Fire Management

OBJECTIVE: Track trends in wildland fire and fire management actions.

DATA SOURCES: Fire management records (KCFAST, Firefamily Plus, FACTS (Forest Service Activity Tracking System)

FREQUENCY: Annually.

REPORTING PERIOD: 2010 - 2013

VARIABILITY: Deviation from historic ranges of wildland fire and desired conditions.

EVALUATION:

As the Forest incorporates a more comprehensive ecosystem management type model into Forest Plan revision, two useful new concepts are emerging:

> ***Fire Regime*** – a general classification of the role fire would play across a landscape in the absence of modern human mechanical intervention, but including the influence of aboriginal burning. Five such fire regimes have been defined, based on fire frequency and fire intensity, and there is a need to evaluate the Forest in terms of these five regimes.
>
> ***Fire Regime Condition Class*** – a classification of the amount of departure from the natural regime – possibly resulting in alterations of key ecosystem components such as species composition, structural stage, stand age, canopy closure, and fuel loadings. Three condition classes have been identified and there is also a need to evaluate the Forest, based on these three condition classes.

At present, fire regime condition class is being evaluated at the project level to determine the departure from natural regimes so that needed treatments can be identified and implemented as funding and conditions allow. While there has been no forest-wide determination, preliminary indications are that in general, lower elevation areas of ponderosa pine and Douglas-fir types have the most departure and are in greatest need of treatment, followed by mid-elevation mixed conifer types. Upper elevation lodgepole and sub-alpine fir types have the least departure from natural regimes.

MONITORING RESULTS:

Wildland Fire Situation

The Bitterroot Valley has experienced a relatively mild 2010 fire season that was very similar to 2009. Winter snow pack and spring run-off were average. Spring rains allowed for some prescribed fire. About the middle of June, spring rains ceased and fire indices began to climb but periodic rain events throughout the summer moderated the season. A season ending event occurred at the end of August. 2012, 2012, 2013 were pretty active fire seasons.

Two indices that are tracked each year to determine fire severity are 1000-hr fuel moisture content and the energy release component (ERC). The 1000-hr fuel moisture content represents the fuel moisture content in dead fuels in the 3- to 8-inch diameter class and can range from 1 to 40%. As large dead fuels dry, this number decreases and large fuel moistures below 10% signify the potential for high fire severity.

The energy release component (ERC) is used to provide a relative indication of drought conditions. It relates to the potential heat release per unit area in the flaming zone of a fire front, and as live fuels cure and dead fuels dry, the ERC values get higher. As an example, conditions producing as ERC value of 24 represent a potential heat release twice that of conditions resulting in an ERC value of 12. For the Bitterroot Valley on the average in 2008 and 2009, only about 10% of the days during the summer experience an ERC above 56. For 2010, estimated ERC's fluctuated from 20-35 all spring, but started to climb sharply in mid-June. Periodic rain events never really allowed ERCs to get much above the 90th percentile (56) during the summer.

The season's first fire was human-cause and recorded on April 14th, and the first lightning fire was recorded on July 1st. The last lightning fire occurred on October 3rd and the last human-caused fire occurred on October 29th. Two fires, Dominic Point (894 acres) and Downing Mountain (315 acres), escaped initial attack and were managed by incident management teams. Twelve lightning fires were managed for resource benefit, burning a total of 175.4 acres. On average, the forest has about 134 fire starts annually. From 2001 to the present, the average is only 94 fires/year – probably a result of having some many acres now in standing snags and thus less fire starts from lightning (Chart 1).

Figure 1 – Fires/Year from 1989 - 2013

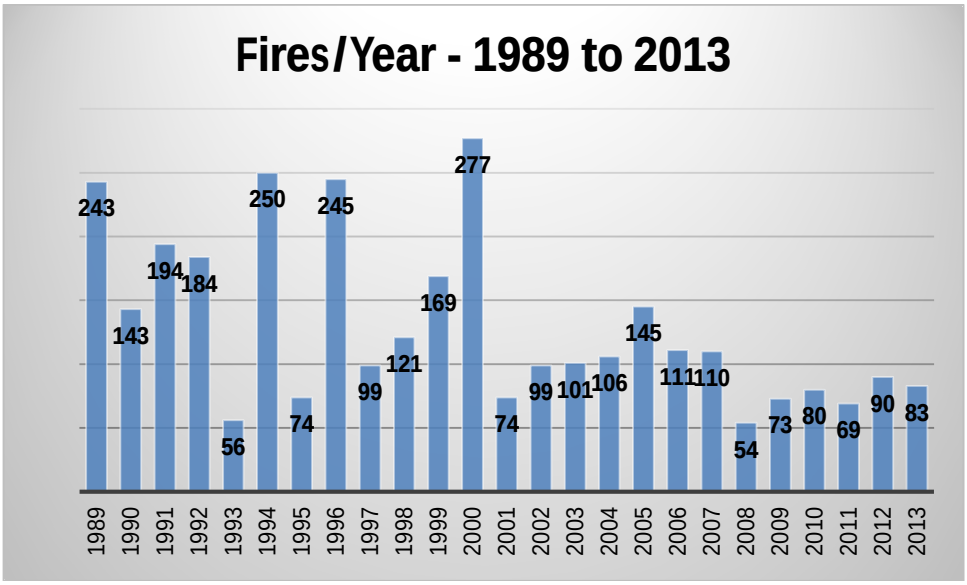

Table 1 - Number of Fires by Year within Forest Protection Boundary and by Type of Fire

Type of Fire	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Lightning	229	125	159	154	37	200	49	203	71	112	137	249
Human-caused	14	17	20	30	17	15	25	45	28	9	32	28
Total	**243**	**143**	**194**	**184**	**56**	**250**	**74**	**245**	**99**	**121**	**169**	**277**
Type of Fire	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**		
Lightning	50	76	96	90	126	74	94	33	55	68		
Human-caused	23	23	5	17	19	28	14	16	18	12		
Total	**74**	**99**	**101**	**106**	**145**	**111**	**110**	**54**	**73**	**80**		
Type of Fire	**2011**	**2012**	**2013**	**Average**								
Lightning	58	78	60	**107**								
Human-caused	11	12	23	**20**								
Total	**69**	**90**	**83**	**127**								

Table 2 - Number of Wildfire Acres Burned By Year within Forest Protection Boundary

Type of Fire	1989	1990	1991	1992	1993	1994
Lightning	183	3,156	3,028	450	454	8,680
Human-caused	549	3,166	1,889	161	11	777
Total	**732**	**6,322**	**4,917**	**611**	**465**	**9,457**
Type of Fire	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
Lightning	207	22,826	2,898	308,576	231	1,241
Human-caused	33	3835	316	11,559	5	242
Total	**240**	**26,661**	**3,214**	**320,135**	**236**	**1,483**

Type of Fire	2005	2006	2007	2008	2009	2010
Lightning	44,994	7,174	50,500	8,092	11,291	1,420.65
Human-caused	12	8,886	450	2	28	24.6
Total	**45,006**	**16,060**	**51,000**	**8,094**	**11319**	**1,445.25**

Type of Fire	2011	2012	2013	Average
Lightning	44,994	7,174	50,500	**24,388**
Human-caused	12	8,886	450	**1,553**
Total	**45,006**	**16,060**	**51,000**	**25,941**

Table 3 – Wildfire Acres Burned By Management Area (MA)

	MA 1, 2, 3a, 3b, 3c, 8b, 9, 10, 11a		MA 5 & 8a	MA 6 & 7
Year Burned	Roaded	Inventoried Roadless		
1994 Acres	1,164	495	3,837	3,961
Percent of MA	0.29	0.50	1.48	0.48
1995 Acres	323	2	6	288
Percent of MA	0.08	0.00	0.00	0.04
1996 Acres	747	217	367	46,821
Percent of MA	0.19	0.22	0.14	5.71
1997 Acres	119	11	2	108
Percent of MA	0.03	0.01	0.00	0.01
1998 Acres	3,875	5	157	22,624
Percent of MA	0.97	0.01	0.06	2.76
1999 Acres	29	1,415	28	1,742
Percent of MA	0.01	1.43	0.01	0.21
2000 Acres	216,998	28,331	20,899	53,907
Percent of MA	54.28	28.59	8.07	6.57
2001 Acres	7	0	11	218
Percent of MA	0.00	0.00	0.00	0.03
2002 Acres	167	63	15	1238
Percent of MA	0.04	0.06	0.01	0.15
2003 Acres	10,155	6	2,350	458
Percent of MA	2.54	0.01	0.91	0.06
2004 Acres	106	2	160	1298
Percent of MA	0.03	<0.01	0.06	0.16
2005 Acres	3,147	2	6,129	35,728
Percent of MA	0.79	0.00	2.37	4.36
2006 Acres	8,834.24	0	69.8	7,155.78
Percent of MA	2.21	0.00	0.03	0.87
2007 Acres	9,558	10,000	10,006	21,436
Percent of MA	2.39	10.09	3.86	3.23
2008 Acres	4	1	30	8094
Percent of MA	0	0	0.01	0.98
2009 Acres	3515	20	2515	5269
Percent of MA	0.88	0.02	0.97	0.64
2010 Acres	56	964	397	28
Percent of MA	0.01	0.97	0.15	0.0
2011 Acres	15,622	1085	3542	2608
Percent of MA	3.13	0.41	1.36	0.31
2012 Acres	2677	2075	10,742	133,771
Percent of MA	0.53	0.41	4.1	16.3
2013 Acres	2	0	0	39,963
Percent of MA	0	0	0	4.8
2014 Acres	0	0	54	5346
Percent of MA	0	0	0.02	0.65
1994-2014 Average Annual Acres	**13,195**	**2109**	**2919**	**16,660**

The Bitterroot NF Fire Management Plan identifies the following four Fire Management Units (FMUs): FMU1 includes the wildland urban interface areas; FMU2 includes the active roaded areas; FMU3 includes roadless and unroaded areas outside of wilderness; and FMU4 includes wilderness areas. As the Forest begins the latest Forest Plan revision (Tentatively slated for 2018), these areas will begin to have more significance in monitoring and Table 4 tracks acres burned in each FMU since 2003.

Table 4 – Acres Burned per FMU per Year

Fire Management Unit	2003	2004	2005	2006	2007	2008	2009	2010
FMU1	1,210	98	1,723	8,828	492	4	13	342
FMU2	8,310	6	21	74	9,004	1	30	501
FMU3	2,350	165	6,129	3	20,082	4	2,517	293
FMU4	1,099	1,297	37,133	7,155	21,422	8,085	8759	0
Total Acres	**12,969**	**1,566**	**45,006**	**16,059**	**51,000**	**8,094**	**11,319**	**1136**

Fire Management Unit	2011	2012	2013	2014	Average
FMU1	2599	3272	16	48	**1553**
FMU2	21,156	6995	9344	1417	**4738**
FMU3	7665	10,839	3480	59	**4465**
FMU4	2202	128,926	30,620	3924	**20,885**
Total Acres	**33,622**	**150,032**	**43,460**	**5448**	

Hazardous Fuel Reduction Accomplishments

The Forest's hazardous fuels management program plays an important role in sustaining ecosystems by reducing heavy fuel loadings, reducing fire risk to homes along the wildland urban interface of the Forest, and by restoring vegetation composition and structure to a condition that allows ecosystems to function within their historical range.

The warm, dry ponderosa pine and Douglas-fir vegetation types characterize much of the interface area. Thickets of Douglas-fir in the understory have become established in many of these previously open stands, which puts them at risk for higher intensity wildfires. Under natural conditions, low intensity wildland fires frequently underburned these drier sites and maintained them in a more open condition. Forest managers will continue to reduce fuels in these priority areas and coordinate their efforts with Ravalli County, homeowners, and research scientists.

Table 5, shows acres of hazardous fuels reduced of the Bitterroot National Forest since 1994. In 2012-2014, persistent dry weather made fuels treatment a challenge due to being out of prescription early in the season and extended fire season(s) made resources unavailable. Hazardous Fuels Treatments include broadcast burning, hand piling, slashing/leave tree protection, thinning (commercial/noncommercial), tree removal and pile burning. The majority of this work was done in the WUI. The Forest will continue to work to reestablish its prescribed fire program, but limits on funding and weather conditions may not allow it to reach its annual goal of approximately 4,500 acres.

Table 5 – Hazardous Fuels Program Acres Accomplished Per Year

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Acres	2,100	2,000	2,005	5,234	5,700	5,100	2,982	755	349	2,191	5,171
	2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**		
Acres	2,100	2,090	7,814	3,710	4,602	9,167	7,360	9,428	4,514		
	2014	**2015**	**Total**								
Acres	4,189	5,413	**93,974**								

In addition to the above acres wildfire acres also contribute to the reduction of hazardous fuels. Although fire in the ecosystem is a natural and revitalizing process, it does have other consequences. There may be hazy skies, temporary smoke pooling in the valley, and some visible burn patches on the mountain slopes. However, prescribed burns can be timed to allow control of the prescribed burn length, smoke dispersal, and fire intensity. In contrast, wildland fires often create more long-lasting smoke. The Forest has been monitoring air quality in relation to smoke from wildland fires and prescribed fires for several years.

Expanded Cooperative Efforts

As more people continue to build homes in forested settings in the Bitterroot Valley, the complexity of wildland fire suppression in these areas continues to increase. The Bitterroot National Forest, State and Private Forestry program is working cooperatively with the Bitter Root Resource Conservation and Development Area, Inc. (RC&D), State of Montana Department of Natural Resource Conservation, and private landowners in the treatment of hazardous fuels on private lands and National Forest lands immediately adjacent to private lands. Bitterroot National Forest fire management personnel have been providing expertise to the RC&D community forester when working with the private landowners to improve understanding of fire risk in areas that need fuels treatment. They have also been assisting Rural Fire Departments in updating a Community Fire Plan that identifies priority areas for fuels treatment in conjunction with work being planned on adjacent public lands (http://www.bitterrootfireplan.org/).

The State and Private Forestry program provides grant monies and fuels treatment expertise to private landowners to assist them in reducing fire risk on their lands. This increases the chance of successfully suppressing a fire during initial attack and correspondingly reduces risks to lives, homes, and property from a catastrophic large fire. In 2011 to 2013, 117 landowners treated 663 acres of their private lands in Ravalli County using $461,400 of grant money.

Table 6 – State and Private Forestry Accomplishments

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
Acres	518	799	146	320	405	425	392	435	635	479	4,554

Insect and Disease Status as a Result of Management Activity, Mountain Pine Beetle Infestation, Harvest of Moderate to High Risk Mountain Pine Beetle Stands Items 25, 36 & 37

OBJECTIVE: To determine insect and disease status as a result of management activities. Monitor trends of mountain pine beetle infestations and respond if needed.

DATA SOURCE: Forest Pest Management aerial observations, Forest Health and Protection site trips & reports, field surveys and project monitoring

FREQUENCY: 100 percent annually

REPORTING PERIOD: 2010-2013

VARIABILITY: Epidemic conditions following management activities or approaching the suitable timber base.

EVALUATION:

Bark Beetle Activity on the Forest is increasing. The primary data source for monitoring insect and disease conditions on the Forest is the aerial detection flight conducted annually by Forest Health and Protection. These flights provide general estimates, locations, and trends of insect and disease activity on the Forest and are not meant to provide statistically accurate numbers of affected trees. Aerial flights detect dead and dying trees which are usually the result of the previous year's insect, disease, or fire activity.

The 2012 aerial detection flight mapped 190,543 acres of bark beetle caused mortality on the Forest compared to the 36,000 acres mapped in 2006. Mountain pine beetle caused mortality within the Northern Region in 2013 is declining (Egan et al. 2013). However, sub-watersheds with high and very high beetle activity were primarily in the Bitterroot, Clearwater, Beaverhead, and Big Snowy Mountain Ranges. Populations of bark beetles remain high but are not directly tied to management activities occurring on the Forest. They are the result of prolonged dry weather, decades of fire suppression, recent large fires, and existing vegetation conditions. Projects and the mitigation measures applied to projects have been effective in preventing noticeable spread of damaging insect or diseases.

The aerial detection flight showed a marked decline in the number of acres infested and the number of trees killed by Douglas-fir bark beetle (DFB) throughout all of western Montana. In a few areas, including the Bitterroot NF, Douglas-fir beetle populations and resultant beetle-killed trees remained at higher-than-normal levels and in many areas beetle-killed trees were still noticeable. Areas on the Bitterroot NF affected by recent fires, as well as areas not affected by past fire, showed populations declining dramatically as compared to the previous year. Total number of infested acres dropped by over 75% compared to 2006.

The Forest Plan requires monitoring of MPB activity since this beetle has historically caused widespread mortality of lodgepole pine throughout the western U.S. Mountain pine beetle activity has caused extensive pine mortality throughout the Northern Region over the Past decade (Egan 2014). MPB-caused mortality in whitebark pine continues to be a great concern on the Bitterroot since the distribution of this species is limited across the Forest.

Management Activities Affecting Insect Activity. Project monitoring in 2010-2013 found relatively few insect and disease problems resulting from management activities. Ongoing activities that have the potential to cause insect or disease activities on the Forest include prescribed burning, timber harvest, precommercial thinning, and slashing. Mitigation measures applied to these projects have been effective in preventing any noticeable spread of damaging insects or diseases. Incidental tree mortality was found on some of these projects but was well within the acceptable limits given the project objectives.

MONITORING RESULTS:

Table 1 thru Table 3 summarizes the insect and disease information provided by the aerial detection flights conducted in the summer of 2010-2012. Data are presented for the Bitterroot Reporting Area which includes the Bitterroot National Forest, private, and state-owned lands. Only the portion of the Forest outside of wilderness was flown and mapped.

Table 1 - Insect and Disease Aerial Survey Summary For 2010

	Bitterroot National Forest *		Private Land Bitterroot Area		State Land Bitterroot Area		TOTAL Bitterroot Reporting Area	
Pathogen	**Acres**	**Trees**	**Acres**	**Trees**	**Acres**	**Trees**	**Acres**	**Trees**
Douglas-fir Beetle	1,269	3,319	66	81	8	12	1,343	3,412
Mountain Pine Beetle (PP)	4,301	14,105	640	1541	419	723	5,360	16,389
Mountain Pine Beetle (LP)	69,371	7677	700	2,282	640	1,990	70,711	290,811
Western Pine Beetle (PP)	3005	4077	10	5	2	1	20	10
West. Balsam Bark Beetle (SAF)	2,108	9,165	10	15	-	-	2,118	9,180
TOTAL ACRES	**78,785**	**38,343**	**1426**	**3924**	**1069**	**2726**	**37,248**	**319,802**

***** Montana outside of wilderness

Table 2 - Insect and Disease Aerial Survey Summary For 2011

	Bitterroot National Forest *		Private Land Bitterroot Area		State Land Bitterroot Area		TOTAL Bitterroot Reporting Area	
Pathogen	**Acres**	**Trees**	**Acres**	**Trees**	**Acres**	**Trees**	**Acres**	**Trees**
Douglas-fir Beetle	66	173	85	60	-	-	151	233
Mountain Pine Beetle (PP)	20,389	25,213	1244	1862	236	332	21,869	27,407
Mountain Pine Beetle (LP)	78,457	404,662	1116	3623	248	708	79,821	408,993
Western Pine Beetle (PP)	-	-	-	-	-	-		-
West. Balsam Bark Beetle (SAF)	46	67	-	-	-	-	46	67
TOTAL ACRES	**98,958**	**430,115**	**2445**	**5545**	**484**	**1040**	**101,887**	**436,700**

***** Montana outside of wilderness

Table 3 - Insect and Disease Aerial Survey Summary For 2012

	Bitterroot National Forest *		Private Land Bitterroot Area		State Land Bitterroot Area		TOTAL Bitterroot Reporting Area	
Pathogen	**Acres**	**Trees**	**Acres**	**Trees**	**Acres**	**Trees**	**Acres**	**Trees**
Douglas-fir Beetle	78	3	116	3	-	-	194	6
Mountain Pine Beetle (PP)	40,034	40,890	4502	3734	2516	1091	47052	45,715
Mountain Pine Beetle (LP)	138,845	198,433	3436	6211	1016	522	143,297	205,166

Pathogen	Bitterroot National Forest *		Private Land Bitterroot Area		State Land Bitterroot Area		TOTAL Bitterroot Reporting Area	
	Acres	Trees	Acres	Trees	Acres	Trees	Acres	Trees
Western Pine Beetle (PP)	-	-	-		-	-	-	-
West. Balsam Bark Beetle (SAF)	26	33					26	33
TOTAL ACRES	**178,983**	**239,359**	**8054**	**9948**	**3532**	**1613**	**190,569**	**250,920**

***** Montana outside of wilderness

Project Monitoring:

The Forest Plan requires that silvicultural prescriptions utilize integrated pest management strategies and treatments that reduce long-term losses due to insects and diseases. In most cases, increasing tree vigor and reducing susceptibility to attack by insects and diseases is part of the criteria used to select which trees will stay and which will be removed. Examples of this include the control of mistletoe by selectively removing mistletoe-infected trees or thinning to reduce the susceptibility of forest stands to bark beetles. Mitigation measures are also routinely included in project implementation to prevent the spread of undesirable insects and diseases. In stands where ponderosa pine grows the primary concern is bark beetles (mainly pine engravers and mountain pine beetle) and annosum root disease. In Douglas-fir stands, Douglas-fir beetle, mistletoe, and root disease are the primary concerns.

Several projects were monitored in 2010-2013 and are listed below in Table 4. The direction or mitigation measures provided in the silvicultural prescription are listed along with a synopsis of the monitoring results.

Table 4 - Effectiveness of prescribed treatments and mitigation measures monitored in FY 2010-2013

Direction and/or Mitigation Measure	Insect or Disease of Concern	Applicable Projects [1/]	Purpose of Treatment or Mitigation	Effectiveness
Silvicultural prescription and marking guide	Mistletoe	Trapper Bunkhouse, Lower West Fork	Remove mistletoe infected trees that are the source for new infections	Very effective to moderately effective
Silvicultural prescription and marking guide	Mountain Pine Beetle (MPB)	Larry Bass, Sweeney, Forest Campgrounds	Reduce density of trees improving tree vigor. Open stand conditions less desirable for MPB.	Very effective to moderately effective
Mitigation Measure: Restricted harvest operating season (July to December)	Pine engravers	Non-commercial thinning (PCT)	Operations scheduled in periods when pine engravers not seeking trees to infest	Very effective in PCT, very effective in timber harvest projects when applied in conjunction with mitigation measures listed below.
Mitigation Measure: Large landing piles	Pine engravers	Trapper Bunkhouse, Larry Bass	Large piles provide suitable habitat for pine engravers and prevent standing green trees from being attacked	Very effective when applied in conjunction with a limited operating season.

Direction and/or Mitigation Measure	Insect or Disease of Concern	Applicable Projects [1/]	Purpose of Treatment or Mitigation	Effectiveness
Mitigation Measure: Removal of ponderosa pine > 3 inches in diameter	Pine engravers	Trapper Bunkhouse, Larry Bass, Sweeney	Removal of material that attracts pine engravers	
Trapping	Pine engravers	TCJC	Trapping and removing pine engraver beetles	
Mitigation Measure: Application of sporax on ponderosa pine stumps (greater than 14" dbh)	Annosum root disease	All timber sales on the Bitterroot	Prevents disease spores from inoculating on cut surface of stumps	Studies have shown to be very effective. Project monitoring has not proven otherwise.

[1/] Projects monitored in 2010-2013 include Sweeney, Trapper Bunkhouse, Lower West Fork, Larry Bass, Forest campgrounds and previous years precommercial thinning. .

The 1987 Forest Plan considered only lodgepole pine for Item 25. The Haacke Clairmont project (2008) proposed 715 acres for commercial thinning, which included lodgepole pine. This is a relatively small amount of our total harvest; approximately 1% during this reporting period. See also Item 12.

REFERENCES:

Previous monitoring reports include reference material describing insect and disease conditions on the Forest. In addition, the following websites contain specific information on forest insect and disease problems described above and summarize conditions throughout the Northern Region:

http://www.fs.fed.us/r6/nr/fid/wid.shtml and
http://www.fs.fed.us/foresthealth/avaitation/qualityassurance.shtml

The following Forest Health & Protection Reports were completed on the Bitterroot National Forest in 2006:

Gibson, Ken. Prevention/Suppression/Restoration Review, Bitterroot National Forest, August 22, 2006. Missoula Field Office. R1. MFO-TR-06-14. August 29, 2006.

Egan, Joel. Mountain pine beetle status and mortality trends from 2012-2013 in Montana and northern Idaho subwatersheds. Missoula Field Office. R1. June 2014.