Scenario: M 7.2 SeaTac Fault
Clallam 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	1	0	0	0	0	0	0	0	0	0	1	0	1
Single Family	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Total Clallam	**2**	**1**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**1**	**2**

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	149	8	2	0	0	159
Commercial	1580	94	20	1	0	1,695
Education	61	2	0	0	0	63
Government	47	1	0	0	0	48
Industrial	509	37	10	0	0	556
Religion	114	5	1	0	0	120
Other Residential	8873	782	185	3	0	9,843
Single Family	21,325	488	6	0	0	21,819

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
$1,256,000	$9,741,000	$5,127,000	$138,000	0.22	$617,000	$339,000	$400,000	$387,000	$18,004,000

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	178	177	100	177	100	178	100	178	100	178	100
Small											
Total	**178**	**177**	**—**	**177**	**—**	**178**	**—**	**178**	**—**	**178**	**—**

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
95	94	1	0	0	0

Scenario: M 7.2 SeaTac Fault
Clallam County

Fire Following Analysis Summary Report

Number of Ignitions	Population Exposed	Value Exposed
3	41	$2,631,000

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	%
28,764	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	%
28,764	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
1	1

Essential Facilities Functionality

	Count	Functionality (%)
		At Day 1
Emergency Operation Center	2	98
Fire Station Facilities	21	98
Police Station Facilities	5	98
School	34	98

Scenario: M 7.2 SeaTac 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	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial	0	2	2	0	0	0	0	0	0	0	0	0	0	2	2
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	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other-Residential	2	0	1	0	0	0	0	0	0	0	0	0	2	0	1
Single Family	2	1	1	0	0	0	0	0	0	0	0	0	2	1	1
Total Island	**4**	**4**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**4**	**4**

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	115	14	4	0	0	133
Commercial	1151	153	45	3	0	1,352
Education	52	5	2	0	0	59
Government	35	4	1	0	0	40
Industrial	417	63	23	2	0	505
Religion	78	8	2	0	0	88
Other Residential	5186	944	267	9	0	6,406
Single Family	23,375	1,647	38	6	1	25,067

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
$3,402,000	$25,064,000	$12,369,000	$219,000	0.46	$1,375,000	$614,000	$778,000	$834,000	$44,656,000

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	50	98	50	98	51	100	51	100	51	100
Small	26	26	99	26	99	26	100	26	100	26	100
Total	**77**	**76**	**—**	**76**	**—**	**77**	**—**	**77**	**—**	**77**	**—**

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	6	0	0	0	0

Scenario: M 7.2 SeaTac Fault
Island County

Fire Following Analysis Summary Report

Number of Ignitions	Population Exposed	Value Exposed
3	94	$6,477,000

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	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	%
30,319	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
4,000	2,000	6,000	240

Shelter Summary Report

Number of Displaced Households	Number of People Needing Short Term Shelter
4	2

Essential Facilities Functionality

	Count	Functionality (%)
		At Day 1
Emergency Operation Center	1	99
Fire Station Facilities	26	94
Police Station Facilities	4	93
School	32	95

Scenario: M 7.2 SeaTac 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	98	0	2	136	0	3	223	0	1	43	0	7	500
Commercial	29	1,538	993	6	297	186	1	38	24	1	75	45	37	1948	1248
Educational	0	151	28	0	23	4	0	2	0	0	4	1	0	180	33
Hotels	19	4	6	3	1	1	0	0	0	1	0	0	23	5	7
Industrial	33	246	154	7	53	33	1	7	5	2	14	9	43	320	201
Other-Residential	387	71	144	54	10	20	4	1	1	7	1	3	452	83	168
Single Family	264	45	97	16	3	6	1	0	0	1	0	0	282	48	103
Total King	**732**	**2,056**	**1,520**	**86**	**389**	**386**	**7**	**51**	**253**	**12**	**95**	**101**	**837**	**2591**	**2260**

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	1,123	497	243	51	5	1,919
Commercial	19,413	10,131	6,018	1,388	162	37,112
Education	750	345	197	46	4	1,342
Government	266	149	101	35	5	556
Industrial	4,773	2,730	1,884	486	71	9,944
Religion	1,365	601	294	64	6	2,330
Other Residential	46,351	25,030	11,894	2,325	300	85,900
Single Family	325,768	115,626	6,347	670	161	448,572

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
$678,380,000	$3,022,180,000	$1,374,925,000	$39,794,000	2.32	$379,899,000	$244,371,000	$277,663,000	$249,521,000	$6,266,732,000

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	3,554	72	3,583	72	4,821	98	4,938	100	4,938	100
Medium	684	451	66	456	67	655	96	681	100	682	100
Small	100	64	64	64	64	96	96	99	99	100	100
Total	**5,727**	**4,069**	**—**	**4,103**	**—**	**5,572**	**—**	**5,718**	**—**	**5,720**	**—**

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
1,033 (1034*)	847	62	52	52	21

* values in parentheses include rounding error.

Scenario: M 7.2 SeaTac Fault
King County

Fire Following Analysis Summary Report

Number of Ignitions	Population Exposed	Value Exposed
78	12,338	$1,129,013,000

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	101,598	14	87,365	12	60,435	8	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	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
559,000	1,021,000	1,580,000	63,200

Shelter Summary Report

Number of Displaced Households	Number of People Needing Short Term Shelter
4,761	2,796

Essential Facilities Functionality

	Count	Functionality (%)
		At Day 1
Emergency Operation Center	18	70
Fire Station Facilities	164	71
Police Station Facilities	52	69
School	721	72

Scenario: M 7.2 SeaTac Fault
Kitsap 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	2	0	0	3	0	0	1	0	0	7
Commercial	1	51	42	0	7	6	0	1	1	0	1	1	1	60	50
Educational	0	15	2	0	2	0	0	0	0	0	0	0	0	17	2
Hotels	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Industrial	1	5	3	0	1	0	0	0	0	0	0	0	1	6	3
Other-Residential	40	8	15	5	1	2	0	0	0	0	0	0	45	9	17
Single Family	36	7	14	3	1	1	0	0	0	0	0	0	39	8	15
Total Kitsap	**78**	**86**	**77**	**8**	**12**	**11**	**0**	**1**	**4**	**0**	**1**	**2**	**86**	**100**	**94**

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	200	72	31	5	1	309
Commercial	2,237	949	481	82	7	3,756
Education	96	36	18	3	0	153
Government	83	31	15	3	0	132
Industrial	675	305	175	30	3	1,188
Religion	178	66	29	6	1	280
Other Residential	8,349	5,580	3,209	364	29	17,531
Single Family	49,315	14,767	716	146	36	64,980

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
$48,796,000	$261,847,000	$119,250,000	$1,647,000	1.78	$27,697,000	$13,762,000	$18,030,000	$14,642,000	$505,671,000

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	297	162	55	165	56	280	94	297	100	297	100
Medium	55	26	48	27	49	49	90	55	100	55	100
Small											
Total	**352**	**188**	**—**	**192**	**—**	**329**	**—**	**352**	**—**	**352**	**—**

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
82 (83*)	77	2	2	1	1

* values in parentheses include rounding error.

Scenario: M 7.2 SeaTac Fault
Kitsap County

Fire Following Analysis Summary Report

Number of Ignitions	Population Exposed	Value Exposed
8	544	$40,332,000

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	%
91,417	18,123	20	8,786	10	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	%
91,417	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
49,000	49,000	98,000	3,920

Shelter Summary Report

Number of Displaced Households	Number of People Needing Short Term Shelter
245	156

Essential Facilities Functionality

	Count	Functionality (%)
		At Day 1
Emergency Operation Center	1	80
Fire Station Facilities	50	77
Police Station Facilities	8	73
School	110	76

Scenario: M 7.2 SeaTac Fault
Lewis 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	1	0	0	1	0	0	0	0	0	2
Commercial	0	5	4	0	1	0	0	0	0	0	0	0	0	6	4
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	1	1	0	0	0	0	0	0	0	0	0	0	1	1
Other-Residential	5	1	2	0	0	0	0	0	0	0	0	0	5	1	2
Single Family	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Total Lewis	**6**	**8**	**7**	**0**	**1**	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**6**	**9**	**9**

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	206	21	9	1	0	237
Commercial	1,466	231	99	9	0	1,805
Education	45	5	2	0	0	52
Government	53	4	1	0	0	58
Industrial	488	75	36	4	0	603
Religion	119	13	6	1	0	139
Other Residential	8,835	1,652	596	40	1	11,124
Single Family	19,405	877	40	2	0	20,324

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
$5,091,000	$23,301,000	$12,223,000	$526,000	0.6	$3,382,000	$1,678,000	$2,156,000	$1,964,000	$50,320,000

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	390	305	78	307	79	386	99	390	100	390	100
Medium											
Small	25	20	81	20	82	25	99	25	100	25	100
Total	**415**	**325**	**—**	**327**	**—**	**411**	**—**	**415**	**—**	**415**	**—**

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
332	319	7	3	3	0

Scenario: M 7.2 SeaTac Fault
Lewis County

Fire Following Analysis Summary Report

Number of Ignitions	Population Exposed	Value Exposed
4	114	$8,104,000

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	%
27,107	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	%
27,107	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
4,000	7,000	11,000	440

Shelter Summary Report

Number of Displaced Households	Number of People Needing Short Term Shelter
23	17

Essential Facilities Functionality

	Count	Functionality (%)
		At Day 1
Emergency Operation Center	1	88
Fire Station Facilities	37	95
Police Station Facilities	8	90
School	45	95

Scenario: M 7.2 SeaTac 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	10	0	1	15	0	1	23	0	0	5	0	2	53
Commercial	4	266	192	1	48	33	0	6	4	0	11	7	5	331	236
Educational	0	51	6	0	7	1	0	1	0	0	1	0	0	60	7
Hotels	4	1	1	1	0	0	0	0	0	0	0	0	5	1	1
Industrial	7	49	31	1	10	6	0	1	1	0	3	2	8	63	40
Other-Residential	154	31	56	19	4	7	1	0	0	2	0	1	176	35	64
Single Family	100	20	37	6	1	2	0	0	0	0	0	0	106	21	39
Total Pierce	**269**	**418**	**333**	**28**	**71**	**64**	**1**	**9**	**28**	**2**	**15**	**15**	**300**	**513**	**440**

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	454	191	90	18	2	755
Commercial	6,632	3,242	1,826	388	48	12,136
Education	256	107	57	11	1	432
Government	129	57	32	7	1	226
Industrial	1,916	1,034	675	157	24	3,806
Religion	558	221	100	17	2	898
Other Residential	24,779	15,923	9,710	1,424	165	52,001
Single Family	138,212	45,582	2,315	214	51	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
$193,337,000	$892,560,000	$409,634,000	$13,340,000	2.07	$106,243,000	$54,364,000	$65,447,000	$61,161,000	$1,796,085,000

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	2,222	77	2,237	78	2,824	98	2,870	100	2,870	100
Medium	397	298	75	300	76	389	98	397	100	397	100
Small											
Total	**3,270**	**2,520**	**—**	**2,537**	**—**	**3,213**	**—**	**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 (403*)	343	16	20	16	8

* values in parentheses include rounding error.

Scenario: M 7.2 SeaTac Fault
Pierce County

Fire Following Analysis Summary Report

Number of Ignitions	Population Exposed	Value Exposed
33	3400	$254,583,000

Potable Water System Performance

Total Households	Number of Households Without Water									
	At day 1		At day 3		At day 7		At day 30		At day 90	
	Count	%	Count	%	Count	%	Count	%	Count	%
282,052	12,727	5	7,145	3	836	0	0	0	0	0

Electrical Power System Performance

Total Households	Number of Households Without Power									
	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
180,000	268,000	448,000	17,920

Shelter Summary Report

Number of Displaced Households	Number of People Needing Short Term Shelter
1,056	655

Essential Facilities Functionality

	Count	Functionality (%)
		At Day 1
Emergency Operation Center	5	69
Fire Station Facilities	86	74
Police Station Facilities	26	71
School	299	73

Scenario: M 7.2 SeaTac 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	0	6	0	0	8	0	1	13	0	0	3	0	1	30
Commercial	3	151	104	0	17	12	0	1	1	0	2	1	3	171	118
Educational	0	23	3	0	2	0	0	0	0	0	0	0	0	25	3
Hotels	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Industrial	3	19	12	0	2	1	0	0	0	0	0	0	3	21	13
Other-Residential	56	11	20	5	1	2	0	0	0	0	0	0	61	12	22
Single Family	49	8	18	1	0	1	0	0	0	0	0	0	50	8	19
Total Snohomish	**112**	**212**	**163**	**6**	**22**	**24**	**0**	**2**	**14**	**0**	**2**	**4**	**118**	**238**	**205**

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	617	146	59	8	0	830
Commercial	6,882	2,039	916	113	4	9,954
Education	245	65	29	4	0	343
Government	138	36	18	3	0	195
Industrial	2,523	780	402	55	2	3,762
Religion	477	121	48	6	0	652
Other Residential	22,532	8,902	3,920	292	8	35,654
Single Family	129,586	24,996	956	25	5	155,568

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
$79,836,000	$475,115,000	$228,108,000	$6,619,000	1.18	$40,370,000	$20,991,000	$25,304,000	$24,595,000	$900,939

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	582	79	585	79	727	99	737	100	737	100
Medium	72	58	80	58	81	71	98	72	100	72	100
Small	48	47	98	47	98	48	100	48	100	48	100
Total	**858**	**687**	**—**	**690**	**—**	**846**	**—**	**857**	**—**	**857**	**—**

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	419	14	14	14	5

Scenario: M 7.2 SeaTac Fault
Snohomish County

Fire Following Analysis Summary Report

Number of Ignitions	Population Exposed	Value Exposed
23	2,889	$194,884,000

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	104	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	%
245,054	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
77,000	79,000	156,000	6,240

Shelter Summary Report

Number of Displaced Households	Number of People Needing Short Term Shelter
294	181

Essential Facilities Functionality

	Count	Functionality (%)
		At Day 1
Emergency Operation Center	3	83
Fire Station Facilities	75	86
Police Station Facilities	23	82
School	248	84

HAZUS-MH: Earthquake Event Report

Region Name: SeaTacM72RedoOct09

Earthquake Scenario: SeaTac Oct09 Redo

Print Date: March 10, 2010

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

Disclaimer:
The estimates of social and economic impacts contained in this report were produced using HAZUS loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific earthquake. These results can be improved by using enhanced inventory, geotechnical, and observed ground motion data.

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	SeaTac Oct09 Redo
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	7.20
Depth (Km)	NA
Rupture Length (Km)	NA
Rupture Orientation (degrees)	NA
Attenuation Function	NA

Building Damage

HAZUS estimates that about 68,369 buildings will be at least moderately damaged. This is over 4.00 % of the total number of buildings in the region. There are an estimated 1,123 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	6,747	0.45	1,042	0.34	470	0.80	87	0.99	8	0.74
Commercial	68,871	4.59	17,909	5.82	9,810	16.79	2,022	22.97	222	19.76
Education	2,563	0.17	603	0.20	320	0.55	66	0.75	6	0.55
Government	1,763	0.12	350	0.11	199	0.34	50	0.57	6	0.55
Industrial	21,030	1.40	5,386	1.75	3,361	5.75	751	8.53	100	8.90
Other Residential	278,218	18.53	67,088	21.81	33,050	56.55	4,614	52.43	505	44.96
Religion	5,147	0.34	1,107	0.36	504	0.86	96	1.09	9	0.81
Single Family	1,117,502	74.41	214,099	69.61	10,731	18.36	1,116	12.68	267	23.73
Total	**1,501,842**		**307,585**		**58,445**		**8,801**		**1,123**	

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

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	1,260,353	83.92	242181	78.74	12,461	21.32	1,345	15.28	311	27.66
Steel	28,782	1.92	6629	2.16	4,357	7.45	707	8.03	93	8.25
Concrete	28,156	1.87	7177	2.33	3,465	5.93	695	7.90	77	6.81
Precast	19,288	1.28	5169	1.68	3,658	6.26	867	9.85	113	10.07
RM	57,324	3.82	7681	2.50	3,947	6.75	795	9.03	68	6.07
URM	7,259	0.48	3731	1.21	3,522	6.03	802	9.11	63	5.61
MH	100,680	6.70	35018	11.38	27,035	46.26	3,591	40.80	399	35.52
Total	**1,501,842**		**307,585**		**58,445**		**8,801**		**1,123**	

*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 11,901 hospital beds (83.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 98.00% 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	0	0	73
Schools	2,254	0	0	2,254
EOCs	55	0	0	55
PoliceStations	226	0	0	226
FireStations	938	0	0	938

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	73	0	4,931	4,982
	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	0	0	38	38
Bus	Facilities	45	0	0	45	45
Ferry	Facilities	45	0	0	45	45
Port	Facilities	486	0	0	486	486
Airport	Facilities	62	0	0	62	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	0	0	41	41
Waste Water	146	0	0	98	146
Natural Gas	56	0	0	56	56
Oil Systems	15	0	0	10	15
Electrical Power	78	0	0	56	78
Communication	196	0	0	196	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	1659	1350
Waste Water	85,851	1312	1068
Natural Gas	57,234	1403	1141
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	132,577	103,296	61,271	0	0
Electric Power		0	0	0	0	0

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 166 ignitions that will burn about 6.88 sq. mi 0.02 % of the region's total area.) The model also estimates that the fires will displace about 20,051 people and burn about 1,681 (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 2.360 million tons of debris will be generated. Of the total amount, Brick/Wood comprises 38.00% 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 94,480,000 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 6,489 households to be displaced due to the earthquake. Of these, 3,871 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	38	7	1	2
	Commuting	0	0	1	0
	Educational	0	0	0	0
	Hotels	24	4	1	1
	Industrial	44	9	1	2
	Other-Residential	673	85	5	9
	Single Family	473	27	1	2
	Total	**1,252**	**133**	**9**	**16**
2 PM	Commercial	2,047	373	46	90
	Commuting	2	3	5	1
	Educational	250	35	3	6
	Hotels	5	1	0	0
	Industrial	324	66	9	17
	Other-Residential	128	17	1	2
	Single Family	84	5	0	0
	Total	**2,840**	**500**	**64**	**117**
5 PM	Commercial	1,362	239	29	55
	Commuting	118	165	269	53
	Educational	39	6	1	1
	Hotels	7	1	0	0
	Industrial	203	41	5	11
	Other-Residential	248	32	2	4
	Single Family	174	11	1	1
	Total	**2,150**	**495**	**306**	**123**

Economic Loss

The total economic loss estimated for the earthquake is 13,373.61 (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 9,924.12 (millions of dollars); 17 % 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 53 % 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	20.24	344.67	16.94	17.93	399.78
	Capital-Related	0.00	8.59	320.99	10.17	4.17	343.92
	Rental	25.19	104.83	216.63	7.04	8.73	362.41
	Relocation	65.02	103.38	312.98	35.41	60.67	577.47
	Subtotal	**90.21**	**237.04**	**1,195.26**	**69.57**	**91.50**	**1,683.58**
Capital Stock Loses							
	Structural	288.45	193.69	406.90	93.48	58.49	1,041.00
	Non_Structural	2,068.41	1,123.72	1,188.82	313.85	193.95	4,888.75
	Content	937.53	322.27	659.64	210.24	117.04	2,246.72
	Inventory	0.00	0.00	18.91	43.40	1.75	64.06
	Subtotal	**3,294.39**	**1,639.68**	**2,274.26**	**660.98**	**371.23**	**8,240.54**
	Total	**3,384.61**	**1,876.72**	**3,469.52**	**730.55**	**462.73**	**9,924.12**

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	$159.00	0.30
	Bridges	90,051.61	$1975.82	2.19
	Tunnels	66.98	$0.83	1.23
	Subtotal	**143442.50**	**2,135.60**	
Railways	Segments	2,642.42	$3.35	0.13
	Bridges	19.99	$0.06	0.32
	Tunnels	0.00	$0.00	0.00
	Facilities	181.08	$29.00	16.01
	Subtotal	**2843.50**	**32.40**	
Light Rail	Segments	203.85	$1.12	0.55
	Bridges	0.00	$0.00	0.00
	Tunnels	0.00	$0.00	0.00
	Facilities	101.19	$20.91	20.66
	Subtotal	**305.00**	**22.00**	
Bus	Facilities	53.96	$5.26	9.76
	Subtotal	**54.00**	**5.30**	
Ferry	Facilities	59.90	$5.66	9.46
	Subtotal	**59.90**	**5.70**	
Port	Facilities	970.54	$122.84	12.66
	Subtotal	**970.50**	**122.80**	
Airport	Facilities	660.36	$48.69	7.37
	Runways	2,809.34	$4.14	0.15
	Subtotal	**3469.70**	**52.80**	
	Total	**151145.10**	**2,376.70**	

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	$129.71	8.64
	Distribution Lines	2,861.70	$16.82	0.59
	Subtotal	**4,363.54**	**$146.53**	
Waste Water	Pipelines	0.00	$0.00	0.00
	Facilities	10,696.00	$456.56	4.27
	Distribution Lines	1,717.00	$13.30	0.77
	Subtotal	**12,412.98**	**$469.86**	
Natural Gas	Pipelines	0.00	$0.00	0.00
	Facilities	67.10	$2.21	3.30
	Distribution Lines	1,144.70	$14.22	1.24
	Subtotal	**1,211.83**	**$16.43**	
Oil Systems	Pipelines	0.00	$0.00	0.00
	Facilities	1.70	$0.10	6.11
	Subtotal	**1.65**	**$0.10**	
Electrical Power	Facilities	9,438.00	$438.87	4.65
	Subtotal	**9,438.00**	**$438.87**	
Communication	Facilities	21.60	$1.01	4.67
	Subtotal	**21.56**	**$1.01**	
	Total	**27,449.55**	**$1,072.80**	

Table 14. Indirect Economic Impact with outside aid
(Employment as # of people and Income in millions of $)

LOSS		Total	%
First Year			
	Employment Impact	1,947,381	108.18
	Income Impact	5,817	6.52
Second Year			
	Employment Impact	709,592	39.42
	Income Impact	2,964	3.32
Third Year			
	Employment Impact	16,373	0.91
	Income Impact	602	0.67
Fourth Year			
	Employment Impact	923	0.05
	Income Impact	(229)	-0.26
Fifth Year			
	Employment Impact	49	0.00
	Income Impact	(276)	-0.31
Years 6 to 15			
	Employment Impact	0	0.00
	Income Impact	(279)	-0.31

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

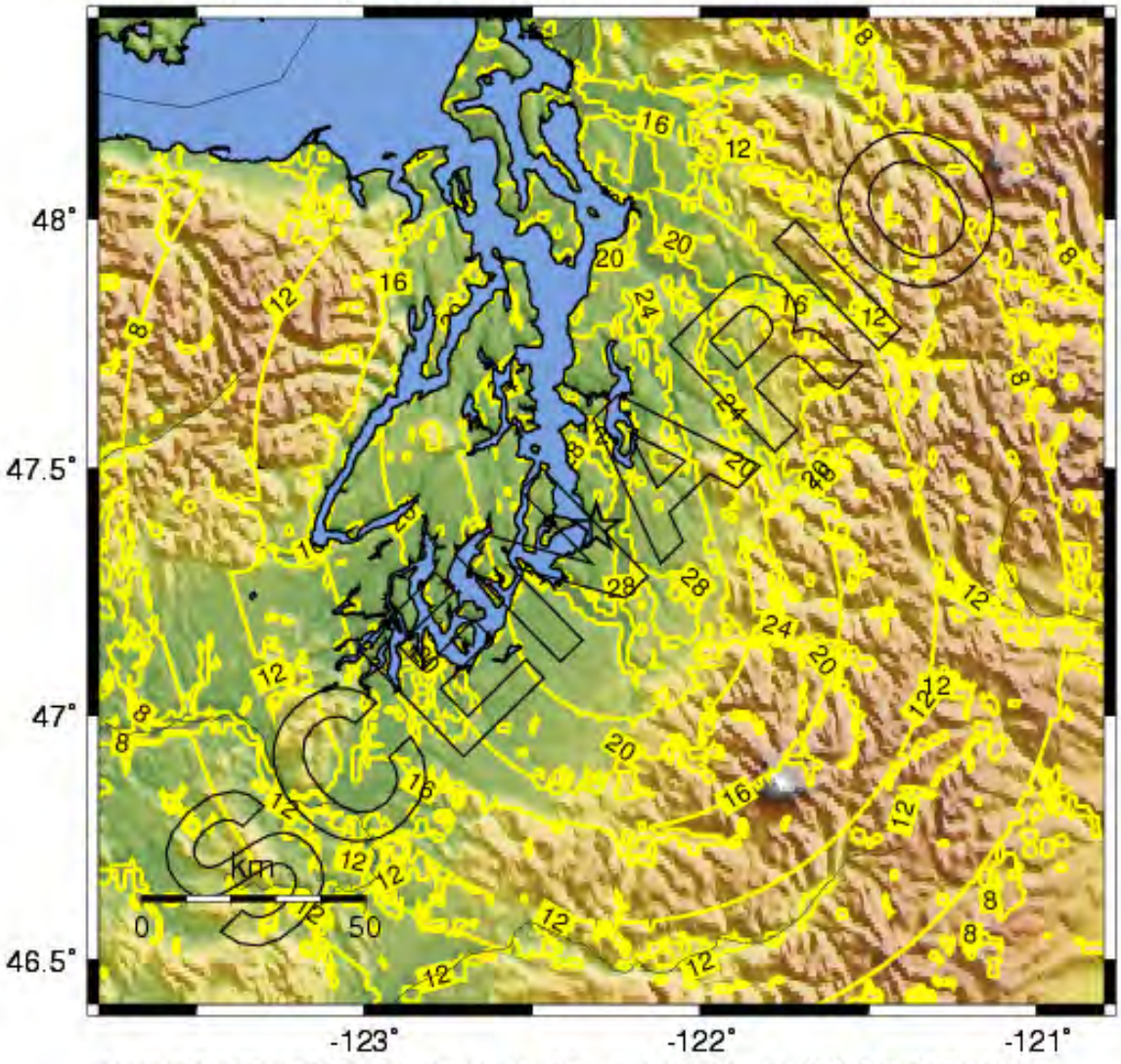
Appendix B: Regional Population and Building Value Data

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 Seatac7.2 Scenario

Scenario Date: Thu May 14, 2009 12:00:00 GMT M 7.2 N47.38 W122.31 Depth: 52.0km

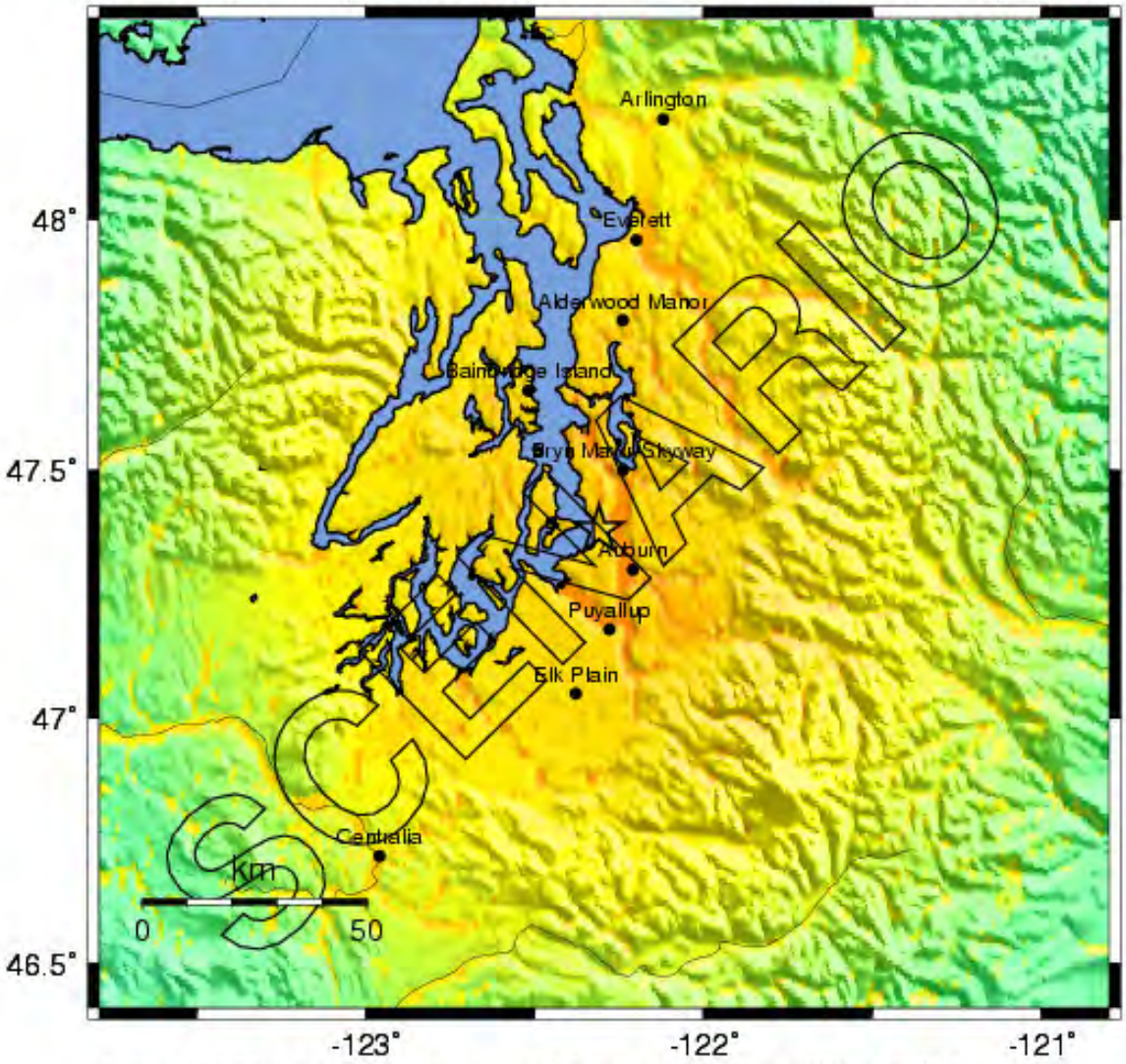


PLANNING SCENARIO ONLY -- Map Version 1 Processed Thu May 14, 2009 12:53:03 PM MDT

-- Earthquake Planning Scenario --

ShakeMap for Seatac7.2 Scenario

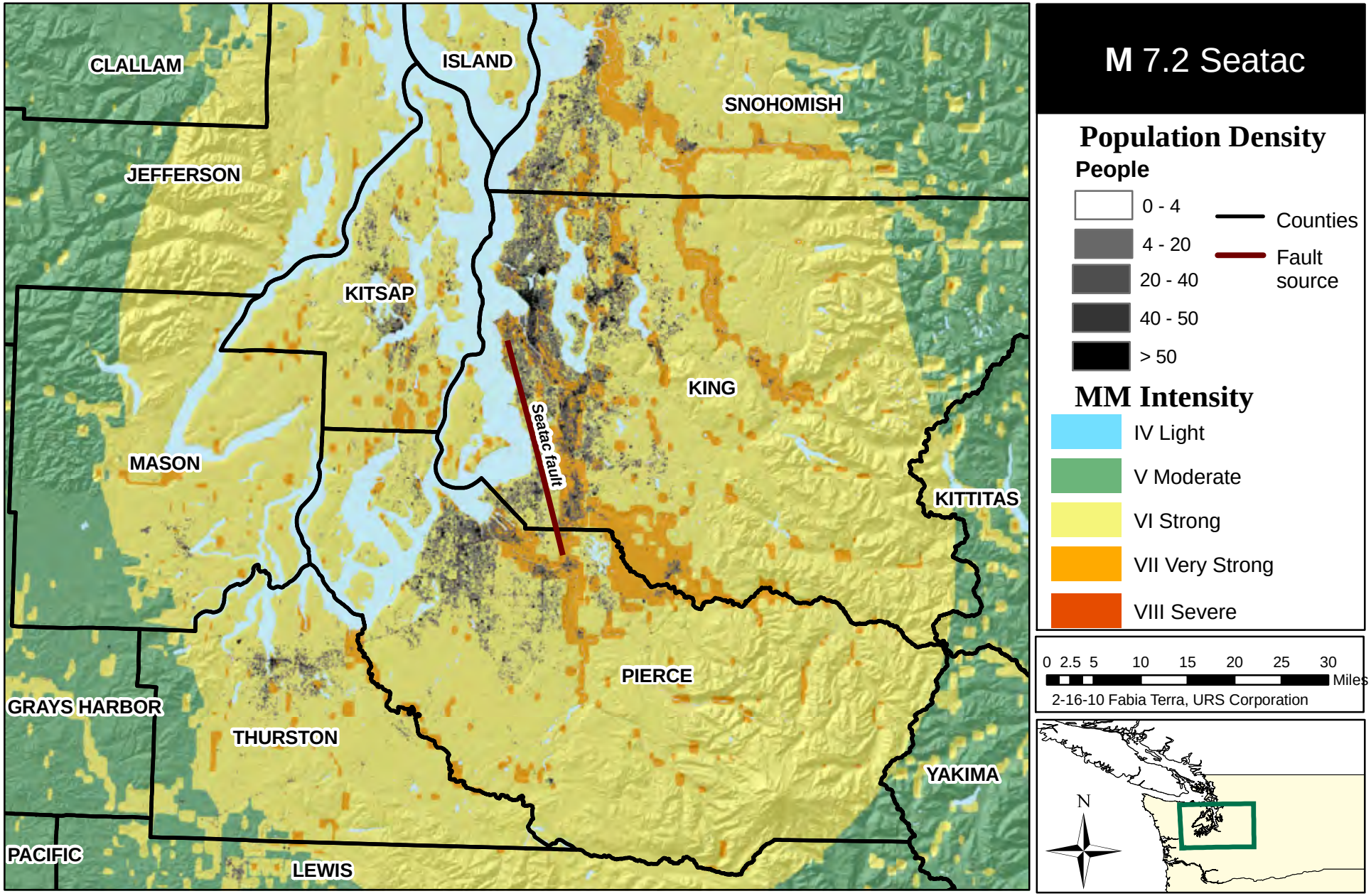
Scenario Date: Thu May 14, 2009 12:00:00 GMT M 7.2 N47.38 W122.31 Depth: 52.0km



PLANNING SCENARIO ONLY -- Map Version 1 Processed Thu May 14, 2009 12:53:03 PM 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+

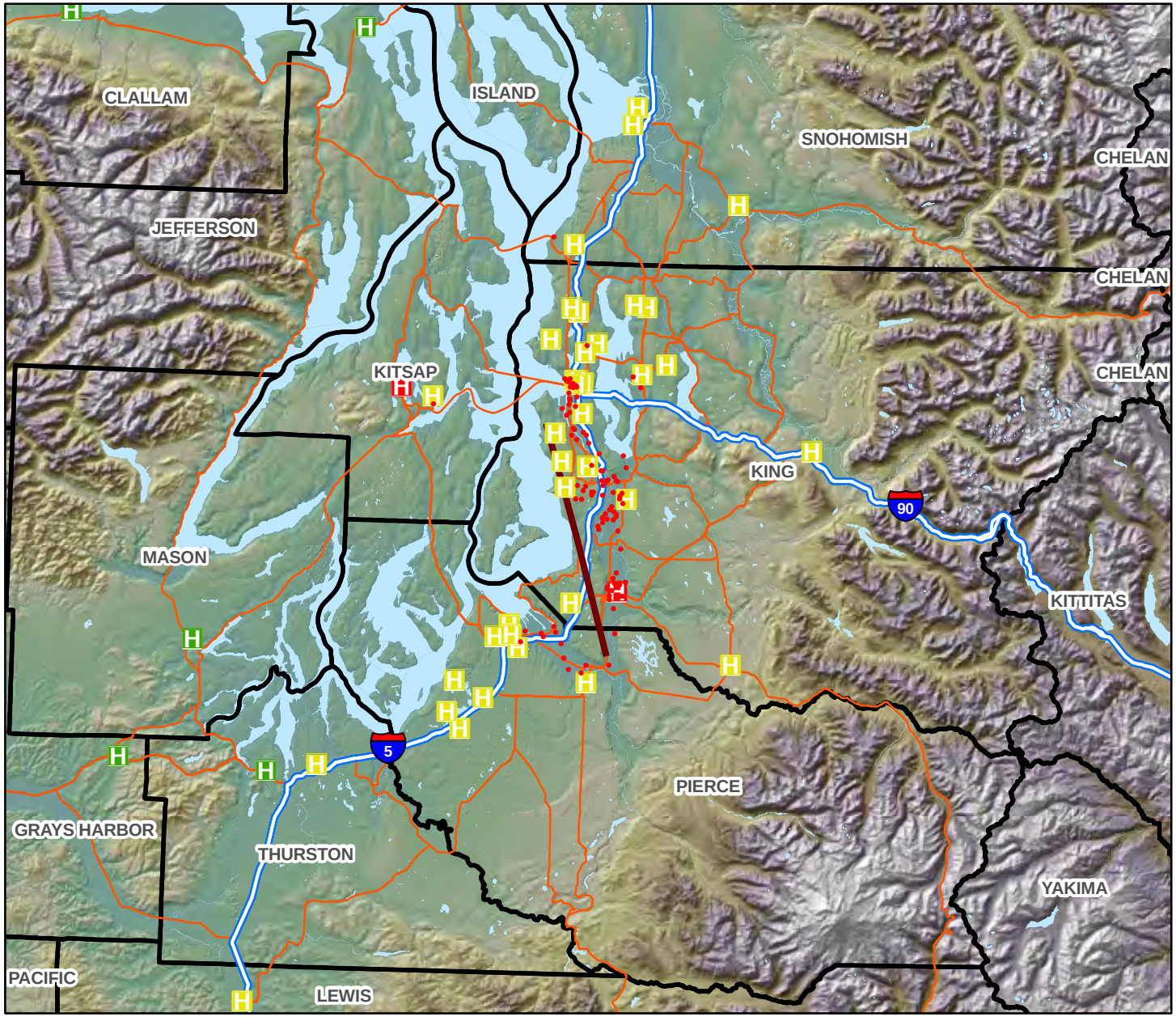
Population Density and Ground Shaking Intensities - Earthquake Scenario: Washington



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

Figure 1

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



M 7.2 Seatac

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

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%

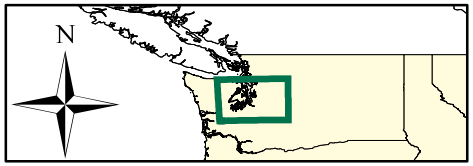
> 90%

County	Injuries Requiring Hospital Treatment (2 PM)	Fatalities (2 PM)
Clallam	2	0
Island	5	0
Jefferson	2	0
King	2,495	96
Kitsap	100	2
Mason	4	0
Pierce	498	16
Snohomish	238	2
Thurston	49	0
Total	**3,393**	**116**

0 2.5 5 10 15 20 25 30

Miles

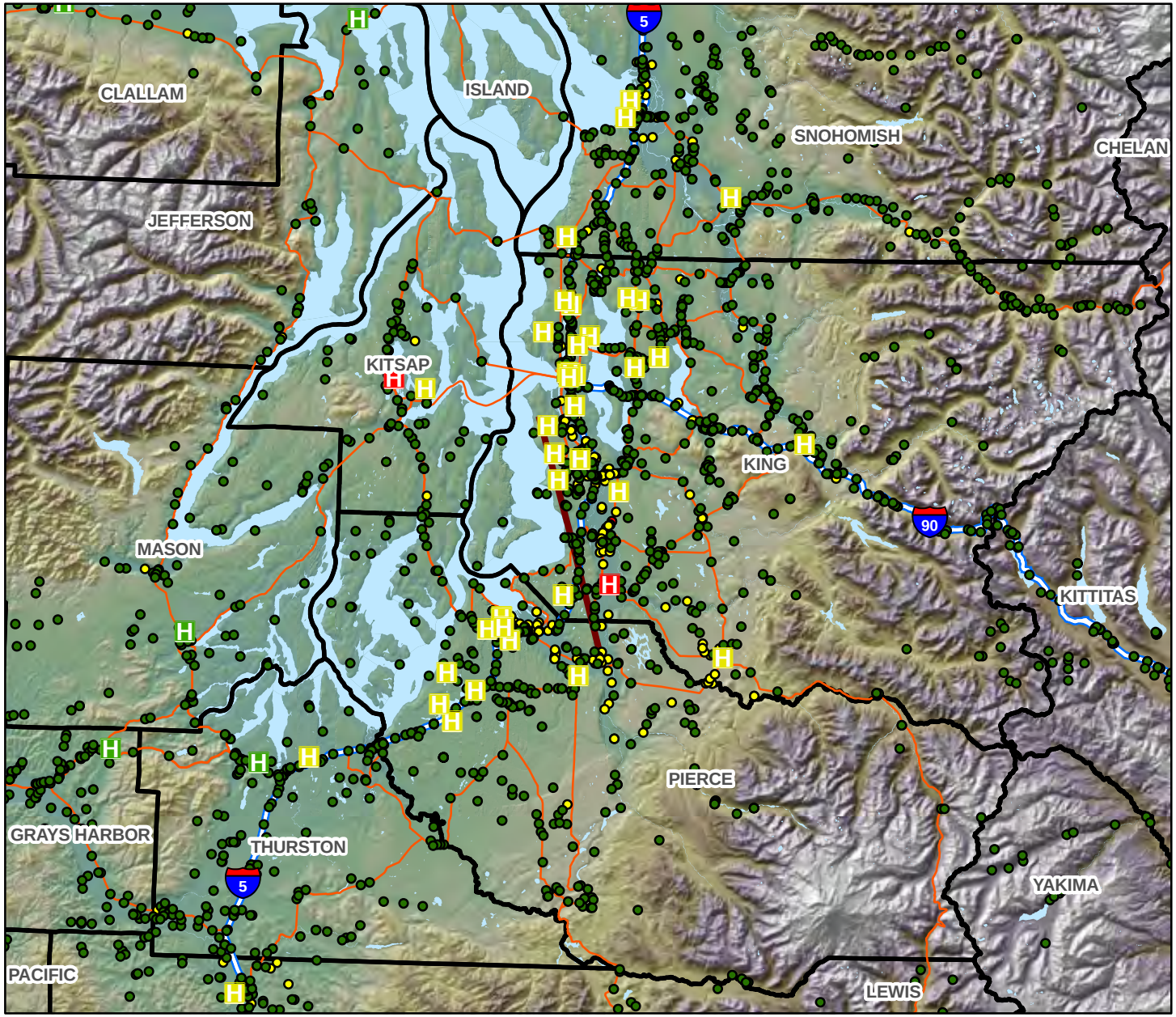
2-22-10 Fabia Terra, URS Corporation



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 7.2 Seatac

Highway Bridge Functionality (Day 1)

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

Bridge Seg.
- high
- moderate
- low

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.

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

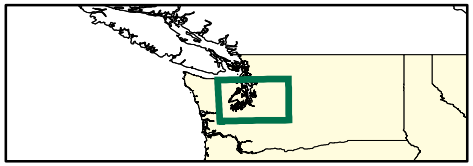
County	Total # Hospital Beds	Hospital Beds Available	Injuries Requiring Hospital Treatment 2pm
Grays Harbor	164	159	0
Island	77	76	5
King	5,727	3,845	2,495
Kitsap	352	181	100
Lewis	415	331	10
Pierce	3,270	2,491	498
Snohomish	858	735	238
Thurston	494	430	49
Total	**11,357**	**8,248**	**3,395**

N

0 2 4 8 12 16 20 24

Miles

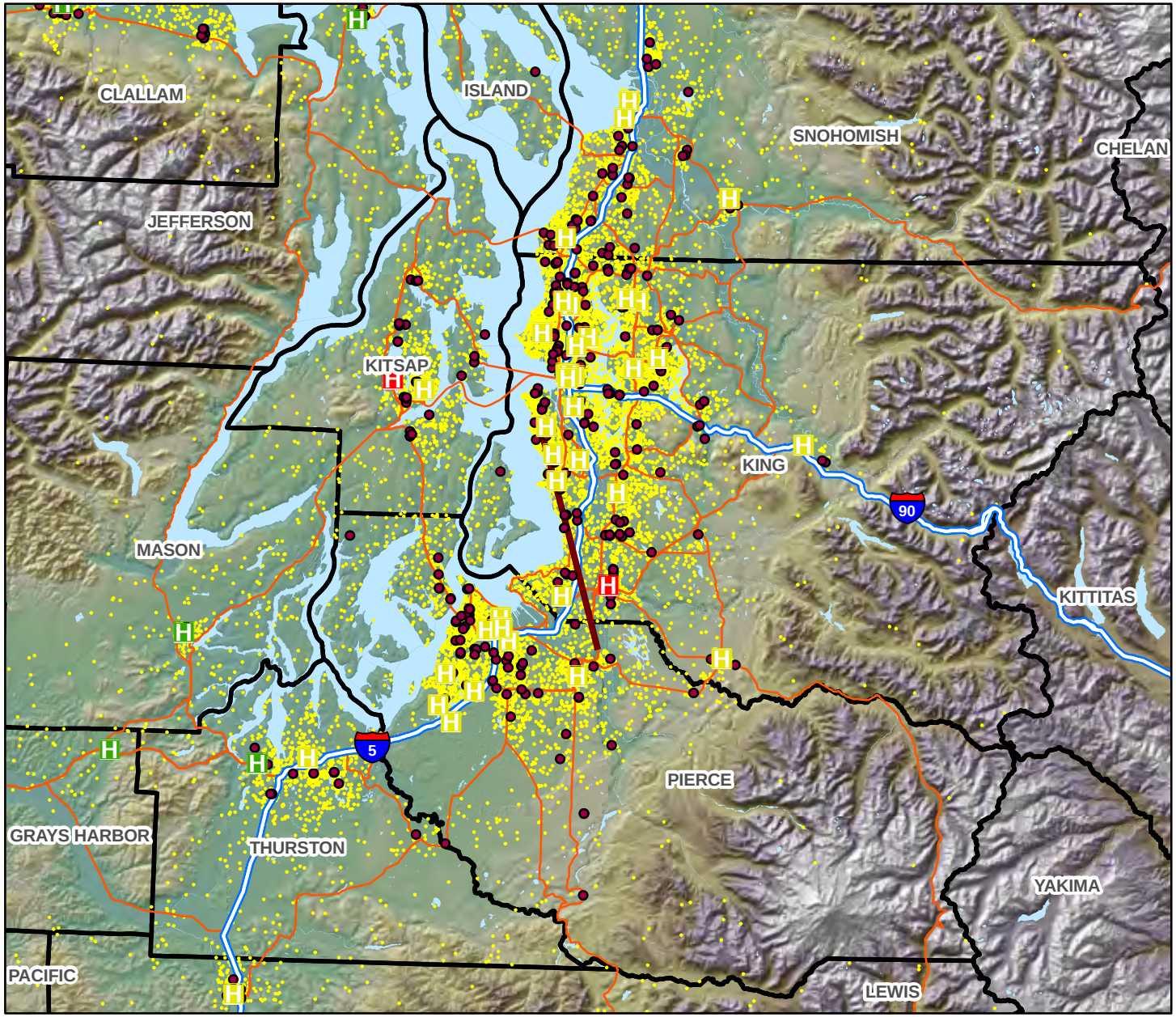
02-22-10 Fabia Terra, URS Corporation



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 7.2 Seatac

1 Dot = 30 People over 65

Nursing Home

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%

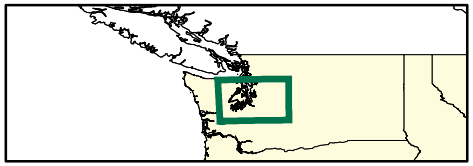
County	Total # Hospital Beds	Hospital Beds Available	Injuries Requiring Hospital Treatment 2pm
Grays Harbor	164	159	0
Island	77	76	5
King	5,727	3,845	2,495
Kitsap	352	181	100
Lewis	415	331	10
Pierce	3,270	2,491	498
Snohomish	858	735	238
Thurston	494	430	49
Total	**11,357**	**8,248**	**3,395**

N

0 2 4 8 12 16 20 24

Miles

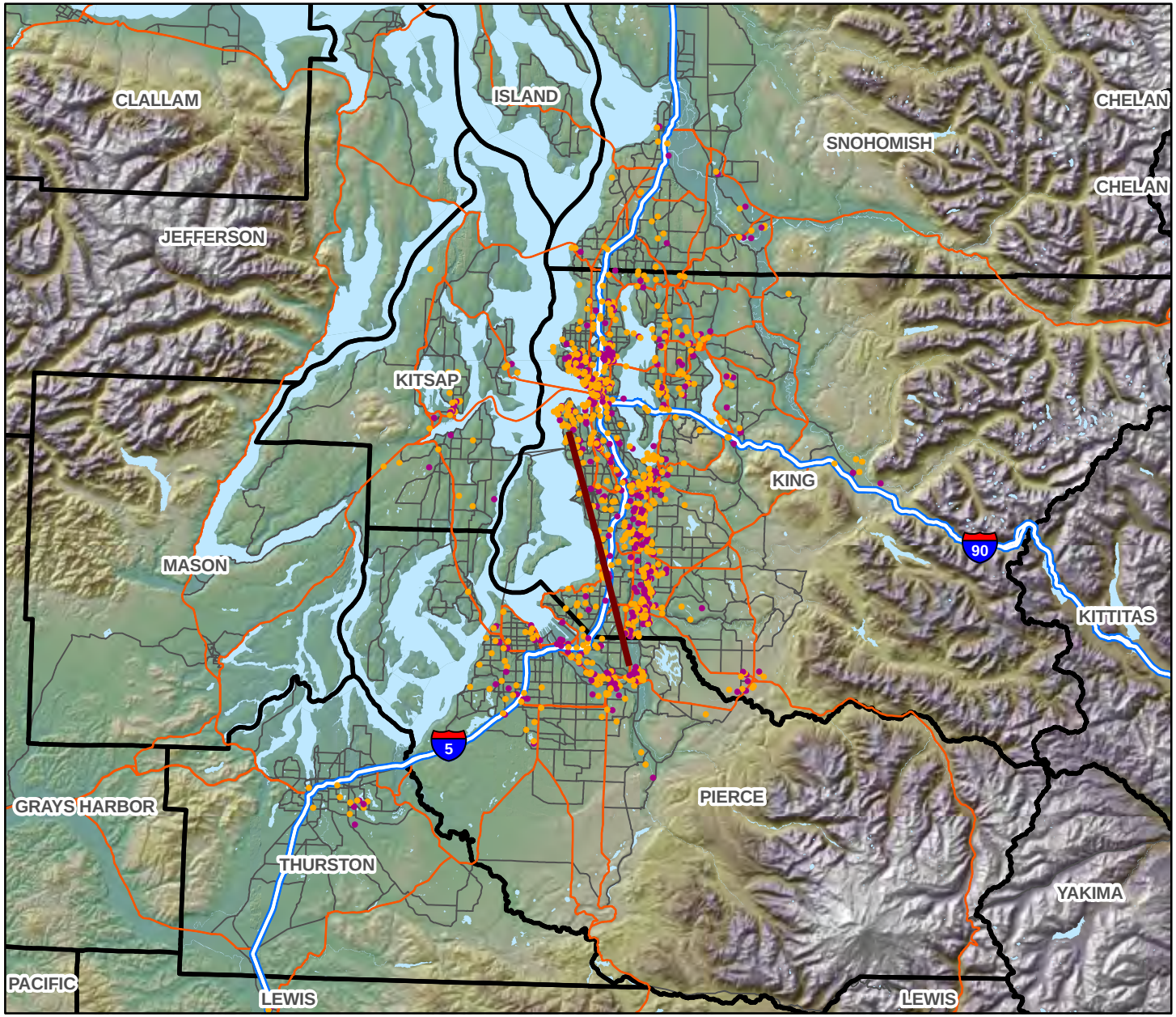
02-22-10 Fabia Terra, URS Corporation



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 7.2 Seatac

	Total #
Public Shelter Needs (Individuals)	6,489
Displaced Households	3,871

1 Dot = 1 Displaced Households*

1 Dot = 1 Public Shelter Needs (Individuals)*

* delineated by census tract

Counties

Fault source

Roads

Interstate

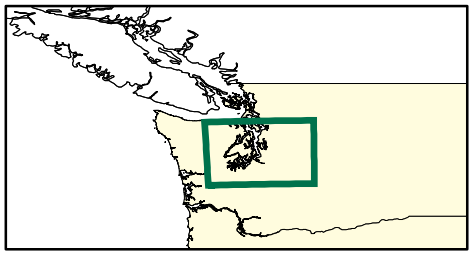
Highway

Major Road

N

0 4 8 12 16 20 24 Miles

02-22-10 Fabia Terra, URS Corporation

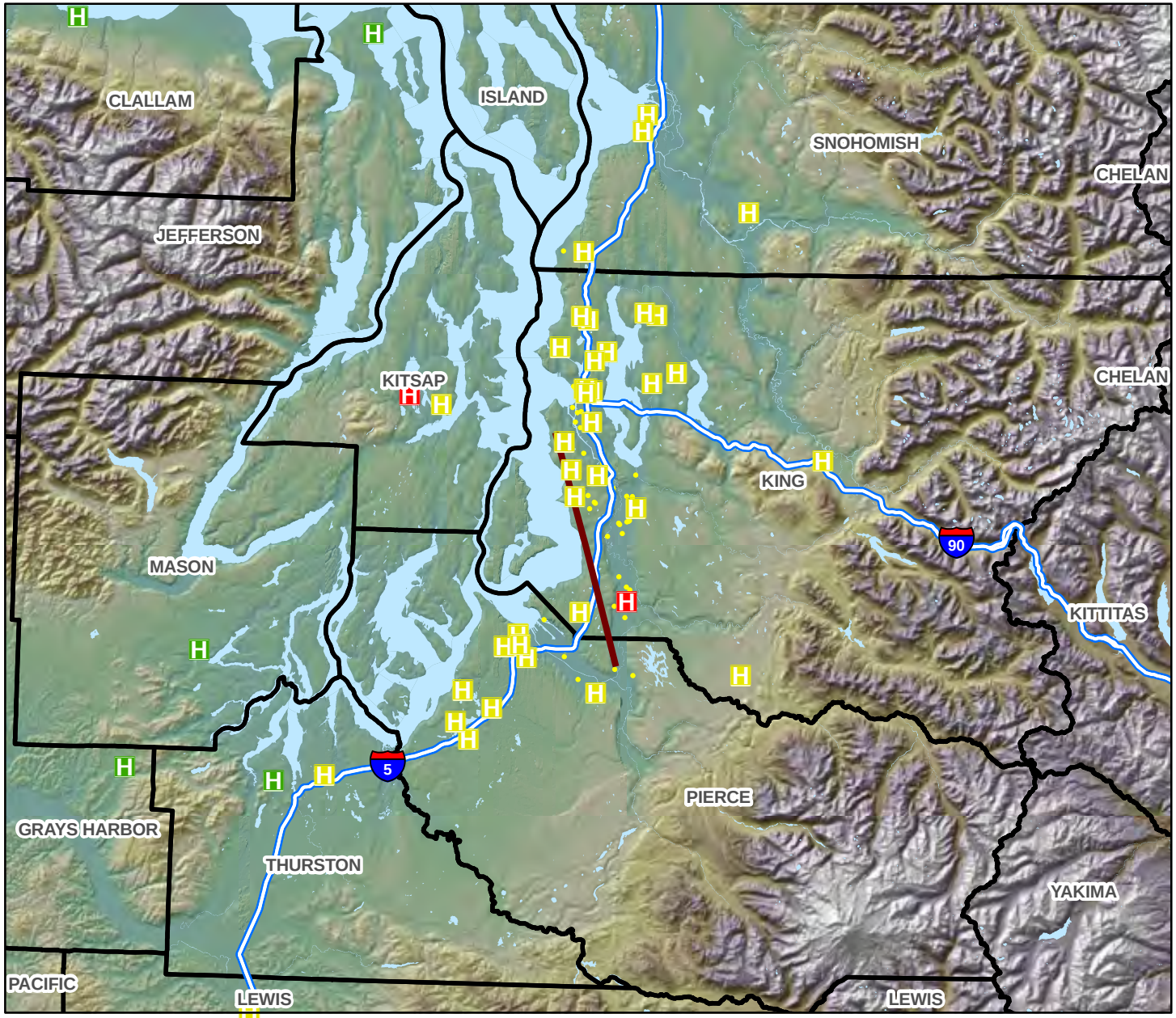


Sources: 2009 HAZUS runs by URS Corporation, Highways HSIP Gold 2007

Projection: NAD83 Harn State Plane Washington 4602 (feet)

Figure 5

Injuries at 2 pm, Collapsed Structures, and Impaired Hospitals - Earthquake Scenario: Washington



M 7.2 Seatac

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**
3,393	64

**Totals for counties in view extent.

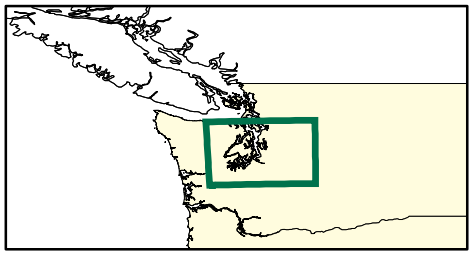
Structure Type	Red (Complete)	Collapse Rates for Complete Damage	Total Collapse
Wood	311	3%	9
Steel	93	6%	6
Concrete	77	10%	8
Precast	113	13%	15
Reinforced Masonry	68	10%	7
Unreinforced Masonry	63	15%	9
Manufactured Housing	399	3%	12
Total	1,124		66

Counties — Fault source

N

0 2 4 8 12 16 20 24 Miles

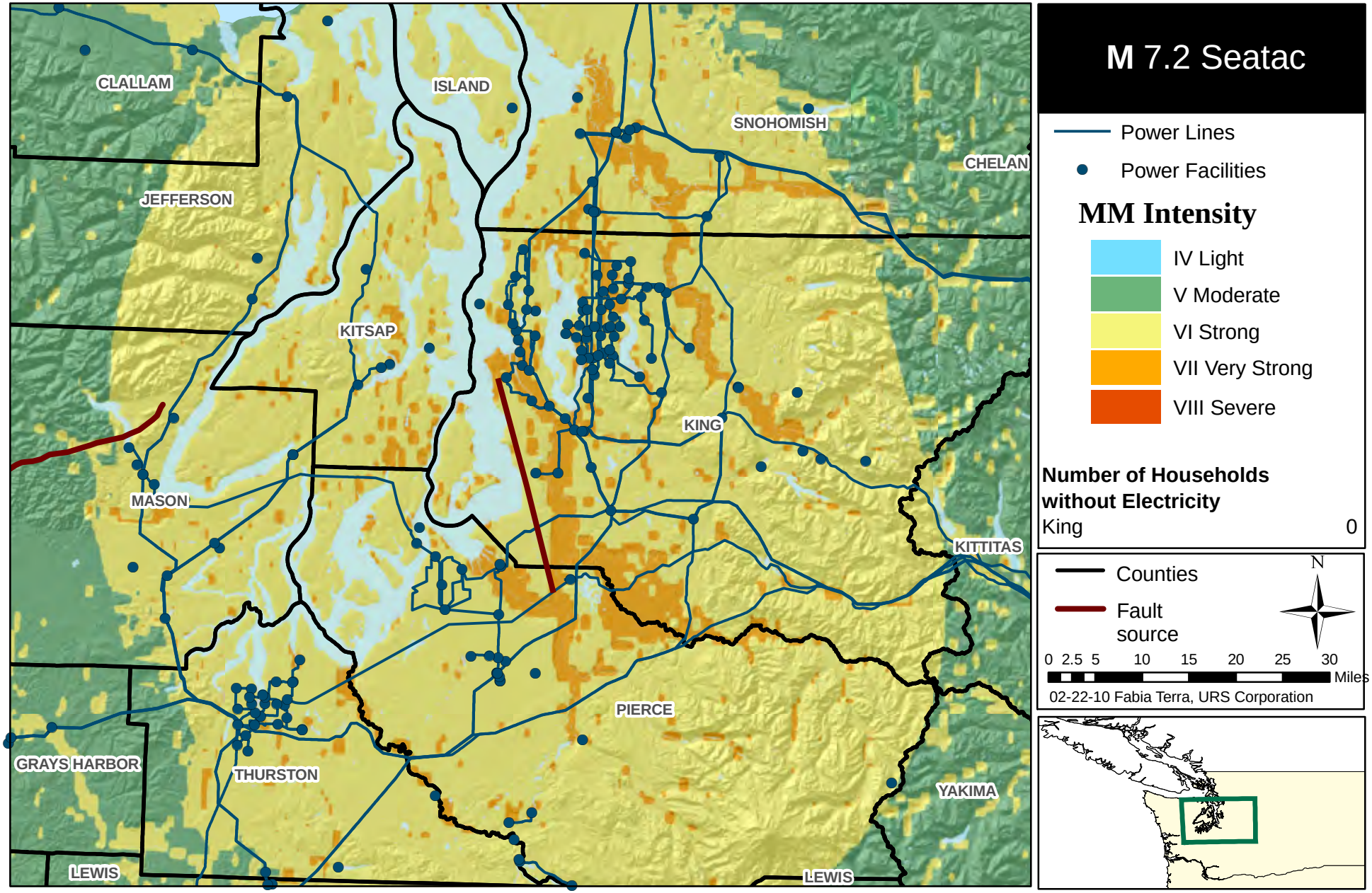
02-22-10 Fabia Terra, URS Corporation



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

Figure 6

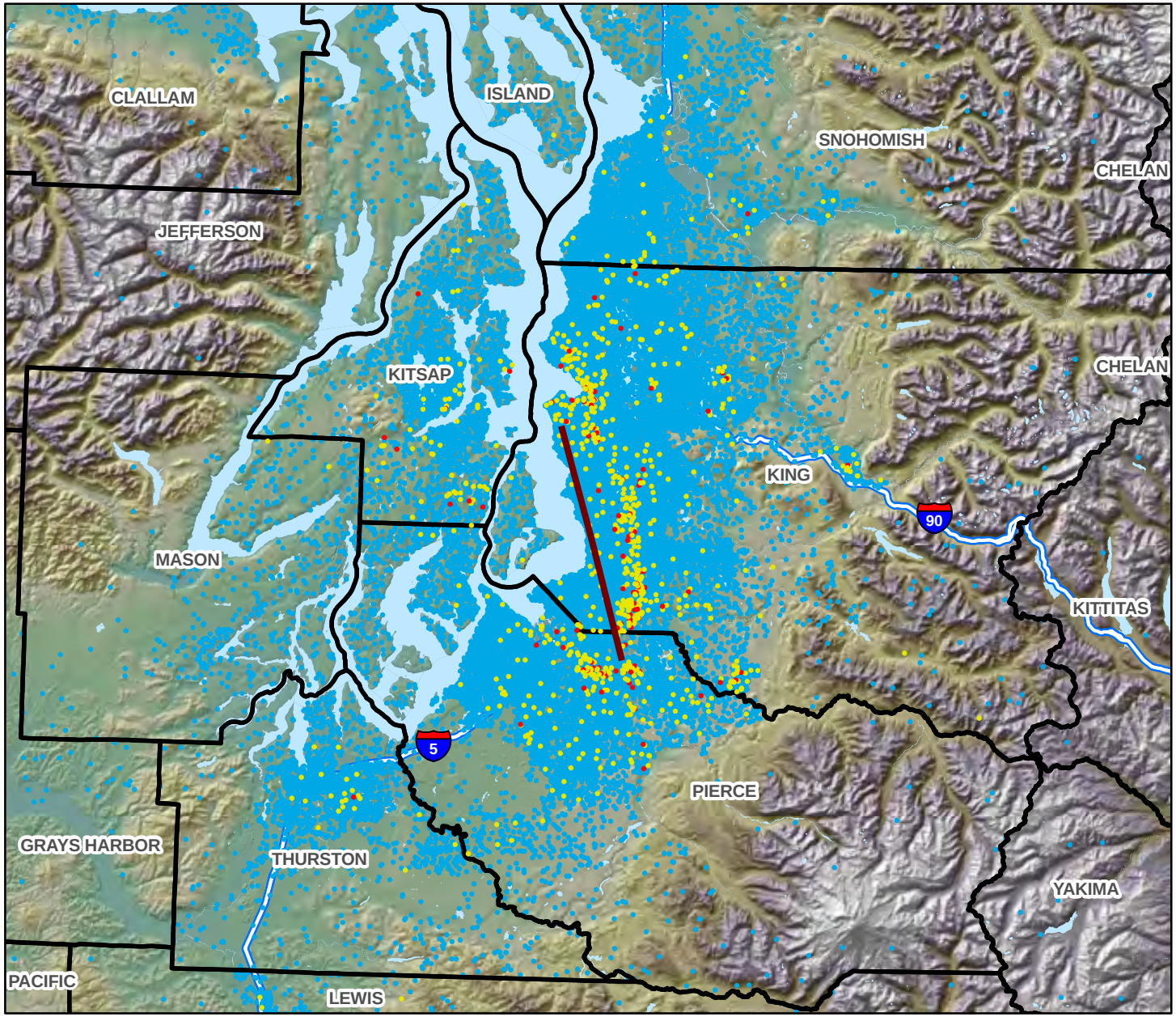
Power Lines and Facilities, Households Without Electricity, and Ground Shaking Intensities - Earthquake Scenario: Washington



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 7.2 Seatac

	Estimated # of Structures	Estimated # of Inspectors Needed*
Red (Complete)	1,123	7
Yellow (Extensive)	8,801	117
Light Blue (Slight/ Moderate)	366,016	2,440
Total	375,941	2,565

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

1 Dot = 1 building (by census tract)

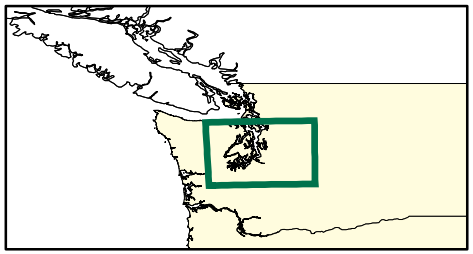
- Red Tag (Complete Damage)
- Yellow Tag (Extensive Damage)
- Blue Tag (Slight/Moderate Damage)

N

- Counties
- Fault source

0 2 4 8 12 16 20 24 Miles

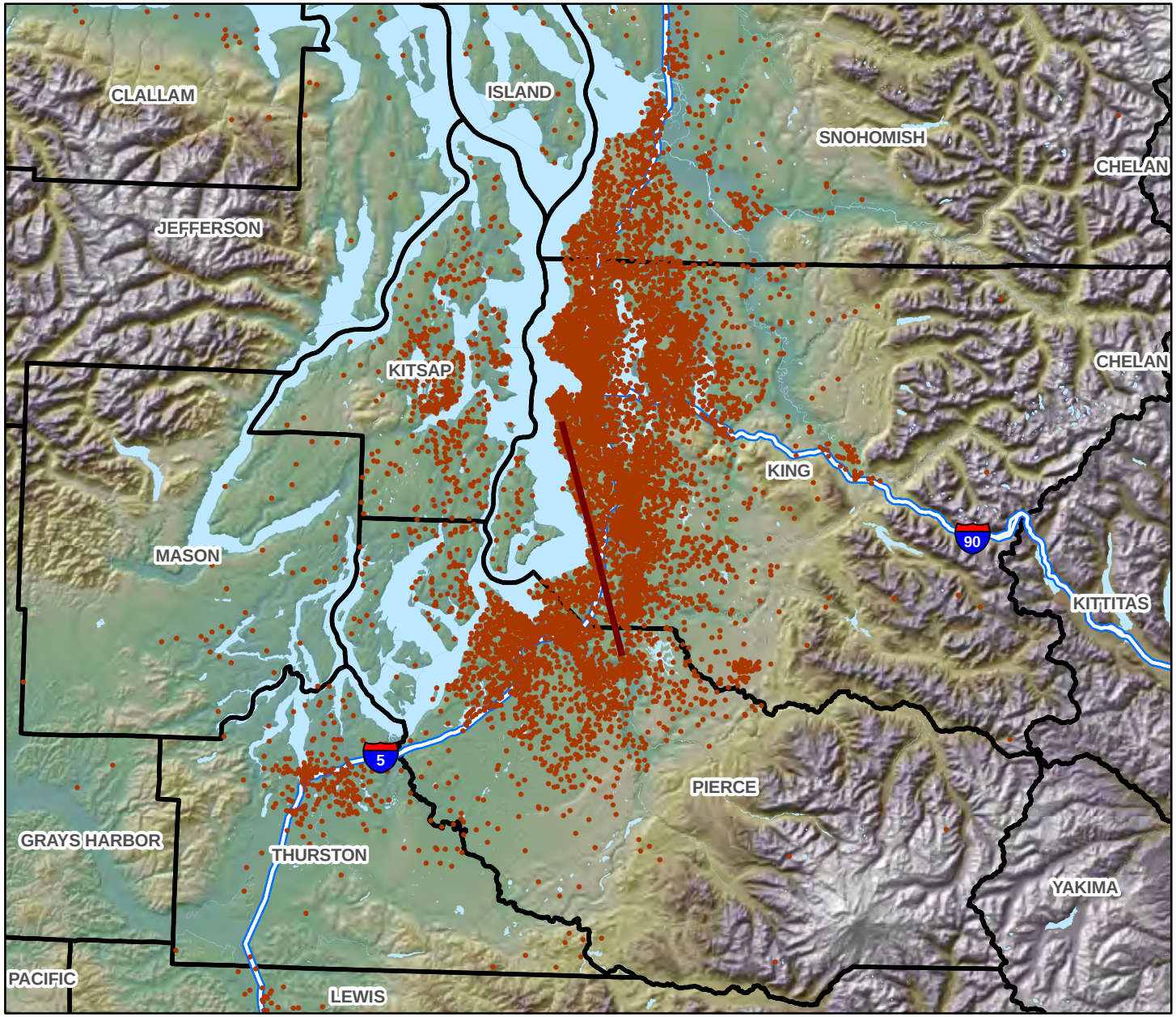
02-22-10 Fabia Terra, URS Corporation



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 7.2 Seatac

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

County	Cost Strucutral Damage	Cost Non-Structural Damage	Total Loss (Including Contents)
Clallam	$1 M	$10 M	$16 M
Garys Harbor	$0 M	$3 M	$5 M
Island	$3 M	$25 M	$41 M
Jefferson	$1 M	$10 M	$17 M
King	$678 M	$3,022 M	$5,075 M
Kitsap	$49 M	$262 M	$430 M
Lewis	$5 M	$23 M	$41 M
Mason	$3 M	$21 M	$34 M
Pierce	$193 M	$893 M	$1,496 M
Snohomish	$80 M	$475 M	$783 M
Thurston	$26 M	$143 M	$235 M
Total	**$1,041 M**	**$4,886 M**	**$8,172 M**

* All values are millions of dollars

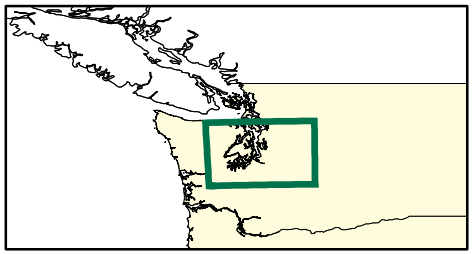
Counties

Fault source

N

0 5 10 15 20 25 30 Miles

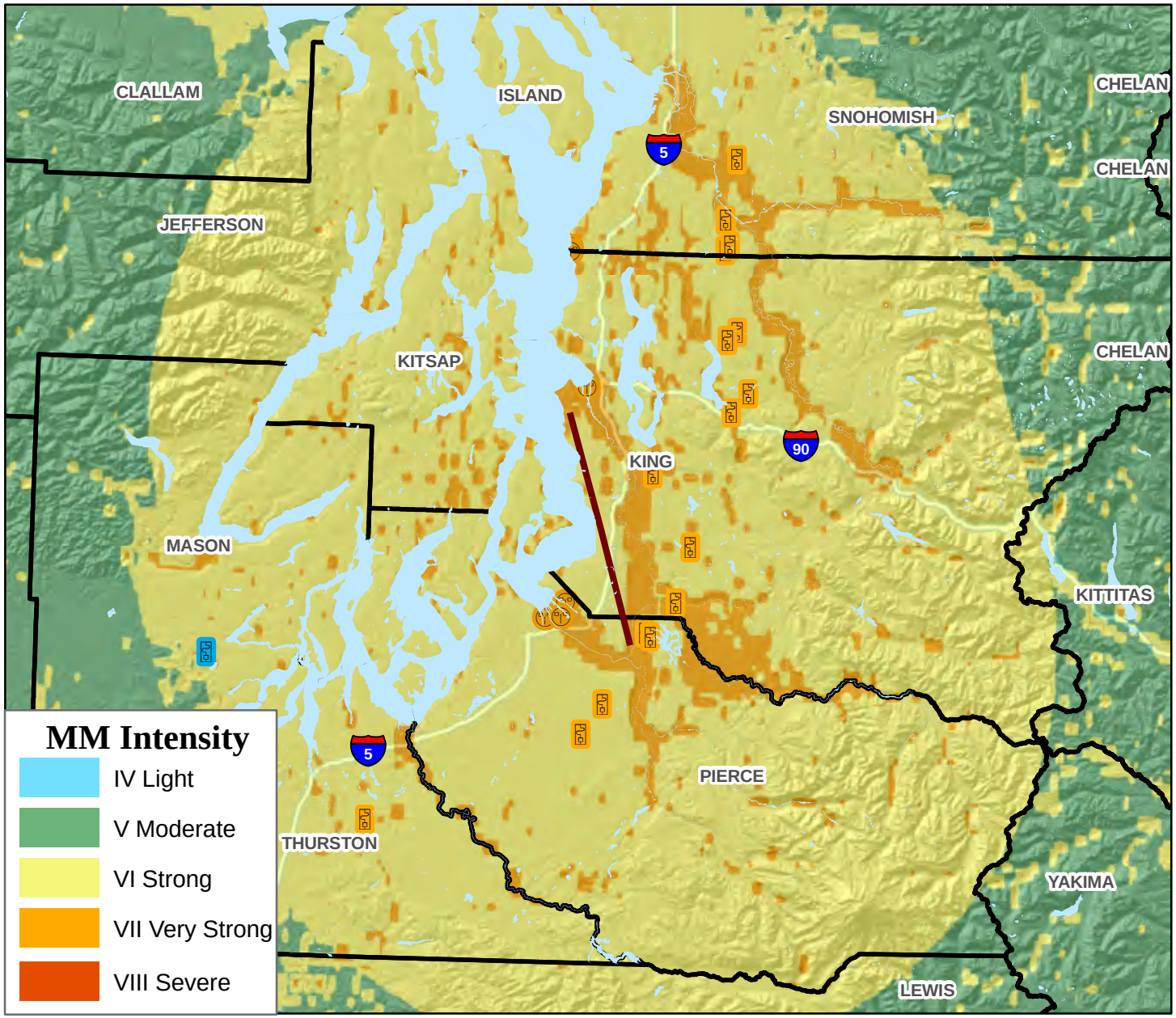
02-22-10 Fabia Terra, URS Corporation



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 7.2 Seatac

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%

MM Intensity

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

Counties

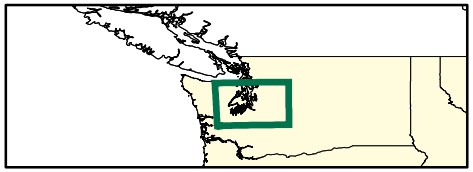
Fault source

N

0 4 8 12 16 20 24

Miles

02-22-10 Fabia Terra, URS Corporation

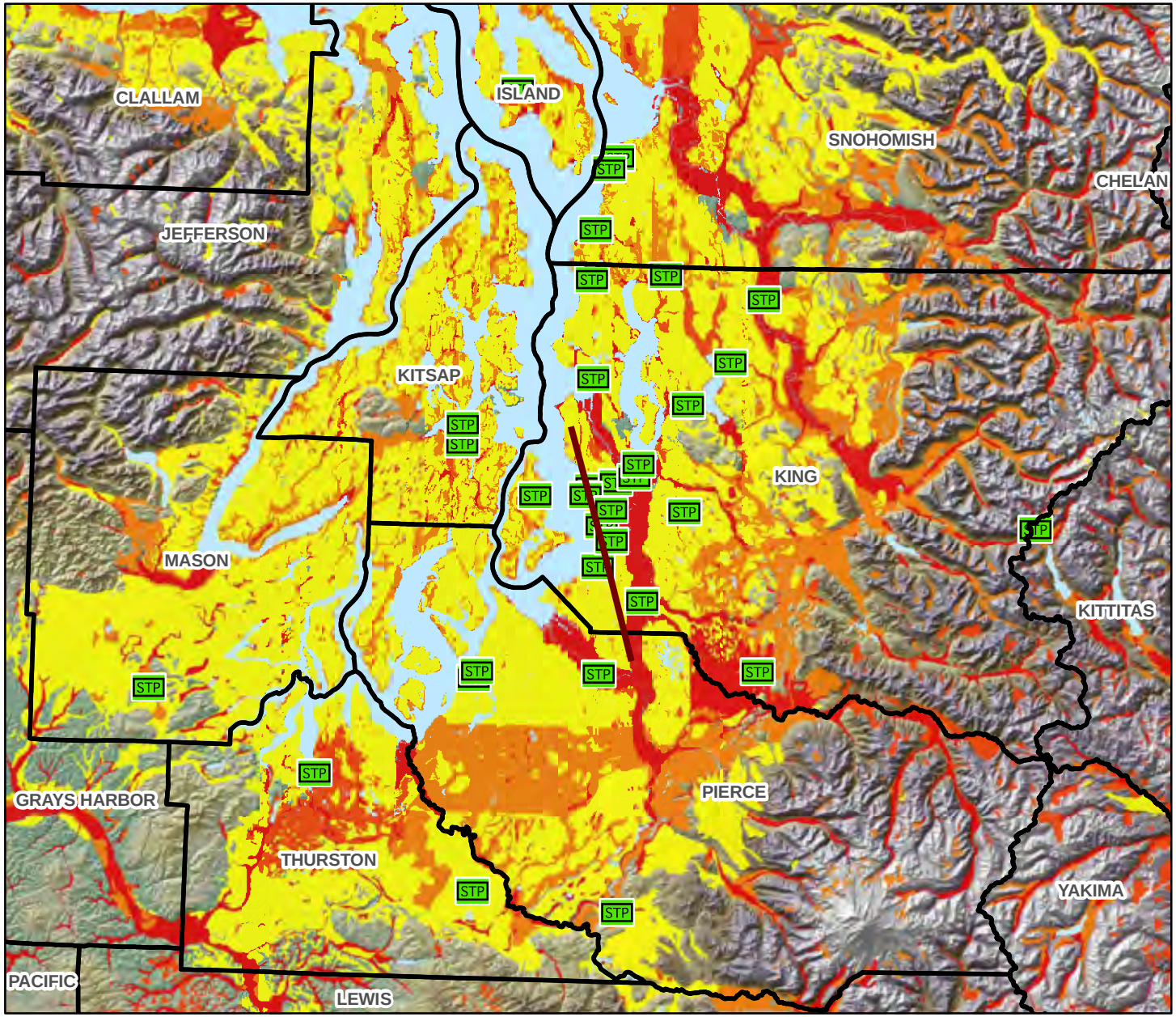


Sources: 2009 HAZUS runs by URS Corporation, Highways HSIP Gold 2007, MMI Map USGS 2009

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 7.2 Seatac

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
King	101,598	304,794	64
Kitsap	18,123	54,369	11
Pierce	12,727	38,181	8

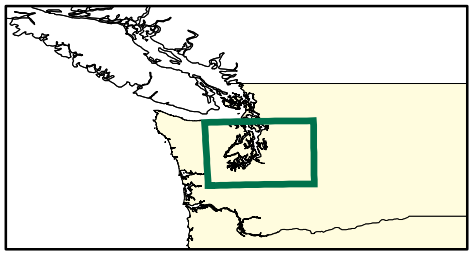
* Based on U.S. Army Corp Mission Guidebook
(Daily water is based on an esimated 3 people per household. One truck can transport an esimated 5000 gallons of water.)

Note: Counties not listed had no potable water losses.

N

0 4 8 12 16 20 24 Miles

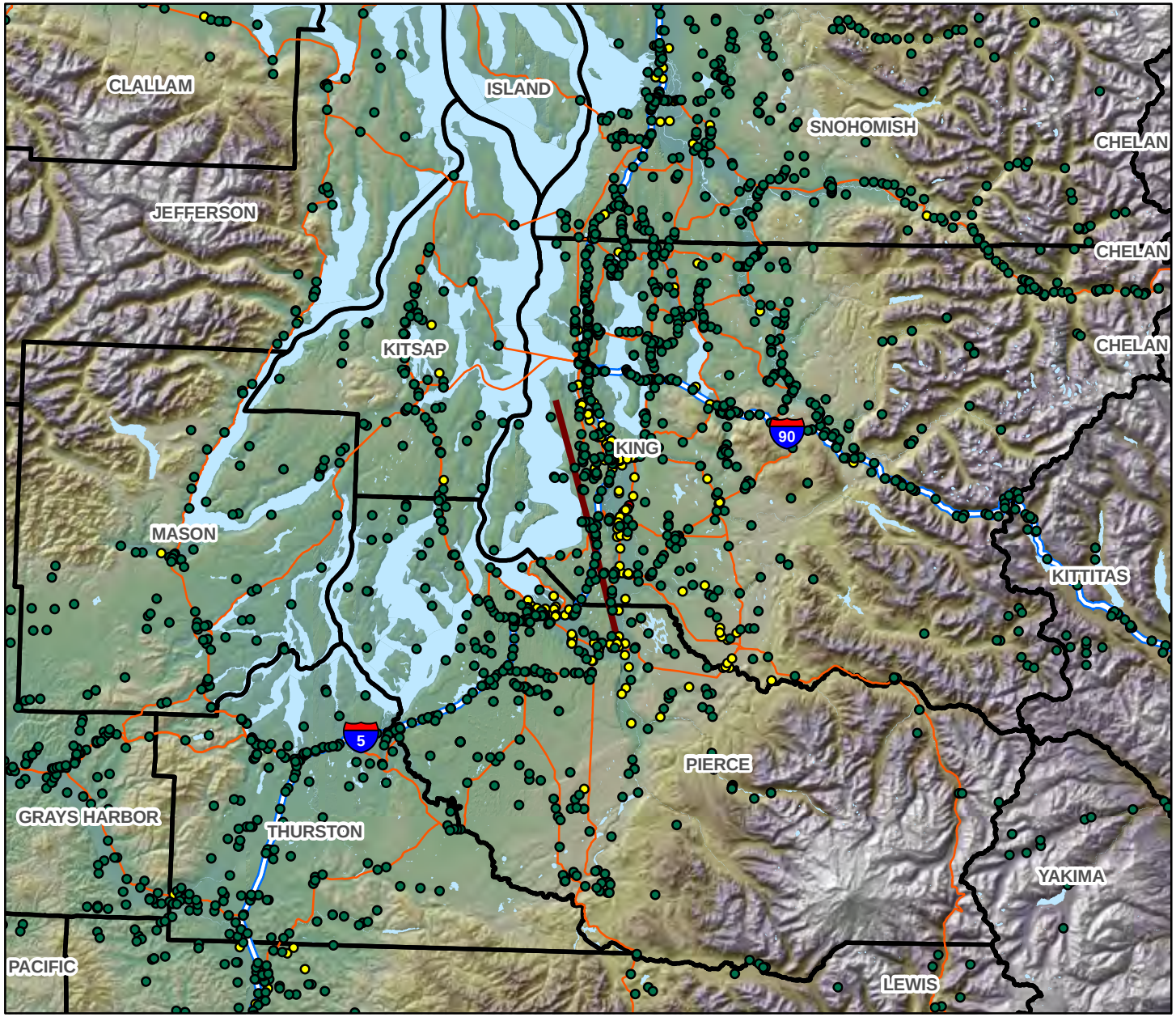
02-22-10 Fabia Terra, URS Corporation



Sources: 2009 HAZUS runs by URS Corporation, Sewage Treatment Facilities 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 7.2 Seatac

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
low
moderate
high

County	# of Bridges Needing Inspection	# of Bridge Engineers Needed*
Clallam	95	13
Grays Harbor	269	36
King	1,033	138
Kitsap	83	11
Lewis	333	44
Mason	92	12
Pierce	402	54
Snohomish	466	62
Thurston	186	25
Total	**2,959**	**395**

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

0 5 10 15 20 25 30
Miles

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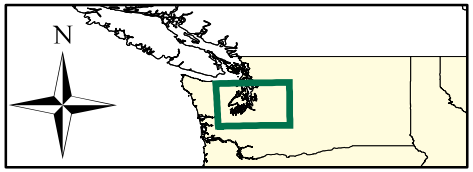
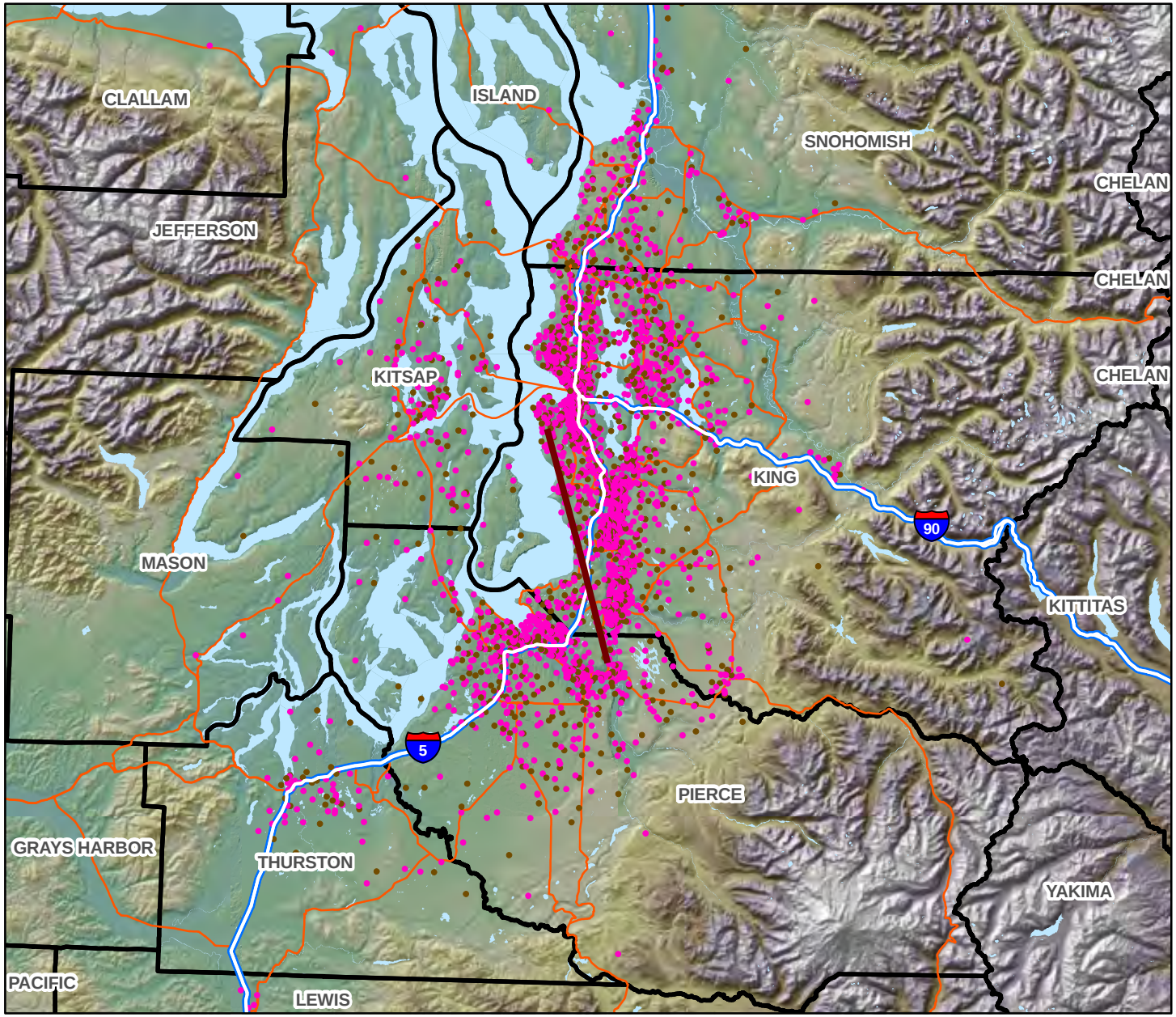


Sources: 2009 HAZUS runs by URS Corporation, Highways HSIP Gold 2007
Projection: NAD83 Harn State Plane Washington 4602 (feet)

Figure 12

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



M 7.2 Seatac

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

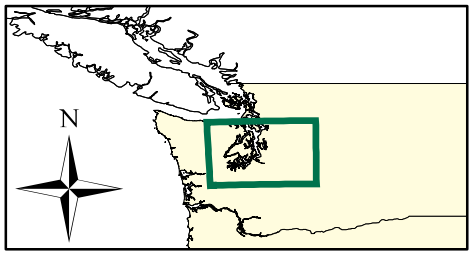
Roads
Interstate
Highway
Counties
Fault source

County	Brick and Wood (tons)	Concrete and Steel (tons)	Estimated Truck Loads*
Clallam	2,000	1,000	120
Island	4,000	2,000	240
Jefferson	2,000	1,000	120
King	559,000	1,021,000	63,200
Kitsap	49,000	49,000	3,920
Lewis	4,000	7,000	440
Mason	4,000	2,000	240
Pierce	180,000	268,000	17,920
Snohomish	77,000	79,000	6,240
Thurston	27,000	25,000	2,080
Total	**908,000**	**1,455,000**	**94,520**

* Truck loads estimated at 25 tons per truck

0 5 10 15 20 25 30 Miles

02-22-10 Fabia Terra, URS Corporation



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

Figure 13