


Final- Hazard Profile – Wildland Fire

Wildland Fire

 Fire	Frequency	50+ yrs	10-50 yrs	1-10 yrs	Annually
	People	<1,000	1,000-10,000	10,000-50,000	50,000+
	Economy	1% GDP	1-2% GDP	2-3% GDP	3%+ GDP
	Environment	<10%	10-15%	15%-20%	20%+
	Property	<\$100M	\$100M-\$500M	\$500M-\$1B	\$1B+
	Hazard scale	< Low to High >			

Risk Level

- Frequency – One or more wildland fires occur in Washington every year.
- People – The number of lives lost to wildland fires in Washington does not meet the minimum threshold for this category.
- Economy – While the local economy where the wildland fire occurs may be affected, the affect that wildland fires have on the economy of Washington does not meet the minimum threshold for this category.
- Environment – While the damage to forest fires can be significant, the potential for 10% of a single species or habitat to be destroyed by such a fire is highly unlikely.
- Property – Past U.S. wildland fires indicate that the amount of property damage due to a wildland fire can exceed \$100 million dollars.

Note: The discussion of the Urban Fire Hazard begins on page 31.

Summary

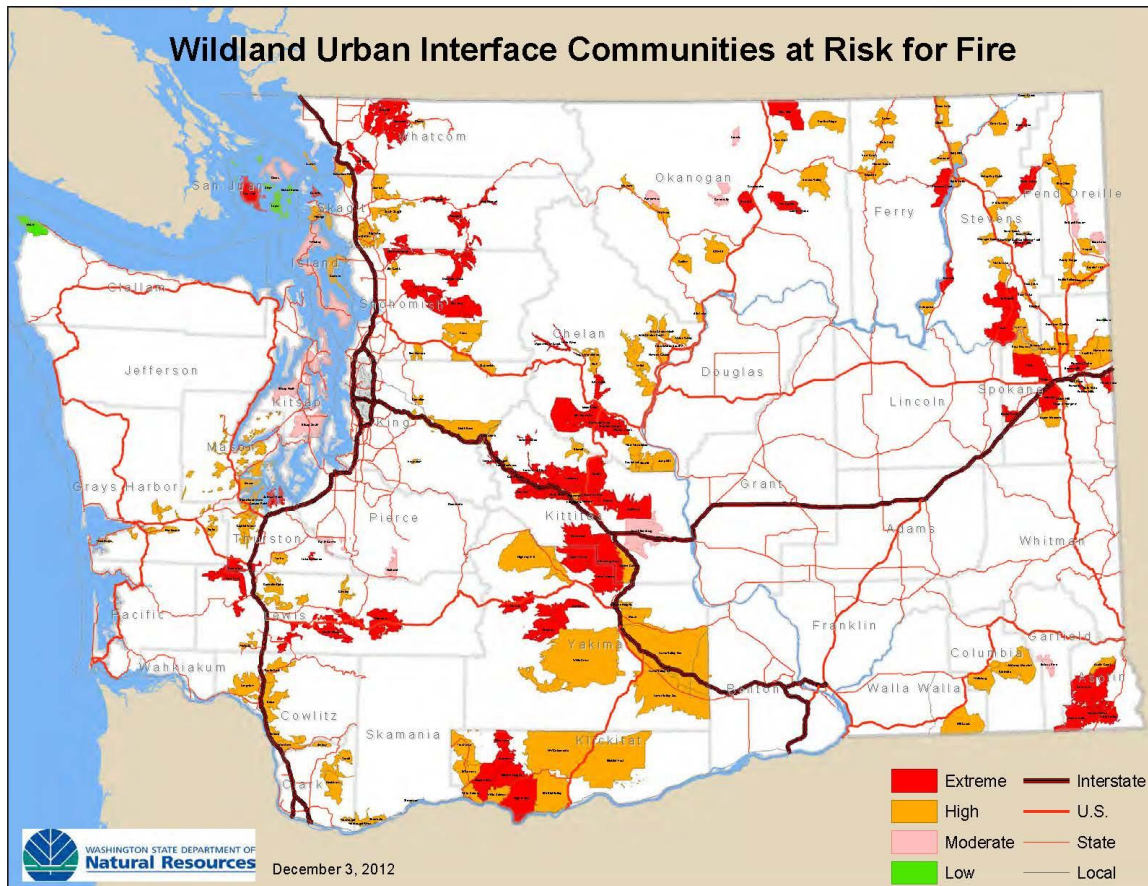
- The hazard – Wildland fire burns approximately 23,000 acres of state-owned or protected land annually. The cost of wildland fire on these lands is more than \$28 million annually in firefighting and damage to timber, habitat, and property.
- Previous occurrences – Washington has a long history of both small and very large fires. Some fires can reach 100,000 acres or more, which has occurred seven times since 1902. The state has experienced 34 fires of at least 2,500 acres on state-owned or protected land since 1992. The most recent large fire was Taylor Bridge in 2012, which burned 23,500 acres, destroyed 61 homes and 211 outbuildings.
- Probability of future events – Approximately 800 wildland fires occur each year on state-owned or protected land; most are small and less than one acre in size. Approximately 70 percent occur in Eastern Washington. Humans cause most wildland fires. The wildland fire season usually begins in early July and typically culminates in late September, but fires have occurred in every month of the year.
- Jurisdictions at greatest risk – The Washington Department of Natural Resources has identified 221 communities in 34 counties at greatest risk to wildland fire, based on criteria in the wildfire hazard severity analysis developed by the National Fire Protection Association (NFPA).

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Hazard Area Map

The hazard map represents the communities in Washington at risk to a wildland-urban interface (WUI) fire. The WUI is defined by the NFPA as the “area where improved property and wildland fuels meet at a well-defined boundary.” More information on the WUI can be found later in this section.

The following map was created by the Washington State Department of Natural Resources (DNR) and classifies risk of a WUI fire between moderate to extreme.



**Figure 5.5-1- Wildland-Urban Interface Communities at Risk for Fire.
Washington Department of Natural Resources (DNR) 2012**

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The Hazard^{1,2,3,4,5,6,7,8}

Wildland fires are fires caused by nature or humans that result in the uncontrolled destruction of forests, brush, field crops, grasslands, and real and personal property.

The wildland fire season in Washington usually begins in early July and typically culminates in late September with a moisture event; however, wildland fires have occurred in every month of the year. Drought, snow pack, and local weather conditions can expand the length of the fire season. The early and late shoulders of the fire season usually are associated with human-caused fires. Lightning generally is the cause of most fires in the peak fire period of July, August and early September.

Short-term loss caused by a wildland fire can include the destruction of timber, wildlife habitat, scenic vistas, and stormwater retention plus closure to recreation, hunting and fishing opportunities. Long-term effects include smaller timber harvests, reduced access to affected recreational areas, and destruction of cultural, economic and community infrastructure resources.

The Washington Department of Natural Resources protects 2.8 million acres of state-owned land and 10 million acres of land in private ownership through legislative directive [RCW 76.04].

The department fights about 800 wildland fires per year across the state of which nearly 70 percent are in Eastern Washington. Most of these fires are small and are usually extinguished while they are less than one acre in size. People start most wildland fires on state lands through arson, recreational fires that get out of control, smokers' carelessness, debris burning, fireworks and children playing with fire. Lightning starts most fires on federally protected lands.

Wildland fires can spread to more than 100,000 acres and may require thousands of firefighters and several months to extinguish. Federal, state, county, city, and private agencies and private timber companies provide fire protection and firefighting services on forestlands in Washington State.

Factors that influence wildland fire⁹

A fire needs three elements in the right combination to start— a heat source, fuel, and oxygen. How a fire behaves primarily depends on the characteristics of available fuel, weather conditions, and terrain.

- Fuel:
 - Lighter fuels such as grasses, leaves and needles quickly expel moisture and burn rapidly, while heavier fuels such as tree branches, logs and trunks take longer to warm and ignite.
 - Snags and hazard trees – those that are diseased, dying, or dead – are larger west of the Cascades, but more prolific east of the Cascades. In 2012, approximately 1.2 million acres of the state's 21 million acres of forestland contained trees killed or defoliated by forest insects and diseases.

- Weather:
 - West of the Cascades, strong, dry east winds in late summer and early fall produce extreme fire conditions. East wind events can persist up to 48 hours with wind speed reaching 60 miles per hour; these winds generally reach peak velocities during the night and early morning hours.

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- East of the Cascades, summer drying typically starts in mid June and runs through early September, with drought conditions extending this season. Passage of a dry, cold front through this region can result in sudden increase in wind speeds and a change in wind direction affecting fire spread.
- Thunderstorm activity, which typically begins in June with wet storms, turns dry with little or no precipitation reaching the ground as the season progresses into July and August. Thunderstorms with dry lightning are more prevalent in Eastern Washington.
- Terrain:
 - Topography of a region or a local area influences the amount and moisture of fuel.
 - Barriers such as highways and lakes can affect spread of fire.
 - Elevation and slope of landforms – fire spreads more easily as it moves uphill than downhill.

The peak burning period of a fire generally is between 1 p.m. and 6 p.m. Wildland fires can take on a life of their own when there is plenty of heat and fuel. They can create their own winds and weather including generating hurricane force winds of up to 120 miles per hour. Fires can heat fuels in their path, drying them out, and making them easier to ignite and burn.



Figure 5.5-2 Table Mountain Fire creating its own weather, DNR 2012

The U.S. Forest Service, Bureau of Land Management, Washington State Department of Natural Resources, and local area fire districts are responsible for the response and suppression of wildland fires in Washington. Washington’s Department of Natural Resources is “the state’s largest on-call fire department with 1,200 temporary and permanent employees who fight fires on about 12 million acres of private and state-owned forest lands”. The Bureau of Land Management (BLM) manages several hundred thousand acres of public lands located mostly in the central Columbian Basin and the Northeast Highlands of Washington near the Canadian border. The U.S Forest Service (USFS) manages 9.3 million acres of public lands located mostly along the spine of the Cascade Mountains, along the Canadian border, and around the Olympic Peninsula. The BLM and USFS have seasonal and permanent employees and equipment to fight wildfires on federal lands.

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These agencies, along with tribal entities, U.S. Fish & Wildlife, and the fire chiefs associations for Washington and Oregon, form the Pacific Northwest Wildfire Coordinating Group (PNWCG). This group provides a coordinated interagency approach to wildfire management in Oregon and Washington. The Northwest Interagency Coordination Center (NWCC) serves as the focal point for these agencies resource coordination, logistics support, aviation support, and predictive services for all state and federal agencies involved in wildland fire management and suppression in Washington and Oregon. The NWCC provides daily significant fire potential maps for the region along with daily situation reports, briefings and large fire information summaries for local, county, and state emergency managers to keep updated on the status of these incidents.

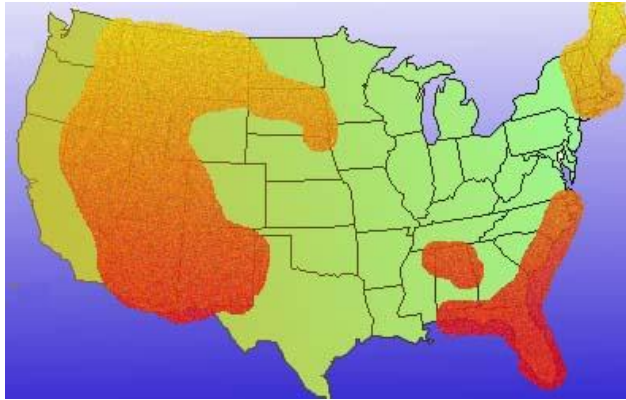


Figure 5.5-3 Burnout operations along Highway 12 for Yakima Complex Fire, DNR 2012

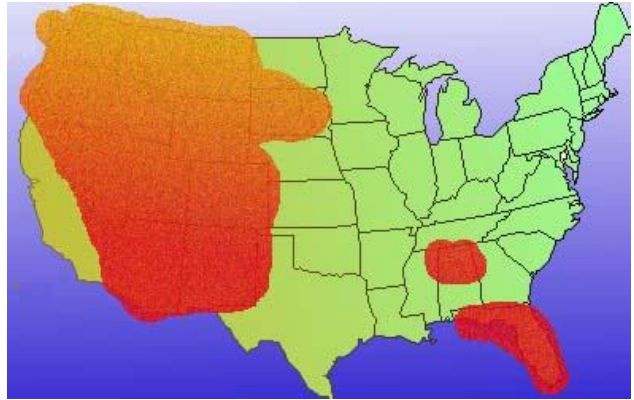
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Fire Seasons¹⁰

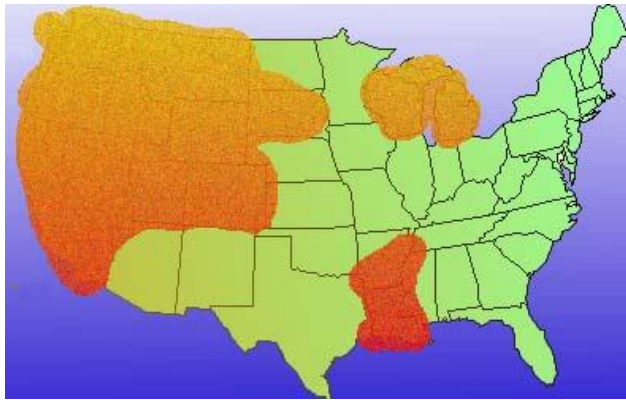
The wildland fire season in Washington State usually begins in early July and typically culminates in late September. The fire season typically is longer in Eastern Washington than in Western Washington because the eastern side is drier and has a larger number of ignition sources, primarily the number of lightning strikes. The western half of the state receives more rainfall and has spring seasons that are wetter and cooler than the east thereby keeping the ignitability of the forest down.



Fire Season – June



Fire Season – July



Fire Season – August



Fire Season – September

Figure 5.5-4 Source: Firewise Communities Program / USDA Forest Service

Impact of Wildland Fire on State-Owned or Protected Land¹¹

From 2008 through 2012, the cost of wildland fire on state-owned or protected lands is more than \$34 million annually in firefighting and damages.

During this time period wildland fires caused about \$14 million in damage annually. The bulk of the losses are harvestable timber and timber products valued at more than \$6.8 million. Fire also destroys forage, wildlife, watersheds, recreation areas, and real and personal property valued at approximately \$7.2 million.

Data on indirect impacts of wildland fire, such as the economic loss caused by reduced revenue and tax receipts from reduced timber and crop sales or leasing of rangeland, is not available.

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Previous Occurrences^{12, 13, 14, 15, 16, 17}

The State of Washington has received 62 Fire Management Assistance Declarations from the Federal government since 1970. Table 1 below provides information on some of the most significant wildland fires in Washington since 1900, some of which resulted in Fire Management Assistance Declarations. The table provides summary information for fires on lands of all ownership – federal, state, local, private, and Indian tribe.

Table 5.5-1 Significant Wildland Fires Since 1900

Year	Fire	Area	Acres Burned	Impacts
1902	Yacolt	Skamania, Clark Counties	238,900	38 deaths.
1910	Great Idaho Fire	Spokane and Pend Oreille Counties	150,000	3 million acres burned, mostly in Idaho and Montana; considered one of the nation’s historically significant fires.
1929	Dole Valley Toats Coulee	Skamania, Clark Counties Okanogan County	227,500 80,000	
1951	Great Forks Fire	Clallam County	33,000	Fire threatened Forks leading to evacuation of the town. A sawmill, and a number of homes, cabins and barns destroyed.
1970	Lightning Bust	Chelan, Okanogan Counties	188,000	
1985	Barker Mountain	Okanogan County	60,000	
1987	Hangman Hills	Spokane	1,500	2 deaths; 24 homes destroyed.
1988	Dinkelman	Chelan County	50,000	1 death.
1991	Firestorm 1991	Ferry, Lincoln, Stevens, Pend Oreille, Spokane, and Whitman Counties	35,000	92 fires destroyed 114 homes and 40 buildings, another 250-300 buildings damaged, one death. Fires started by arcing electrical connections, spread over wide area by high winds. Federal Disaster #922. Stafford Act disaster assistance provided: \$12.3 million.
1992	Skookum	Klickitat County	51,000	Threatened town of Goldendale
1992	Castlerock Canyon	Wenatchee		24 homes destroyed.
1994	Tyee Creek, Hatchery Creek, Rat Creek, Round Mountain	Chelan County	180,000	2,700 homes threatened and evacuated, 37 homes destroyed.
1996	Cold Creek	Benton, Yakima Counties	57,000	

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Table 5.5-1 Significant Wildland Fires Since 1900

Year	Fire	Area	Acres Burned	Impacts
2000	24 Command	Hanford Site, Benton County	192,000 (160,000 on Hanford Site)	Caused by vehicle accident, spread to Hanford Site; 36 structures lost. Burned across three radioactive waste disposal sites, no radioactive release detected. Fire came within two miles of 177 underground storage tanks filled with lethal radioactive waste.
	Mule Dry	Yakama Indian Reservation and Yakima, Klickitat, and Benton Counties	76,800	1 home destroyed.
2001	Rex Creek Complex / Virginia Lake Complex	Colville Indian Reservation and Chelan, Ferry, Okanogan Counties	130,000	Hundreds of homes threatened, 10 destroyed.
	Thirtymile	Okanogan	9,300	4 firefighters died.
2002	Deer Point	Chelan County	42,665	5 homes, 4 outbuildings destroyed.
2005	School	Columbia, Garfield counties	52,000	109 homes, 106 outbuildings destroyed; 120 homes, 56 outbuildings threatened. \$15 million suppression costs.
2006	Tripod	Okanogan County	175,184 (11,465 on DNR protection)	
	Spur Peak	Okanogan County	14,000	
	Tin Pan	Chelan County	9,252	
	Columbia Complex	Columbia, Walla Walla	109,402	Lost 11 homes and 8 outbuildings. Damaged 800 homes and 31 outbuildings. Threatened 350 outbuildings.
2007	Easy Street	Chelan County	5,209	Fireworks caused. 1 outbuilding lost. 2150 homes threatened
	Horse Heaven Hills	Benton County	28,575	WFS mobilization fire
	Tunk Grade	Okanogan County	15,540	95 homes threatened
	Domke Lake	Okanogan Wenatchee Forest	11,900	
	South Omak Lake Fire	Okanogan County	10,500	

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Table 5.5-1 Significant Wildland Fires Since 1900

Year	Fire	Area	Acres Burned	Impacts
2007	Wautoma	Benton County	67,000	Grass fire on wildlife refuge
	Manila Creek	Colville Reservation, Ferry County	26,805	
2008	Badger Mountain	Chelan and Douglas Counties	15,023	Unknown number of homes threatened
	Spokane Valley	Spokane County	1,008	2400 people evacuated, 1900 notified of evacuation. 200 homes threatened, 40 damaged, 12 homes, 14 outbuildings, and 1 communication site destroyed
	Columbia River Road	Okanogan County	22,115	
	Swanson Lake	Lincoln County	19,090	Destroyed 1 abandoned residence, 2 seasonal cabins, and 15 outbuildings
2009	Dry Creek Complex	Yakima and Benton Counties	48,902	1,000 structures threatened
	Oden Road	Okanogan County	9,607	Destroyed 2 homes and 10 outbuildings
	Discovery	Yakima County	4,120	Burned on National and State forest land
2010	Eureka	Walla Walla County	21,620	
	Wenatchee River Complex	Chelan County	2,270	Over 400 homes threatened
	Rainbow Bridge	Chelan County	3,710	Threatened 200 homes in Stehekin
	Swakane	Douglas County	17,115	Threatened homes, structures and utility lines
	Highway 8	Klickitat County	2,019	Threatened 50 homes and 100 structures
2011	Salmon	Okanogan County	1,631	28 homes threatened
	Monastery	Klickitat County	3,626	Destroyed 29 homes and 79 outbuildings
2012	Taylor Bridge	Kittitas County	23,500	Destroyed 61 homes and 211 outbuildings
	Wenatchee Complex	Chelan, Douglas and Kittitas Counties	56,478	17 fires that threatened 260 homes

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Table 5.5-1 Significant Wildland Fires Since 1900

Year	Fire	Area	Acres Burned	Impacts
	Table Mountain	Kittitas County	42,312	Threatened 600 homes, destroyed 3 outbuildings
	Cascade Creek	Skamania and Yakima Counties	20,296	Burned Gifford Pinchot Wilderness Area and threatened portions of Pacific Crest Trail
	Barker Canyon Complex	Douglas County	81,155	Destroyed 3 homes and 9 outbuildings
	Apache Pass	Lincoln County	23,324	Threatened 100 homes, destroyed 4 outbuildings
	Antoine 2	Chelan and Okanogan Counties	6,837	Threatened 50 homes
	St Marys Mission Road	Okanogan County	17,031	Destroyed 2 homes and 8 outbuildings
	Buffalo Lake Road	Okanogan County	11,299	Threatened Coulee Dam and Elmer city
	Yakima Complex	Kittitas and Yakima Counties	2,300	Over 100 fire starts, Hwy 12 closures, threatened 25 homes
	Okanogan Complex	Okanogan County	6,169	4 fires that threatened 75 homes
	Highway 141	Klickitat County	1,644	Threatened 50 homes



Figure 5.5-5 Smoke from Powerline 2 Fire, DNR 2012



Figure 5.5-6 Antoine 2 Fire along Highway 97, DNR 2012

Major Wildland Fires on State-Owned or Protected Lands, 1992-2012^{18, 19, 20}

Table 2, below, provides information on some of the most significant wildland fires on state-owned or protected lands during the latest 16-year period. (Note: List below generally does not include fires

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referenced above. Acreage burned figures are for state-owned or protected lands only; fires may have burned land under other ownership/protection.)

Table 5.5-2 Major Wildland Fires on State Protected Lands, 1992 – 2012

Year	Fire	County/Area	Acres	Impacts
1992	Skookum	Klickitat	2,600	Fire threatened town of Goldendale. Acres for state protected lands only.
1996	Bowie Road	Spokane	3,020	8 homes destroyed.
1997	Red Lake	Stevens	1,151	5 homes destroyed.
1998	Cleveland	Klickitat	18,500	11 homes destroyed, 143 cattle killed. Several cultural and historic sites and state natural area preserve damaged.
1999	Mallot	Okanogan	2,808	
2000	Alderdale	Klickitat	6,000	
	Rocky Hull	Okanogan	9,404	37 homes destroyed.
	Cayuse	Okanogan	5,460	
	Goodnoe	Klickitat	4,455	Destroyed pastureland, 1 barn.
	Buffalo Lake	Colville Indian Reservation	9,300	
	Wood Gulch	Klickitat	2,620	
2001	Libby	Okanogan	3,830	50 structures threatened, none lost.
	Spruce/Dome Complex	Yakima	2,442	
	Brewster Complex	Okanogan	6,154	
	Union Valley	Chelan	4,700	100 structures threatened, 3 destroyed.
	North Coppei	Columbia	4,810	
2002	Deer Mountain	Chelan	2,281	
2004	Mud Lake		4,000	
	Pot Peak-Sisi Ridge	Chelan	47,170	
2005	Dirty Face	Chelan	1,150	\$6.7 million suppression costs.
	Second Hud	Okanogan	4,274	\$2 million suppression costs.
	West Omak Lake	Okanogan	11,325	\$2 million suppression costs.
	Wood Gulch	Klickitat	5,400	\$500,000 suppression costs.
2006	Columbia Complex	Columbia, Walla Walla	109,402	Lost 11 homes and 8 outbuildings. Damaged 800 homes and 31 outbuildings. Threatened 350 outbuildings.
	Tripod Complex	Okanogan	175,184	11,465 acres on DNR protection lands
2007	Easy Street	Chelan	5,209	Caused by Fireworks. 1 outbuilding lots; 2,150 homes threatened.

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Table 5.5-2 Major Wildland Fires on State Protected Lands, 1992 – 2012

Year	Fire	County/Area	Acres	Impacts
	Tunk Grade	Okanogan	15,540	95 homes threatened
2009	Oden Road	Okanogan	9,607	Destroyed 2 homes and 10 outbuildings
	Discovery	Yakima	4,120	Burned on National and State forest land
2010	Swakane	Douglas	17,115	Threatened homes, structures and utility lines
	Highway 8	Klickitat	2,019	Threatened 50 homes and 100 structures
2011	Salmon	Okanogan	1,631	28 homes threatened
	Monastery	Klickitat	3,626	Destroyed 29 homes and 79 outbuildings
2012	Taylor Bridge	Kittitas	23,500	Destroyed 61 homes and 211 outbuildings
	Highway 141	Klickitat	1,644	Threatened 50 homes

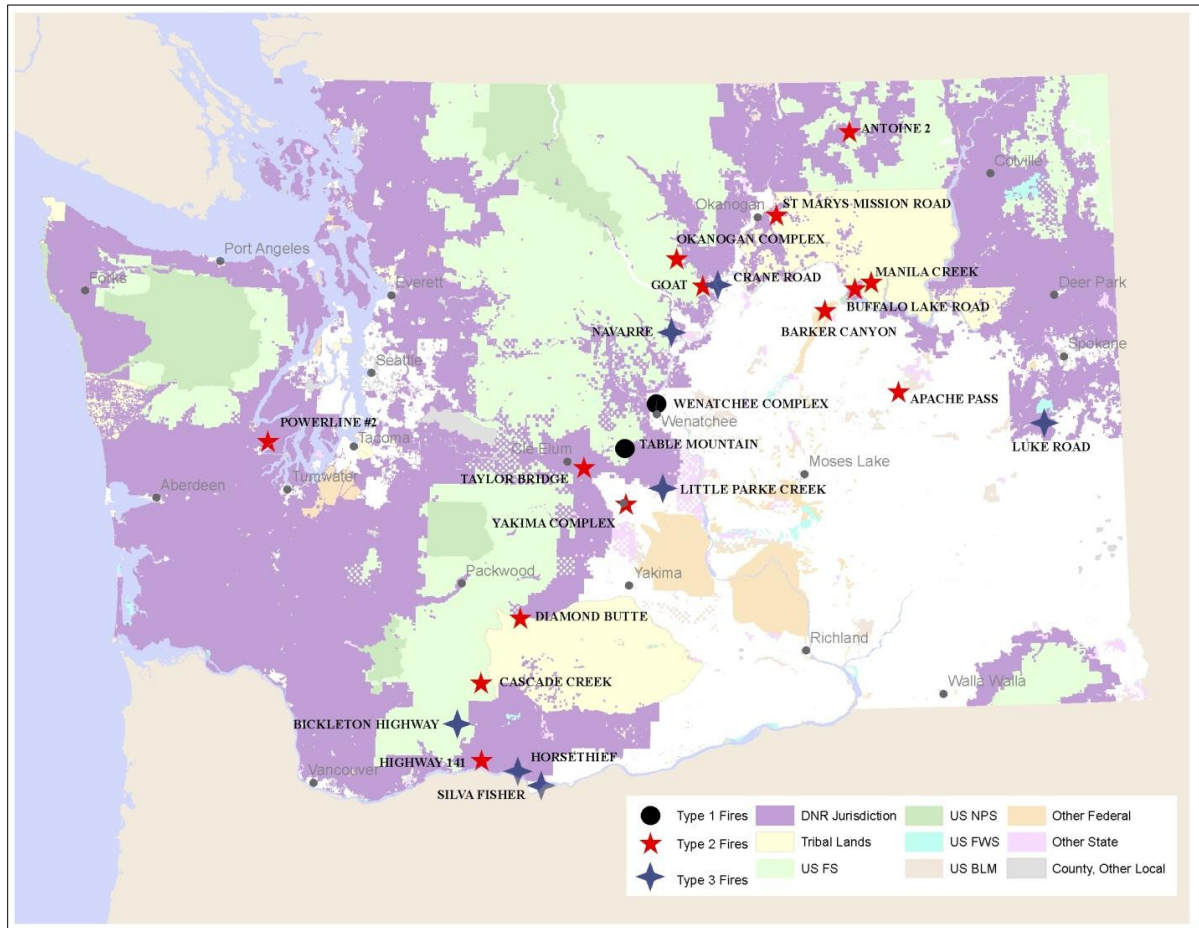


Figure 5.5-7 Washington Department of Natural Resources (DNR) 2012

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Probability of Future Events²¹

While wildfire has always played a big role in the forests of the western United States, the risk to public safety, private property and the quality of life in Washington has changed. There are more people living, recreating, and working in the woods. Washington State’s forests are in jeopardy. Wildfires create public health and water quality problems. Wildfires now increasingly burn with intensities that reduce or eliminate habitat for threatened and endangered species. The direct and indirect consequences of wildfire on the people in the state, and the state’s economy and environment are real.

The last comprehensive look at DNR’s fire program was completed in 2006. Previously, it was 1986. Today, there is an additional 1.6 million people in the State, a 40% increase since 1986. There are now more homes in the woods, homes often without any fire protection. Climate change and other factors have substantially reduced forest health. The results are increased risks to public safety and firefighter safety, compounded by the increased costs of fire suppression and accelerated losses of landowner timber value.

Table 5.5-3 provides summary information, by county, for the number of fires and number of acres burned for 2003-2012. The data was provided by Washington Department of Natural Resources.

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Table 5.5-3

County	2003 fires	2003 acres	2004 fires	2004 acres	2005 fires	2005 acres	2006 fires	2006 acres	2007 fires	2007 acres	2008 fires	2008 acres	2009 fires	2009 acres	2010 fires	2010 acres	2011 fires	2011 acres	2012 fires	2012 acres	County total fires	County total acres burned
Adams County	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	1
Asotin County	0	0	3	30.2	3	150.5	3	2.5	6	21019.3	4	0.7	5	0.56	2	0.1	0	0	6	2558.6	32	23762.41
Benton County	1	0.3	0	0.0	2	0.0	0	0.0	3	101575	0	0	0	0	0	0	0	0			6	101575.3
Chelan County	25	21.2	51	184.3	47	33.4	38	112.2	43	5086.6	36	250.3	50	3034.3	50	19502.5	27	353.59	45	56457.8	412	85036.11
Clallam County	21	43.8	28	24.0	29	3.8	32	19.7	11	12.4	18	5.3	33	16.3	19	4.67	23	6.11	29	10.55	243	146.6
Clark County	32	7.6	27	8.1	28	12.1	21	16.6	33	8.9	25	27.8	24	68.21	13	118.18	19	3.7	25	143.6	247	414.67
Columbia County	5	3.5	1	0.1	3	25010.0	11	821.6	12	10.3	4	0.8	6	0.13	4	200.51	5	0.54	4	0.95	55	26048.33
Cowlitz County	62	25.2	35	40.2	26	58.9	46	134.6	19	12.1	29	59.1	59	98.93	17	111.49	55	12.29	49	20.4	397	573.14
Douglas County	1	0	4	5.0	0	0.0	3	3.0	1	1.0	4	10204	1	15	4	3086	3	600	12	94996.3	33	108910.3
Ferry County	15	32.6	60	23.2	24	10.0	32	549.8	26	41.1	50	1854.7	58	49.97	26	704.28	15	6.19	25	541.39	331	3813.26
Garfield County	0	0	0	0.0	0	0.0	1	0.1	2	0.0	8	2601.6	0	0	1	0.5	4	1.1	1	0.25	17	2603.55
Grant County	0	0	0	0.0	0	0.0	1	5000.0	2	760.0	0	0	2	0	1	0	1	0	1	470	8	6230
Grays Harbor County	24	66.2	32	20.5	29	21.5	49	81.1	30	16.8	15	14.2	18	12.2	15	7.46	15	6.45	20	44.55	247	290.95
Island County	13	24.2	5	2.1	2	1.0	6	0.5	4	0.6	2	0.4	8	1.85	2	1.1	0	0	6	0.75	48	32.41
Jefferson County	15	20	16	5.3	18	26.0	37	11.6	23	3.2	10	1.6	28	449.8	10	8.52	9	24	12	5.56	178	555.61
King County	10	17.3	20	2.8	42	2.3	10	0.2	10	0.2	25	10.7	43	25.33	7	1.3	6	1.14	10	7.28	183	68.6
Kitsap County	10	19.6	6	1.0	4	1.5	3	5.2	3	5.2	1	0.01	3	1.31	2	0	0	0	3	2.65	35	36.32
Kittitas County	30	197.3	86	1611.2	44	16.3	38	559.5	38	559.5	53	739.5	41	138.61	29	64.64	38	778.39	61	67204.9	458	71869.84
Klickitat County	54	76.3	149	320.0	79	113.3	54	1237.7	54	1237.6	63	415.7	60	1337.26	40	3276.64	36	3736.48	43	3119.35	632	14870.22
Lewis County	44	33.3	48	85.1	39	80.2	16	4.2	16	4.2	19	37.7	29	15	11	7.46	15	7.22	34	41.01	271	315.42
Lincoln County	6	18.5	9	340.1	8	1005.2	11	1669.4	11	1669.4	6	19140.3	11	35.12	13	408.56	8	34.52	23	24559.5	106	48880.66
Mason County	60	48.4	65	33.5	66	133.1	33	61.0	33	61.0	43	26.8	37	43.2	19	91.31	29	57.82	47	263.94	432	820.14
Okanogan County	57	1984.3	216	5284.0	88	11785.0	103	16591	95	16948.9	168	33272.8	245	13891.8	112	636.37	78	3461.29	141	43781.4	1303	147636.26
Pacific County	22	10.6	9	36.8	16	43.2	26	12.3	9	1.6	9	19.8	14	11.76	7	4.25	5	1.08	12	12.1	129	153.44
Pend Oreille County	33	13.7	30	3.8	24	10.9	66	18.5	40	15.2	41	26.9	52	19.08	35	60.67	29	14.39	28	26.18	378	209.34
Pierce County	21	34.1	35	43.5	16	24.3	32	448.9	18	6.2	19	45.7	37	25.63	16	2.7	24	6.9	29	42.83	247	680.74
San Juan County	14	5.2	7	2.4	5	0.7	4	5.8	1	0.1	7	2.7	7	4.15	11	7.97	3	1.7	9	2.75	68	33.28
Skagit County	24	55	18	2.0	12	2.2	19	54.3	19	1.0	15	5.3	35	44.85	7	0.76	16	13.22	18	26.34	183	204.97
Skamania County	19	13.7	19	5.4	24	13.3	26	5.7	15	133.5	12	2.7	17	101.07	13	2.22	15	3.04	19	3.47	179	284.05

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Table 5.5-3

County	2003 fires	2003 acres	2004 fires	2004 acres	2005 fires	2005 acres	2006 fires	2006 acres	2007 fires	2007 acres	2008 fires	2008 acres	2009 fires	2009 acres	2010 fires	2010 acres	2011 fires	2011 acres	2012 fires	2012 acres	County total fires	County total acres burned
Snohomish County	29	59.1	24	47.5	9	2.7	21	22.8	17	5.4	13	7.5	27	213.7	12	9.04	15	3.63	25	7.24	192	378.64
Spokane County	135	1385.5	106	331.4	118	1257.5	149	444.7	162	545.5	108	1115.2	141	134.41	72	911.18	112	235.96	150	334.32	1253	6695.58
Stevens County	145	3991.2	167	117.7	100	975.5	151	966.7	154	971.7	189	1264.5	160	366.91	123	2071.25	75	130.05	113	353.92	1377	11209.43
Thurston County	68	33.8	66	101.3	39	96.0	95	58.2	30	12.9	34	18.60	52	47.53	19	3.77	20	11.82	0	0	423	383.93
Wahkiakum County	0	0	3	0.2	5	30.5	5	1.1	0	0.0	4	0.95	2	3.4	3	7.26	0	0	3	0.3	25	43.7
Walla Walla County	1	0.1	0	0.0	3	250.1	7	44636	5	65.0	3	2.1	3	1.02	0	0	1	0	1	0.1	24	44954.54
Whatcom County	9	7.3	21	107.3	13	22.9	15	1.6	13	1.9	13	16.3	23	310.45	10	1.12	10	1.88	17	1.97	144	472.58
WHITMAN	0	0	0	0.0	0	0.00	0	0.00	0	0.0	1	2172	0	0			1	310	0	0	2	2482
Yakima County	18	3983.3	39	4014.6	18	498.5	28	149.9	23	439.2	31	8285.66	38	5656.66	25	266.17	23	426.32	35	6921.5	278	30641.73
TOTALS	1023	12232.2	1405	12834.5	983	41692.2	1192	73707	981	151232	904	66645.4	1369	26175.5	751	31580.9	735	10250.8	1056	301964		

Final- Hazard Profile – Wildland Fire

The DNR worked collaboratively with an external Advisory Committee, looking at today and where we wanted the state's fire program to be in 2020. The Strategic Plan started with a focus on wildfire suppression. Quickly, it became clear that a broader view was necessary. The focus changed to wildland fire protection, the interaction between forest health, wildfire readiness, wildfire prevention and wildfire suppression. The Pathway to 2020 Phase II is the latest rendition supporting the DNR Strategic Plan for Wildfire Protection.

DNR is responsible for preventing and fighting wildfires on 12.7 million acres of private, state and tribal-owned forestlands. DNR is the state's largest on-call fire department, with over 1,000 employees trained and available to be dispatched to fires as needed. During fire season, this includes over 700 DNR employees who have other permanent jobs with the agency and about 400 seasonal employees hired for firefighting duties. Additionally, Department of Corrections' adult offenders and Department of Social and Health Services-Juvenile Rehabilitation Administration juvenile offenders participate in the DNR correctional camps program. DNR also participates in Washington's coordinated interagency approach to firefighting.

Human and lightning caused wildfires will continue to occur in Washington State. DNR reports that approximately 76% of all DNR jurisdiction wildfires from 2008-2012 were caused by humans. Based on figures from 1993 through 2012, about 850 fires have occurred annually on state protected lands (Chart 1), burning over 22,000 acres each year (Chart 2).

Frequency of Occurrence²²

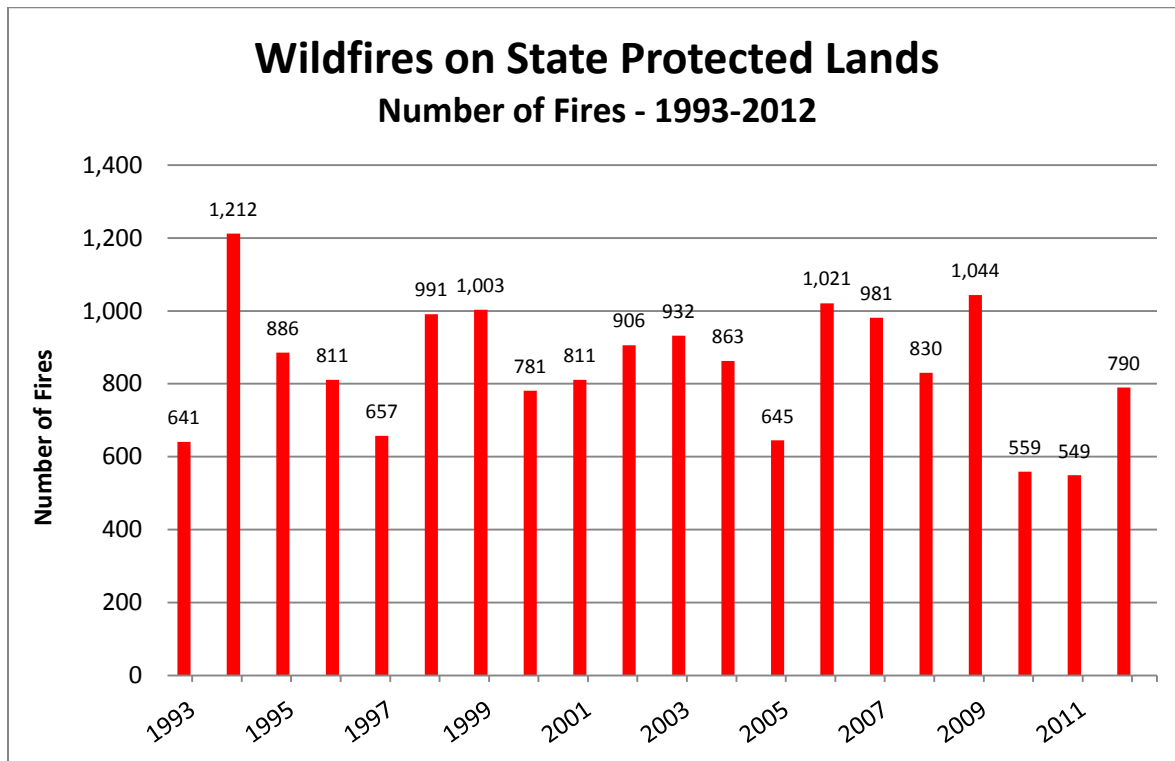


Figure 5.5-8 Washington Department of Natural Resources (DNR) 2012

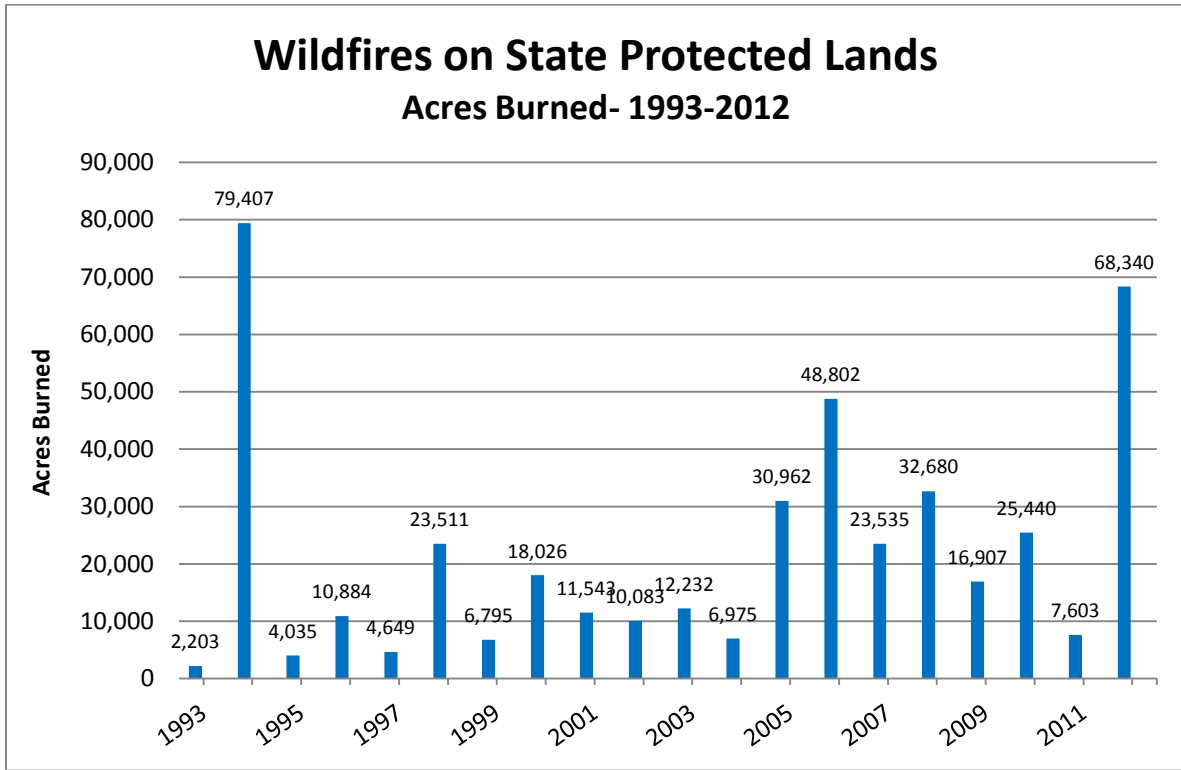


Figure 5.5-9 Washington Department of Natural Resources (DNR) 2012

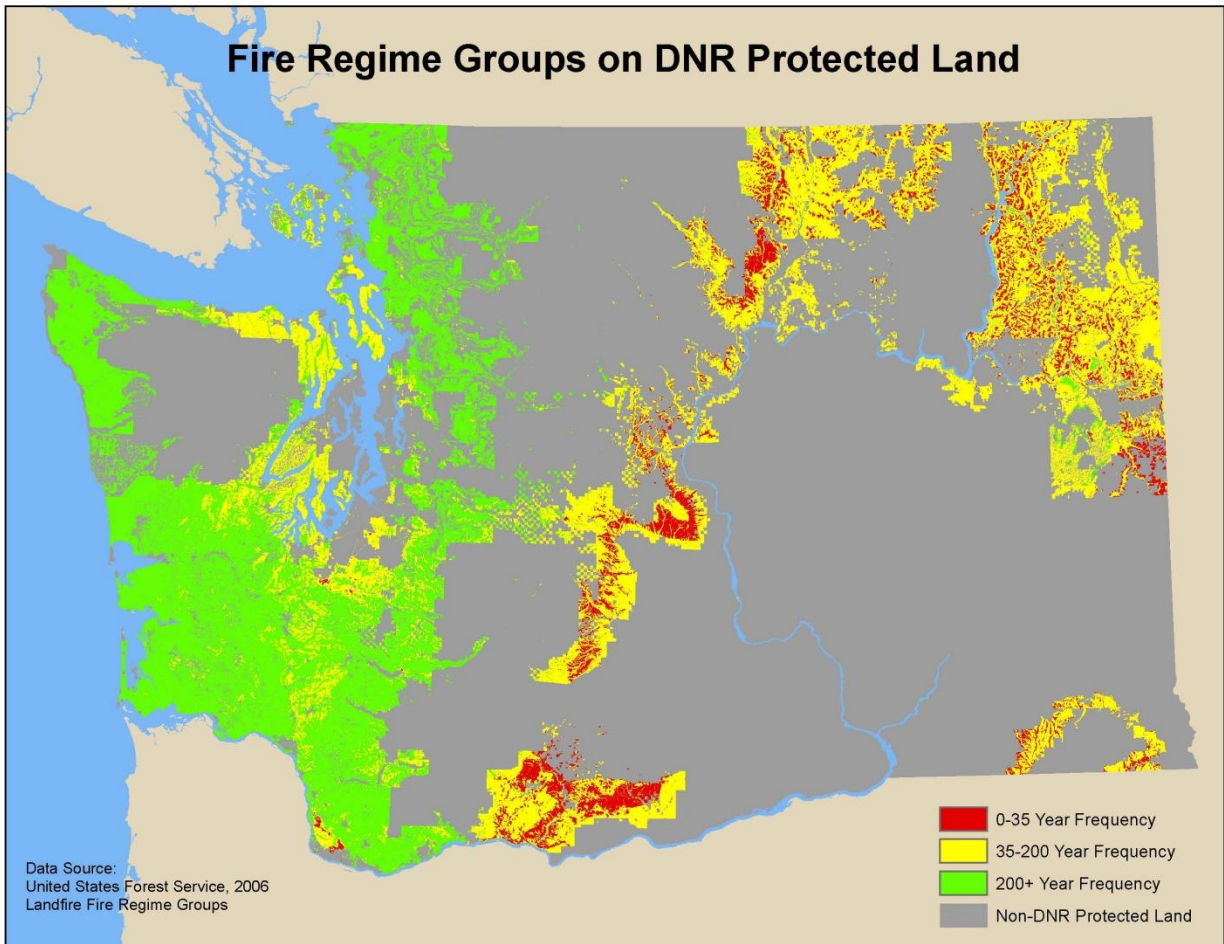


Figure- 5.5-10 Washington Department of Natural Resources, (DNR) 2012

*Mean Fire Return Interval*²³

The Mean Fire Return Interval map (below) quantifies the average period between fires under the presumed historical fire regime. This frequency is derived from vegetation and disturbance dynamics simulations using LANDSUM (Keane and others 2002, Hann and others 2004). This layer is intended to represent one component of the presumed historical fire regimes within landscapes based on interactions between vegetation dynamics, fire spread, fire effects, and spatial context.

Final- Hazard Profile – Wildland Fire

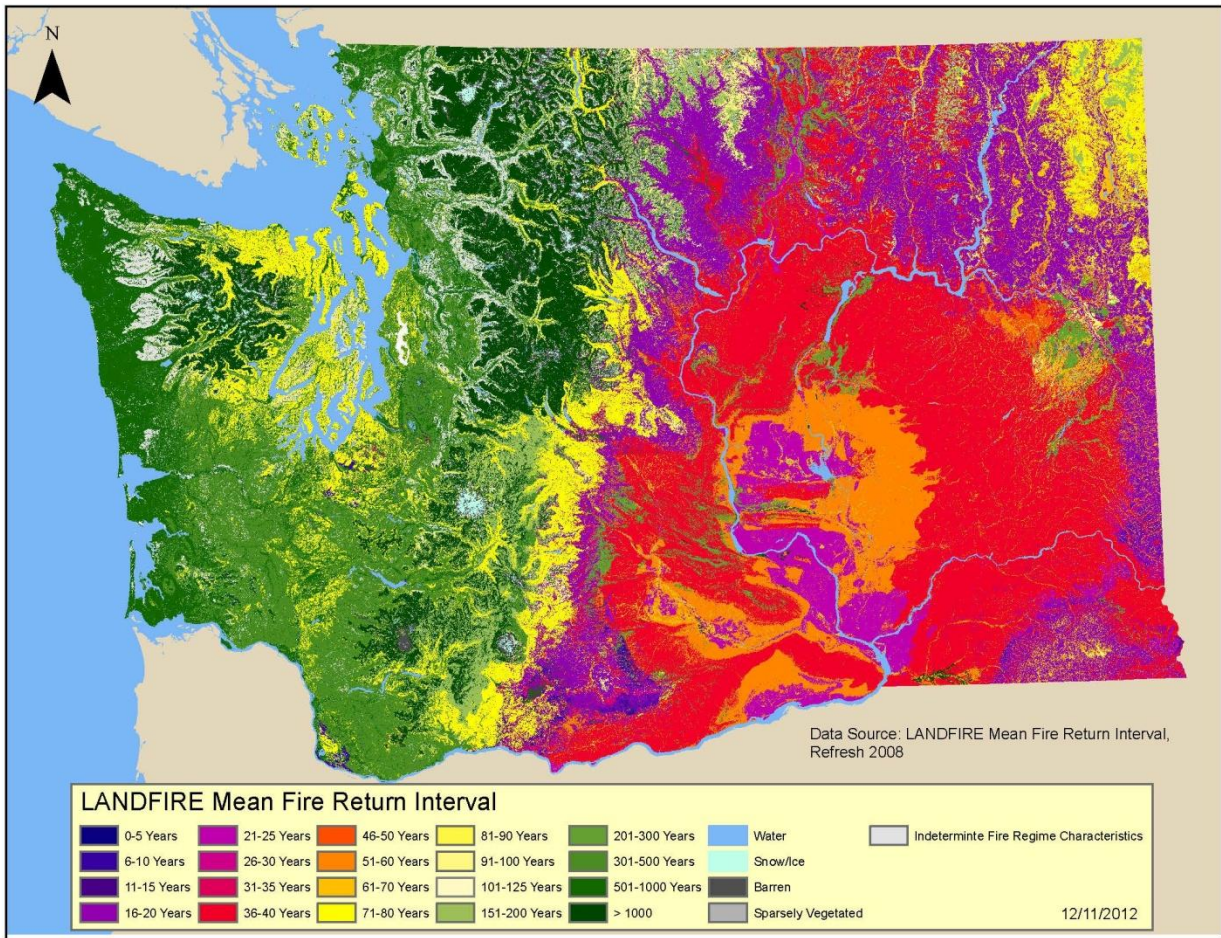


Figure- 5.5-11 Washington Department of Natural Resources, (DNR) 2012

Final- Hazard Profile – Wildland Fire

Jurisdictions Most Threatened and Vulnerable to Wildland Fire^{24,25}

The wildland–urban interface (WUI) is commonly described as the zone where structures and other human development meet and intermingle with undeveloped wildland or vegetative fuels. This WUI zone poses tremendous risks to life, property, and infrastructure in associated communities and is one of the most dangerous and complicated situations firefighters face.

The Washington Department of Natural Resources and its federal and local partners determined the listed communities were at high risk after evaluating them for fire behavior potential, fire protection capability, and risk to social, cultural and community resources. Risk factors included area fire history, type and density of vegetative fuels, extreme weather conditions, topography, number and density of structures and their distance from fuels, location of municipal watershed, and likely loss of housing or business. The evaluation used the criteria in the wildfire hazard severity analysis of the NFPA 299 Standard for Protection of Life and Property from Wildfire. Consequently, Washington’s State Forester (DNR) designated 221 Wildfire-Urban Interface Communities are high risk to wildfire.

Table 5.5-4 Urban Interface Communities at High Risk to Wildfire (DNR) 2012

COMMUNITY_ NAME	HAZARD_ RATING	Community Name	Hazard Rating	Community Name	Hazard Rating
		Castle Rock	High	Dennison	
		Cedar Creek	High	Chattar	High
12 Mile/LPO	High	Cedonia	Extreme	Devil Mtn.	High
7 Mile	Extreme	Centralia Alpha	High	Diamond Lake	High
Aeneas Valley	High	Chain Lakes	Extreme	East Ellensburg	Moderate
Ahtanum	Extreme	Chewelah Golf		Elk Heights	High
Alta Lake	High	Co	High	Ellensburg Pass	Extreme
Amboy	High	Chiliwist	High	Enterprise	High
Asotin Creek	High	Chuckanut Mtn.	High	Entiat	High
Aspen Meadows	High	Chumstick	Extreme	Enumclaw	High
Bakers Pond	Moderate	Cinebar	High	Fertile Valley	High
Beacon Hill	Extreme	Clayton	High	Fidalgo	High
Bead Lake	Moderate	Cle Elem	Extreme	Field Spring	Extreme
Belle Vista	High	Cloverland	Extreme	Finley-Dry Gulch	High
Ben Howard	High	Colockum	Extreme	Flowery Trail	High
Big Lake	High	Conconully	Moderate	Flowery Trails	Extreme
Blewett	High	Concrete	Extreme	Foothills	High
Blue Slide	High	Cooper Point	High	Ford	Extreme
Brender Canyon	Extreme	Cowiche	Extreme	Four Mounds	High
Burnt Valley	High	Coyote Trail	High	Furport	High
BZCorners	High	Crawfish Lake	Extreme	Geiger	Extreme
Cabin Creek	Extreme	Crumbacher	Moderate	Glacier	High
Camano	High	Curlew	High	Glenoma	Extreme
Capitol Forest	High	Darrington/Sauk	Extreme	Glenwood	Extreme
Carlton	High	Deadman	High	Grande Ronde	Extreme
Carnation	High	Deep Lake	Extreme	Green Canyon	Extreme
		Deer Lake	High		

Final- Hazard Profile – Wildland Fire

Greenwater	High	Keech		Peoh Point	Extreme
Grouse Flats	Extreme	Lower Valley		Peshastin Creek	Extreme
Guemis	Extreme	Nor	High	Pierre Lake	High
Haward	Extreme	Lower Valley		Plain	High
Herron Creek	High	River	High	Pleasant Prairie	Extreme
High Prairie	Extreme	Lower Valley		Ponderosa	Extreme
Highway 410	High	South	High	Pontiac Ridge	High
Hockinson	High	Lower Wenas	Extreme	Porter	High
Icicle Creek	Extreme	Lummi	High	Reecer	Extreme
Index	High	Makah	Low	Rendezvous	Moderate
Jim Creek	High	Malloy Prairie	Extreme	Republic	High
Johnson Point	Extreme	Malo East	High	Ridge at	
Jump Off	High	Maloney		Hangman	High
Kalama	High	Mountain	High	Rimrock	Extreme
Kalispell Reserv	Moderate	Manastash	Extreme	Robinette	High
Kelly Hill	High	Marblemount	Extreme	Rochester	Extreme
Kelso	High	Marshall	Extreme	Rockport	Extreme
Kendall	High	Martin/Mossy	Extreme	Rocky Gorge	High
Kettle Falls	High	Mason	High	Roy McKenna	Moderate
Kitsap North	Moderate	Mazama	High	Salmon LaSac	Extreme
Kitsap South	Moderate	McCoy Flats	Extreme	Samish	High
Klickitat East	High	Midway	High	San Juan	Extreme
Klickitat Heights	Extreme	Mill Creek	High	Sand Creek	High
Klickitat Valley	High	Mission Creek	Extreme	Shaw	Low
Lake Chelan		Montesano	High	Sherman Creek	Extreme
North	High	Mount Hull	High	Skamania	High
Lake Chelan		Moxee	High	Skykomish	High
South 1	High	Mt. Loop	Extreme	Snoqualmie	High
Lake Chelan		Mtn Home Rd	Extreme	Snowblaze	Low
South 2	High	Mullen Hill	High	Snowden	Extreme
Lake Kachness	High	National	Moderate	South Skagit	High
Lake Lawrence	Extreme	Navarre Coulee	High	Springdale	Extreme
Lake		Newman Lake	High	Squilchuck	High
Wenatchee	High	Nine Mile	Extreme	Steamboat	
Liberty	Extreme	Nooksack	Extreme	Island	High
Liberty Lake	Extreme	North Bend	High	Stemilt	High
Limebelt	Extreme	NW Goldendale	High	Stensgar Creek	High
Longview	High	Onion Creek	High	Stevenson	High
Lookout Mtn	High	Orcas	Moderate	Suncrest	High
Loomis	Moderate	Orient	High	Teanaway	Extreme
Loon Lake	High	Oso/Cavanaugh	Extreme	Teanaway2	High
Lopez	Low	Outer Islands	Low	Tenino	High
Lower Lake Cle		Painted Hills	High	Terrace Heights	High
E	Extreme	Park Road	High		
Lower Lake	Extreme				

Final- Hazard Profile – Wildland Fire

Tiger	High	Waitts Lake	High	White Salmon	High
Trout Creek	High	Washougal	High	White Salmon 1	High
Trout Lake	High	Washougal		White Swan	High
Tum Tum	High	River	High	Winlock	High
Twin Creeks	Extreme	West Grays	High	Winthrop	High
Union Valley	High	West Lewis	Extreme	Woodland	High
Upper Nason		West		Yacolt	High
Creek	Extreme	Wenatchee	High	Yakima Canyon	High
Upper Wenas	Extreme	Whatcom	Extreme		
Waitsburg	High	Whidbey	Moderate		
		White River	Extreme		

Final- Hazard Profile – Wildland Fire

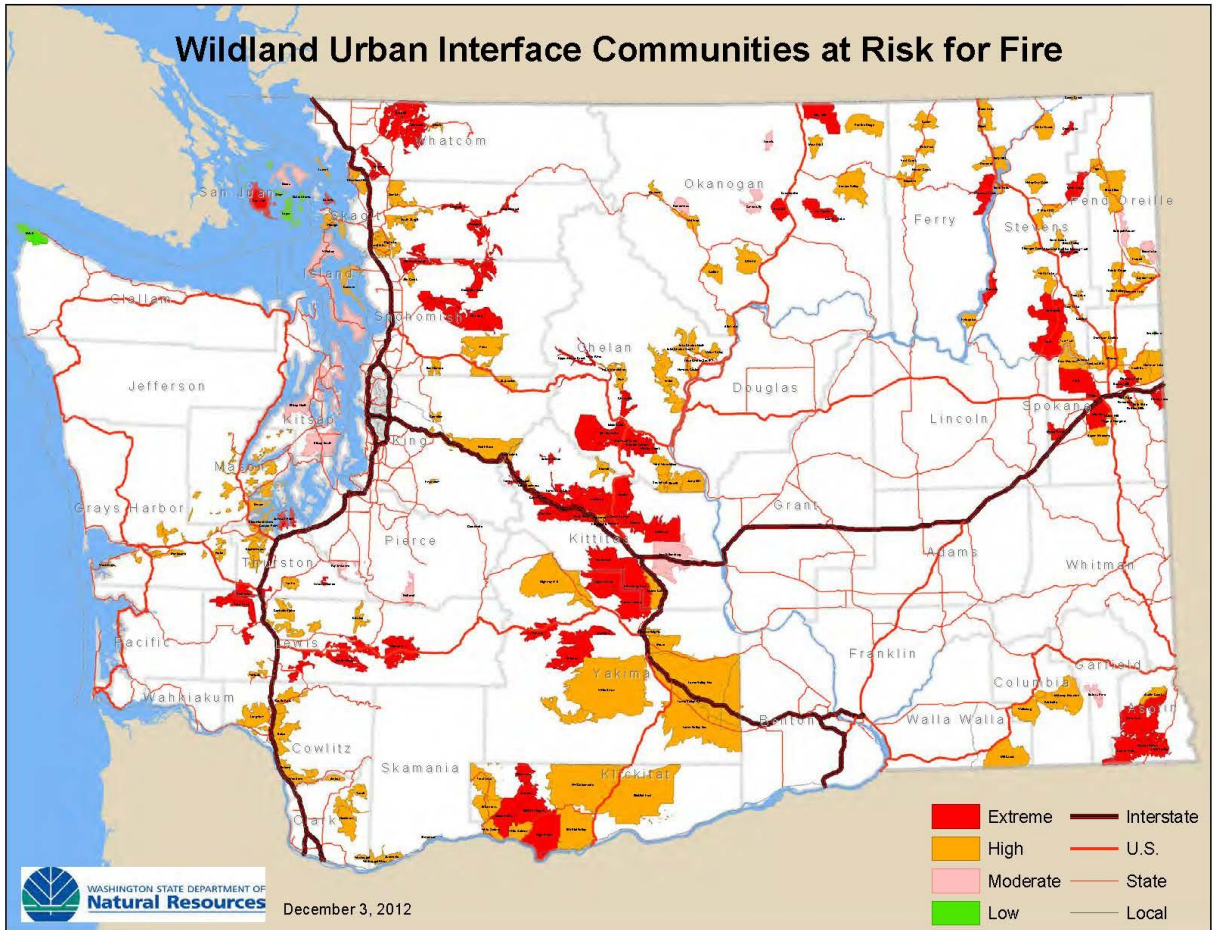


Figure 5.5-12 WUI Communities by Zip Code. Department of Natural Resources, 2004

These communities represent over 2/3 of Washington State’s thirty nine counties.

Table 5.5-5 Counties with Communities at High Risk to Wildfire

Asotin	Chelan	Clallam	Clark	Columbia	Cowlitz	Ferry
Garfield	Island	King	Kitsap	Kittitas	Klickitat	Lewis
Mason	Okanogan	Pend Oreille	Pierce	San Juan	Skagit	Skamania
Snohomish	Spokane	Stevens	Thurston	Walla Walla	Whatcom	Yakima

With the help and guidance of DNR fire prevention staff, 95 Washington communities have earned recognition as a Firewise Community for their wildfire prevention work. Washington State has the second-most Firewise Communities in the nation. The Firewise program encourages local solutions by homeowners, community leaders, planners, developers, firefighters, and others to protect people and property from the risk of wildfire by creating defensible spaces around structures and by minimizing fire ignitable building materials.

Final- Hazard Profile – Wildland Fire

Forty-nine communities have mitigation plans or Community Wildfire Protection Plans are part of the fire prevention strategies for Washington's wildland urban interface communities. CWPP are community driven plans for prioritized fuel reduction and treatment of structural ignitability.

While the majority of wildfires in Washington are caused by humans, lightning caused fires burn the most acres.²⁶ From 2008-2012, DNR reports that approximately 76% of all DNR jurisdiction wildfires were caused by humans.

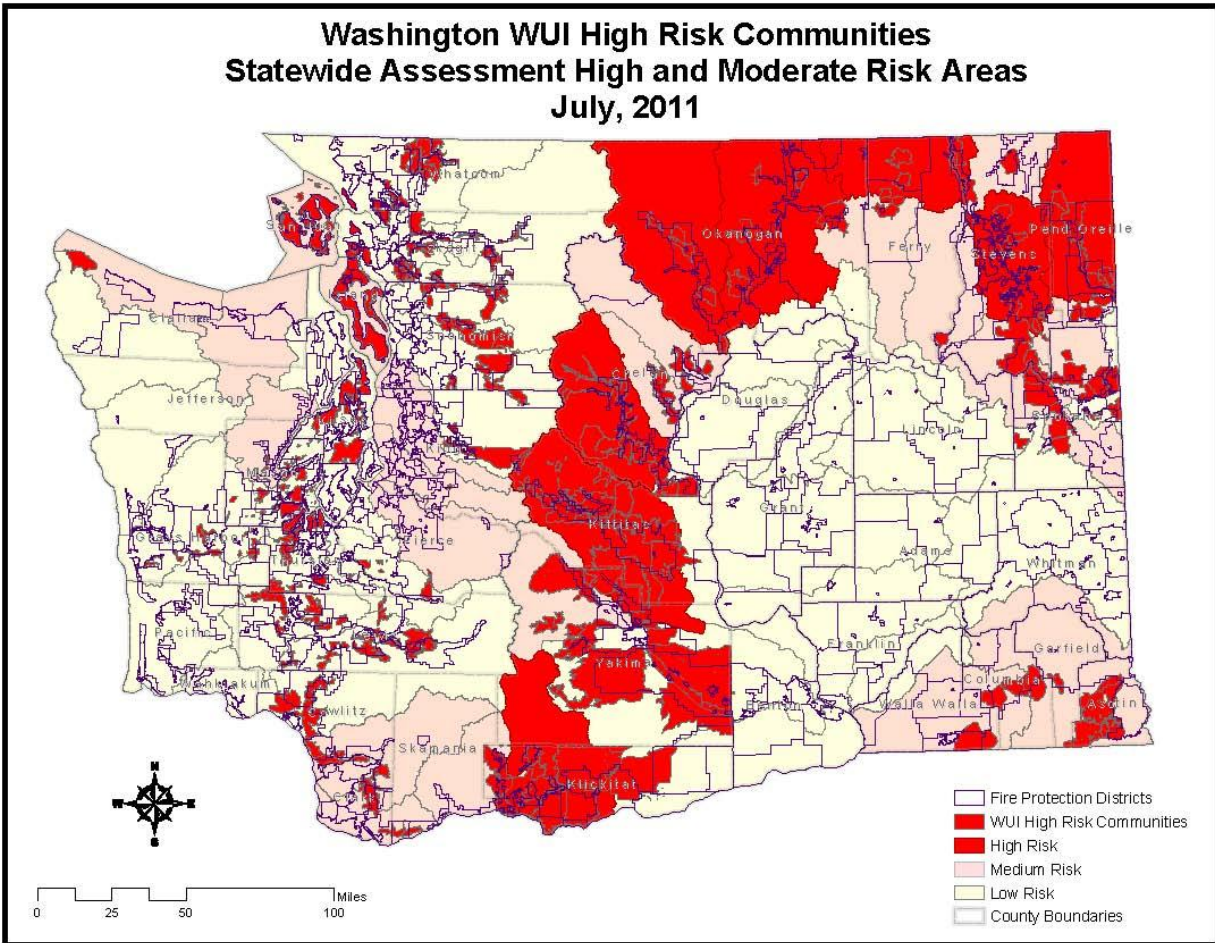


Figure 5.5.-13 Washington Department of Natural Resources 2011

Potential Climate Change Impacts^{27, 28}

According to a 2005 Governor’s report prepared by the Climate Impacts Group titled *Uncertain Future: Climate Change and its Effects on Puget Sound*, “from paleoclimatological evidence, we know that over the history of the earth high levels of greenhouse gas concentrations have correlated with, and to a large extent caused, significant warming to occur, with impacts generated on a global scale.” While the report also indicates that the “ultimate impact of climate change on any individual species or ecosystem cannot be predicted with precision,” there is no doubt that Washington's climate has demonstrated change.

In July 2007, the Climate Impacts Group launched an unprecedented assessment of climate change impacts on Washington State. *The Washington Climate Change Impacts Assessment* (WACCIA) involved developing updated climate change scenarios for Washington State and using these scenarios to assess the impacts of climate change on the following sectors: agriculture, coasts, energy, forests, human health, hydrology and water resources, salmon, and urban stormwater infrastructure. The assessment was funded by the Washington State Legislature through House Bill 1303.

In 2009, the Washington State Legislature approved the *State Agency Climate Leadership Act* Senate Bill 5560. The Act committed state agencies to lead by example in reducing their greenhouse gas (GHG) emissions to: 15 percent below 2005 levels by 2020; 36 percent below 2005 by 2035; and 57.5 percent below 2005 levels (or 70 percent below the expected state government emissions that year, whichever amount is greater.). The Act, codified in RCW 70.235.050-070, directed agencies to annually measure their greenhouse gas emissions, estimate future emissions, track actions taken to reduce emissions, and develop a strategy to meet the reduction targets. Starting in 2012 and every two years thereafter, each state agency is required to report to Washington State Department of Ecology the actions taken to meet the emission reduction targets under the strategy for the preceding biennium.

Recognizing Washington’s vulnerability to climate impacts, the Legislature and Governor Chris Gregoire directed state agencies in 2009 to develop an integrated climate change response strategy to help state, tribal and local governments, public and private organizations, businesses and individuals prepare. The state Departments of Agriculture, Commerce, Ecology, Fish and Wildlife, Health, Natural Resources and Transportation worked with a broad range of interested parties to develop recommendations that form the basis for a report by the Department of Ecology: *Preparing for a Changing Climate: Washington State’s Integrated Climate Change Response Strategy*.

Fire is an important process for recycling dead biomass in the arid west, where natural decomposition rates are extremely slow. However, the National Forest Service Health Forests policy to clean out dead and dying trees in the west to reduce the risk of wildfires blames increasing wildfire activity in the western United States solely on increasing stand density and the buildup of dead fuel as a result of fire exclusion policies; it does not acknowledge any role of changing climate in recent wildfire trends. Many articles and scientific studies suggest wildfires have increased and will continue to increase in number and severity due to the effects of climate change. “Since 1986, longer summers have resulted in a fourfold increase of major wildfires and a six fold increase in the area of forest burned, compared to the period from 1970 to 1986”. It has also been noted that the “length of the active wildfire season (when fires are actually burning) in the western United States has increased by 78 days, and that the average burn duration of large fires has increased from 7.5 to 37.1 days”.

Final- Hazard Profile – Wildland Fire

Four critical factors have been attributed to the increase seen in wildfire activity: earlier snowmelt, higher summer temperatures, longer fire season, and an expanded vulnerable area of high-elevation forests. These factors have all been linked to the increase in overall summer temperatures that can be attributed to the effects of climate change.

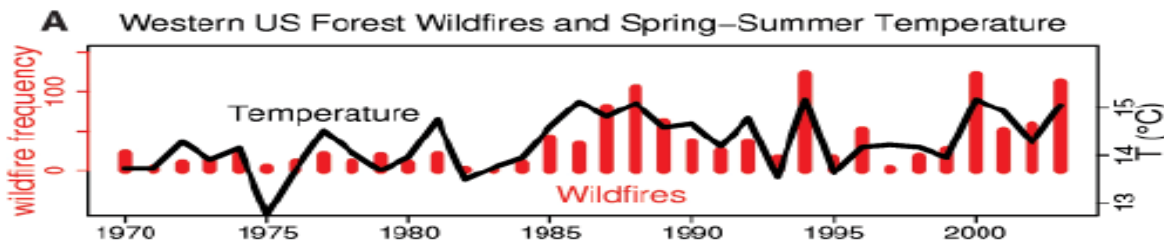


Figure 5.5-14 Wildfire Frequency in the Western U.S. and Spring-Summer Temperatures

Some probable effects from climate change include the following:

- Higher forest fire frequency and intensity likely, especially in eastern WA.
- Forests east of the Cascade crest will be most susceptible to larger fires.
- Mountain pine beetle poses a significant threat to Washington’s pine forests.
- Tree species composition will change as species respond uniquely to a changing climate.
- Productivity of Douglas-fir forests is likely to decrease statewide.

Healthy Forests

In 2007, the legislature amended state law governing forest health (RCW 76.06). Washington State Department of Natural Resources (DNR) was designated as the agency responsible for implementing a comprehensive program to improve forest health statewide. DNR currently provides insect and disease technical information and education to forest landowners. DNR also monitors forest health to record the extent of insect and disease damage, and gain advanced warning of outbreaks by certain pests.

As forest health problems spread across numerous land ownerships and cause a significant increase in dead trees, fire danger increases significantly. RCW 76.06 authorizes the Commissioner of Public Lands to appoint a technical advisory committee to evaluate the forest health threats and recommend potential remedial actions. This committee is comprised of forest management practitioners and scientific experts. The Commissioner, considering the recommendations of the technical committee and other factors such as local input received at public meetings, may issue a “forest health hazard warning” to publicize the situation and stimulate a coordinated response.

If forest conditions continue to deteriorate, the technical committee can recommend that the Commissioner issue a “forest health hazard order.” This would identify the forest health threat in a specific area and require landowners to take remedial action within designated timeframes. Failure to act means landowners could face potential liability for firefighting costs if a wildfire should occur in untreated forests there, unless the problem originated on public lands. The law provides a formal appeal and mitigation process for affected landowners.

In 2012, a Forest Health Hazard Warning was issued for portions of Okanogan, Ferry, Klickitat, and Yakima counties. Landowners in the affected area received a letter notifying them of the warning. DNR

Final- Hazard Profile – Wildland Fire

held landowner workshops in the affected counties. If requested, Stewardship foresters provided site visits with recommendations.



Figure 5.5-15 Retardant drop on Highway 141 Fire, 2012

Final- Hazard Profile – Wildland Fire

Table 5.5-6 NW Area Fires & Acres by Agency (Federal & State) 1988-2011

Source: Agency-Provided Statistics

Year	BIA Fires	BIA Acres	BLM Fires	BLM Acres	FWS Fires	FWS Acres	NPS Fires	NPS Acres	USFS Fires	USFS Acres	ORODF Fires	ORODF Acres	WADNR Fires	WADNR Acres
1988	207	20,604	317	14,835	9	131	0	02	1,192	133,841	1096	24,868	1,072	11,698
1989	319	4,026	324	38,650	17	1,626	51	116	1,643	85,476	1,115	12,966	1,334	22,252
1990	310	2,113	344	141,797	17	3,719	86	556	2,221	100,368	1,147	11,518	1,142	10,792
1991	339	6,326	333	22,533	17	1,125	41	25	2,130	16,107	1,192	8,148	1,174	7,867
1992	422	25,028	583	73,984	28	2,243	103	1,927	2,315	48,361	1,662	23,482	1,084	41,371
1993	218	1,976	234	9,802	21	2,688	54	212	1,000	3,409	841	2,858	641	2,203
1994	422	50,796	377	329,917	22	389	133	4,896	2,373	281,375	1,445	27,617	1,212	78,291
1995	263	674	307	46,165	39	3,771	103	348	1,176	9,105	1,020	4,979	886	5,227
1996	230	14,1750	436	324,652	28	1,421	55	83	1,612	256,274	1,076	25,529	811	7,075
1997	226	870	327	33,213	29	2,019	92	345	1,159	4,483	815	1,657	657	7,639
1998	316	25,860	267	104,519	7	137	36	18	1,753	13,742	969	2,681	991	23,511
1999	425	22,609	366	39,451	27	45,130	63	299	1,605	9,617	1,182	9,536	1,003	5,890
2000	255	62,276	219	150,245	66	81,125	19	7	1,005	154,531	920	13,248	780	20,139
2001	271	98,139	463	320,400	29	7,339	58	751	1,758	124,105	1,289	51,109	814	22,313
2002	270	14,859	380	181,495	39	2,573	64	458	1,563	772,936	1,175	99,167	892	10,083
2003	252	19,898	275	17,084	39	1,293	78	5,287	1,447	263,970	1,174	8,619	932	10,450
2004	397	25,630	295	1,779	54	1,039	75	654	1,427	66,333	921	5,940	862	14,237
2005	241	28,569	205	36,659	33	11,400	25	129	882	118,207	837	11,605	645	3,579
2006	348	9,717	368	308,784	46	4,546	37	7,892	1,730	373,027	1,103	7,693	1,021	48,803
2007	349	56,649	288	152,559	93	81,908	41	7	1,191	444,667	1,092	38,682	981	23,835
2008	364	34,102	212	36,369	45	6,139	47	425	1,597	60,017	1,088	7,581	830	32,680
2009	408	9,913	259	10,569	23	793	67	118	1,532	66,864	983	6,407	1,044	16,906
2010	176	3,4794	230	19,719	19	6,933	31	5,148	1,192	41,884	693	6,122	1,203	13,381
2011	245	11,1743	286	148,169	10	90	47	1,216	964	26,910	701	2,599	541	7,552
10yrAvg	308	33,227	298	108,542	42	12,396	52	2,087	1432	233,201	1,036	24,292	922	19,627

Final- Hazard Profile – Wildland Fire

At-Risk State Agency Facilities

State Agency facilities identified as being at-risk to wildland fire were determined using geospatial software to match their location to the wildland fire-urban interface hazard zone. The results are captured in the table below.

STATE AGENCY STRUCTURES AT RISK	VULNERABILITY ASSESSMENT	
Number and Function of Buildings	Approx. Square Footage of Facilities	Approx. Value of Owned / Leased Structures and Building Contents
<p><u>Total at-risk buildings:</u> 1,687 state facilities were identified as being in the wildland fire-urban interface hazard zone potentially at-risk to direct damage or to the indirect impacts of wildland fire (utility services reductions, transportation restrictions, etc.).</p> <p><u>Function of at-risk buildings:</u> Included in the state facilities potentially at-risk to wildland fires in the urban interface are the following:</p> <ul style="list-style-type: none"> • University of Washington’s Big Beef Creek Laboratory and Friday Harbor Marine Laboratory. • Communication towers and facilities of the Washington Departments of Natural Resources, Transportation, and State Patrol. • Ferry terminals at Southworth, Bremerton, Clinton, Keystone, Lopez Island, and Friday Harbor, and a variety of vehicle maintenance, storage and other facilities of the Department of Transportation. • Lewis River, Tucannon, Mossyrock, Methow, Marblemount, and Arlington fish hatcheries, and facilities at a variety of wildlife and fishing access areas belonging to the Department of Fish and Wildlife. • Campus of Echo Glen Children’s Center for juvenile offenders. • Grandview and Toppenish armories of the State Military Department • The Washington Veteran’s Home in Retsil. • Picnic, comfort, shelter and other facilities at more than 30 parks operated by the State Parks and Recreation Commission. 	16,460,689	\$2,100,931,685
<p><u>Total at-risk critical facilities:</u> 732 state critical facilities were identified as being in the wildland fire-urban interface hazard zone potentially at-risk to direct damage or to the indirect impacts of wildland fire (utility services reductions, transportation restrictions, etc.).</p> <p><u>Function of at-risk critical facilities:</u> Included in the state facilities potentially at-risk to wildland fires in the urban interface are the following:</p> <ul style="list-style-type: none"> • Lighthouses at Fort Casey and Limekiln State Parks. • Pump houses, chemical storage, emergency generators and other facilities at state parks, state fish hatcheries, and transportation department installations statewide. • Communication towers and facilities of the Washington Departments of Natural Resources, Transportation, and State Patrol. • Campus of Echo Glen Children’s Center for juvenile offenders. 	1,451,630	\$1,851,528,845

Final- Hazard Profile – Wildland Fire

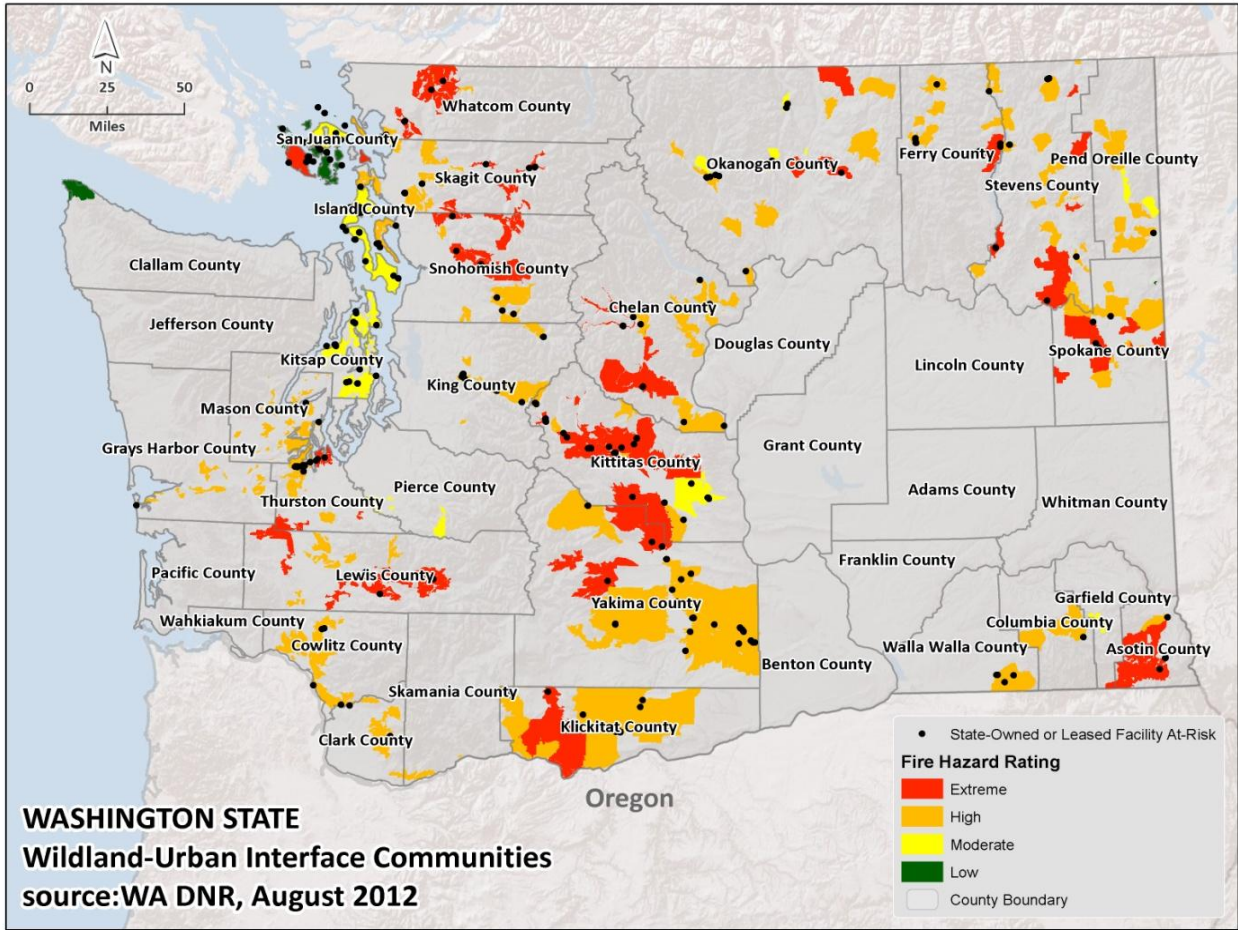


Figure 5.5-16 State-Owned and Leased Facilities in Communities at Risk

Final- Hazard Profile – Wildland Fire

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