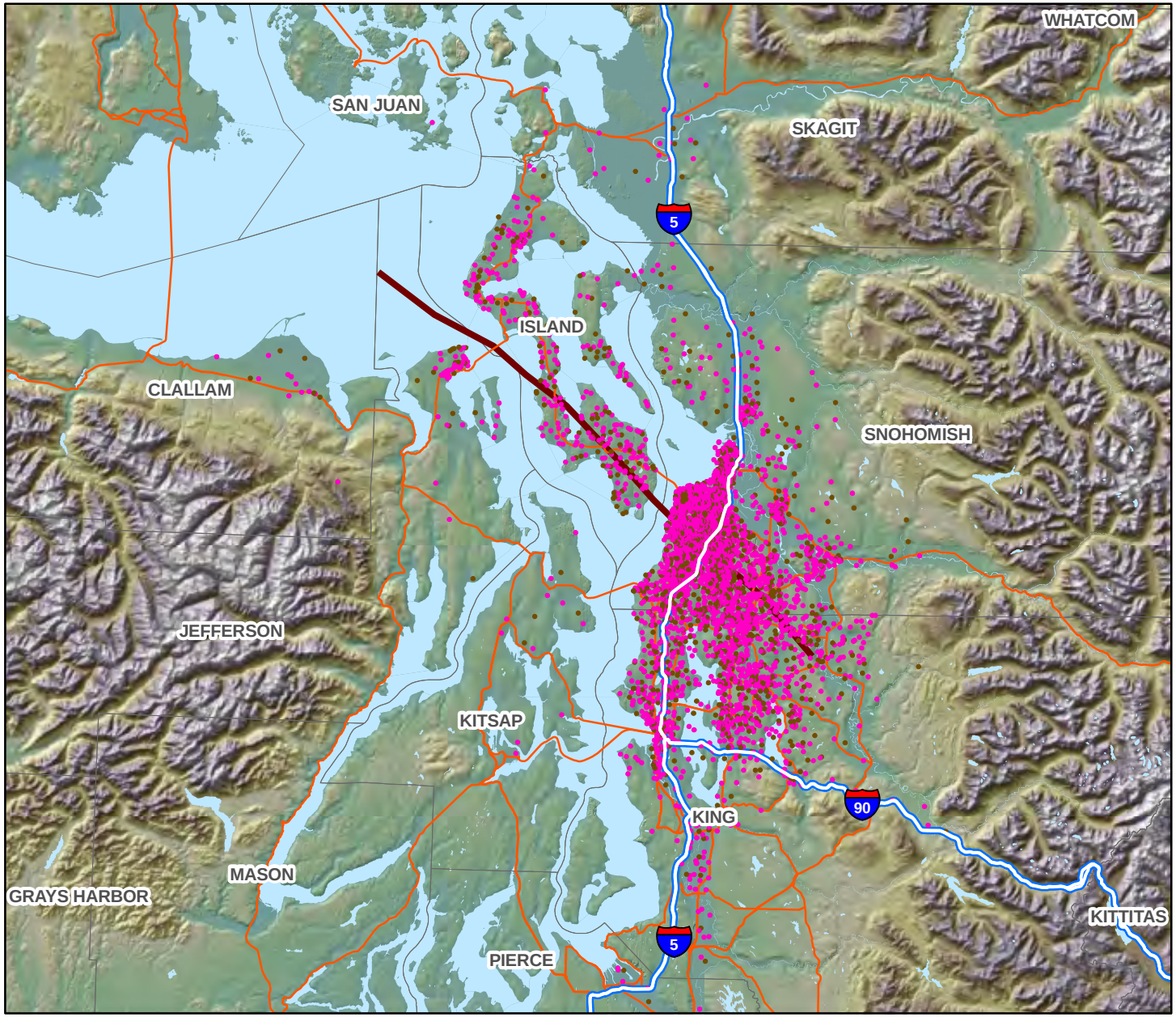


Sources: 2009 HAZUS runs by URS Corporation, Highways HSIP Gold 2007
Projection: NAD83 Harn State Plane Washington 4602 (feet)

Figure 12

Estimated Brick, Concrete, Steel, and Wood Debris - Earthquake Scenario: Washington



M 7.4 Southern Whidbey Island Fault

1 Dot = 1 thousand tons of Concrete and Steel Debris*
1 Dot = 1 thousand tons of Brick and Wood Debris*
*by census tract

Roads
Interstate
Highway
Counties
Fault source

County	Brick and Wood (tons)	Concrete and Steel (tons)	Estimated Truck Loads*
Clallam	7,000	6,000	520
Island	97,000	153,000	10,000
Jefferson	17,000	29,000	1,840
King	379,000	611,000	39,600
Kitsap	10,000	7,000	680
Pierce	8,000	6,000	560
San Juan	1,000	1,000	80
Skagit	8,000	9,000	680
Snohomish	707,000	1,514,000	88,840
Total	**1,234,000**	**2,336,000**	**142,800**

* Truck loads estimated at 25 tons per truck

0 5 10 15 20 25 30 Miles

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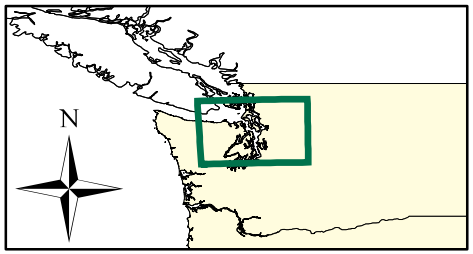

Sources: 2009 HAZUS runs by URS Corporation, Highways HSIP Gold 2007
Projection: NAD83 Harn State Plane Washington 4602 (feet)

Figure 13