Forest Conditions Update

SAF Policy committee meeting with Governor Bullock 1/15/19

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Summary

Forest health reports compiled from aerial surveys completed by both the US Forest Service and Montana DNRC where used to compile a 17 year history of major Montana insect pests occurrences along with wildfire acres impacted per year. Table 1 shows that major wildfire years have occurred 3-5 year cycle since 2000 and cumulatively impacted 7.7 million acres or roughly 30% of the entire forested area of Montana. In addition, mountain pine beetle, spruce budworm and Douglas-fir beetle has also impacted an additional 10 million acres. Although these are natural disturbance agents, the rate of change to our forests indicates that somewhere between 50-75% of the entire forested areas of Montana has experienced significant decrease to tree density and species composition over the past 17 years. This should be of concern to wood products reliant industries that rely on some predictability of consistent forest growth and regeneration in order to maintain productivity, market share and modernization and investment strategies of their facilities.

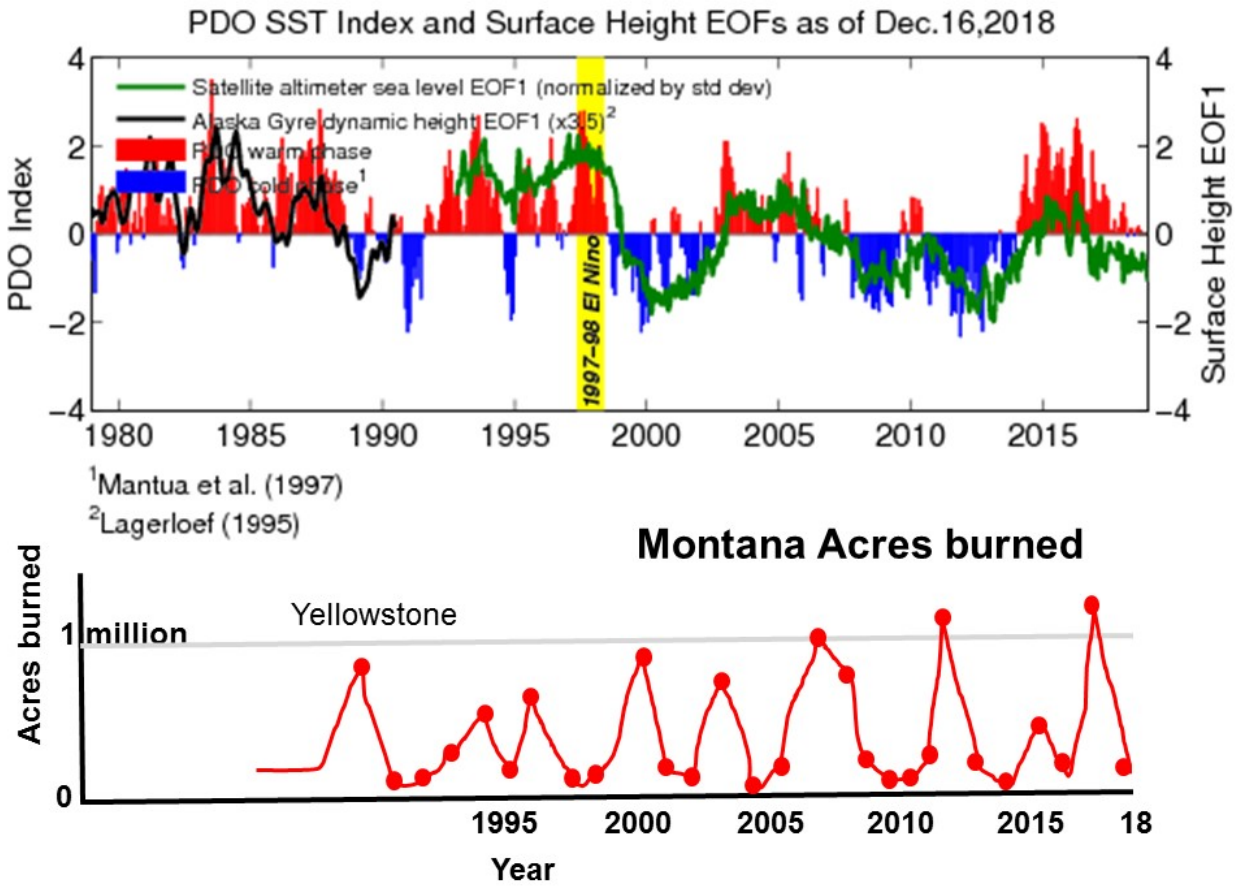
Table 1

Montana Wildfire and Insect Pest Impacted Forest Acres: *Years 2000-2018*

Acres Burned		Pine Beetle Mortality	Spruce Budworm	Douglas-fir beetle
Year	Acres	Acres	Acres	Acres
2000	1,160,145	103,920	1,300+	34,401
2001	146,819	223,892	1,300+	82,274
2002	110,309	450,134	54,444+	60,000
2003	736,809	493,785	124,142	75,954
2004	18,445	730,782	187,000	92,307
2005	103,294	1,213,602	453,739	168,258
2006	1,047,118	1,000,289	1,158,619	60,600
2007	778,079	948,517	495,884	22,285
2008	166,842	1,905,355	577,622	21,718
2009	48,912	3,694,164	2,554,205	22,528
2010	56,710	2,141,035	325,549	16,052
2011	168,100	1,092,878	1,200,000	9,123
2012	1,100,000	672,788	1,500,000	3,008
2013	124,209	526,458	598,000	15,901
2014	38,118	598,830	878,000	20,466
2015	351,000	174,000	1,200,000	14,333
2016	*113,837*	*10,765*	*890,194*	*14,839*
2017	*1,366,484*	*7,972*	*380,312*	*16,569+*
2018	*97,396*	-	+	+
Total:	***7,732,626***	***6,516,713***	***3,000,000***	***750,616***

Research into climate trends and effects shows a strong correlation with climatic variability, wildfire and in some cases tree damaging insect agents. Figure 1 shows that there is a strong correlation between the Pacific Decadal Oscillation and wildfire occurrence. Most of the time, multiple year warm-dry trends have the most profound effect, but 2012 shows that under the right conditions, a brief warming trend also correlates with significant wildfire activity. Fuel buildups, forest structure and condition, timing and frequency of ignitions, and summer humidity and rainfall patterns interact with climatic trends to offer some level of predictable wildfire behavior trends.

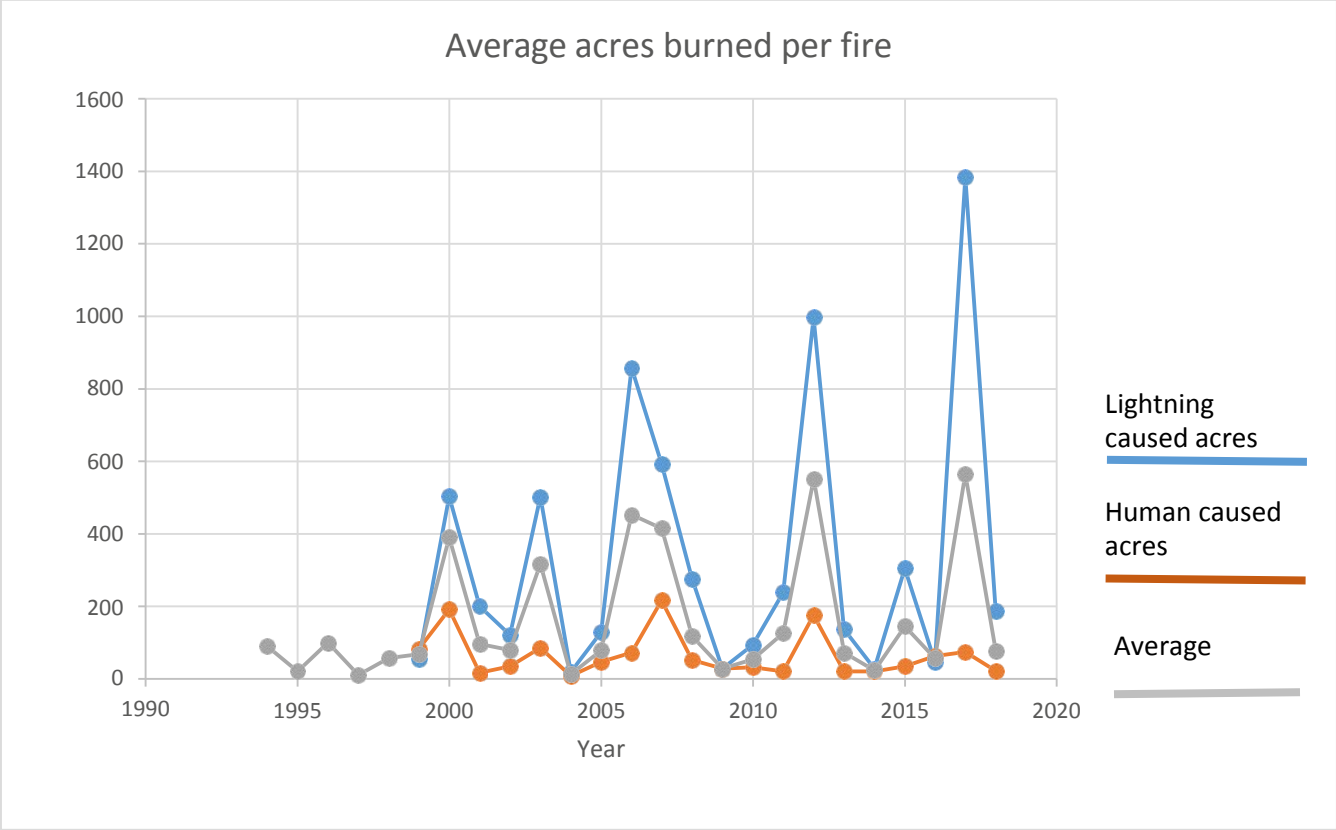
Figure 1



An examination of interagency gathered ignition and wildfire acreage data shows that there is also a strong difference between the average size of wildfires originating from human caused ignitions and lightening caused ignitions. A graph that shows calculated average acres burned from human caused ignitions versus average acreage burned per lightening caused ignition is shown in Figure 2. On severe wildfire years (hot and dry) the average acreage burned from lightning caused fires is 100x greater than from human caused fires. The cause and effect relationship is speculative due to lack of more detailed data, however, there may be specific assumptions that should be examined that will allow for better future analysis. Human caused ignitions in their very nature occur where human activity is present, and thus access and human vegetation management actions more commonly found. Lightning caused fires

may occur in more remote areas where access and human management activities are less common. Anecdotal knowledge of some of the larger acreage fires of the past two decades supports that many were started by lightning wildfires in the backcountry of federal lands. There are notable exceptions such as the Roaring Lion fire, although this fire was severe but not exceptionally large in acreage impacted. It is also notable that the average acreage impacted by human caused ignitions has decreased in size over the past decade whereas the average acreage impacted by lightning caused fires has increased. Further speculation might indicate that a more highly trained, experienced, and prepared wildfire suppression capacity has developed among municipal, state and federal agencies, allowing for more effective wildfire suppression and control where access to fire teams is available. The considerable fuel hazard reduction work conducted on private and accessible forest lands might also assist in wildfire control where human activity is present and contributes to wildfire ignitions.

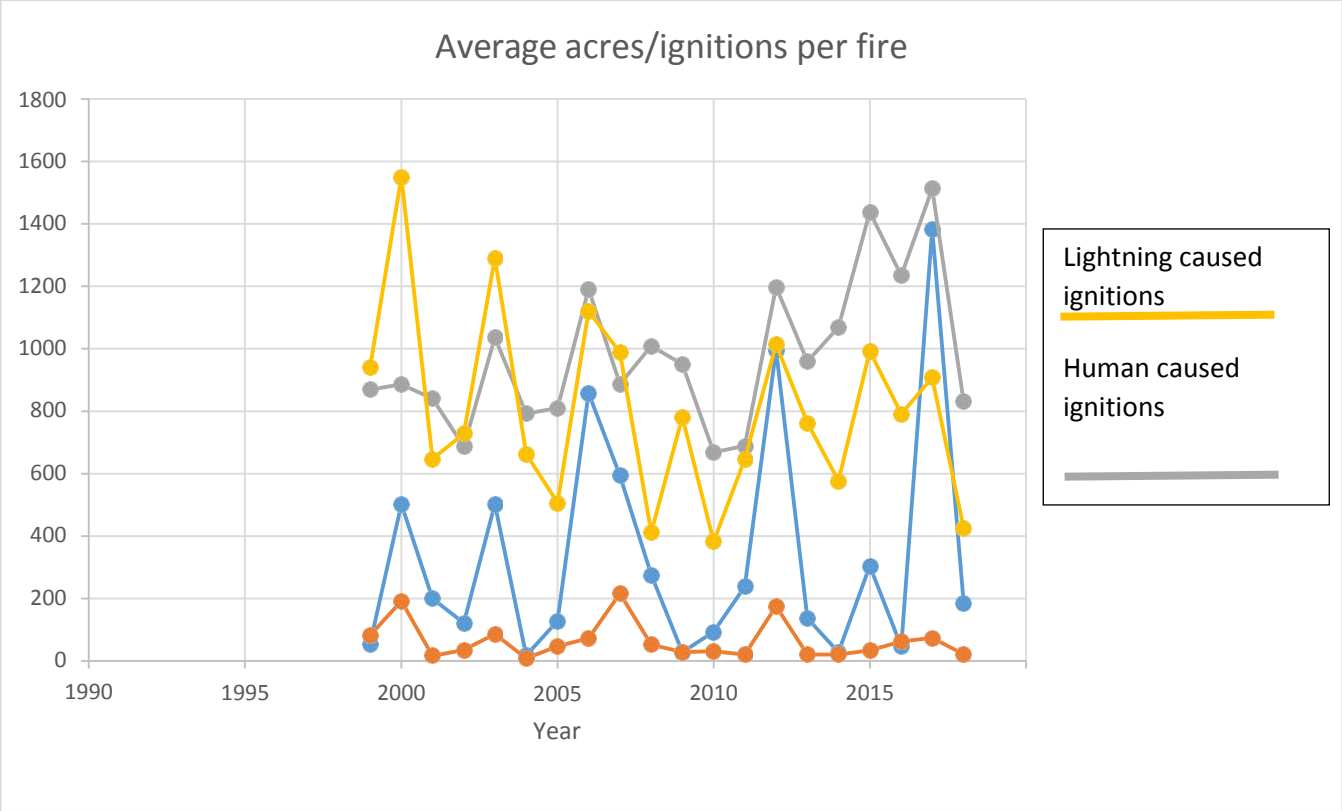
Figure 2



A further examination of wildfire data appears to support the afore mentioned speculation (Figure 3) when the trend of ignitions is superimposed on the average acreage burned per incident. Since 2000 when source of ignitions and incident acreage was recorded, the number of lightning versus human caused ignitions has significantly changed. From 2000 until 2004 lightning ignitions where significantly greater than human ignitions across Montana forests. Since 2005, human caused ignitions have almost doubled and in some years also result in twice the number of ignitions as lightning. Lightning ignitions also are well correlated with average acres burned and hot dry wildfire conditions. This is logical since lightning is more likely to result in large wildfires during warm-dry weather trends.

Human caused ignitions are also somewhat correlated to acres burned, though considerably less than lightning. As with lightning ignitions, warm-dry weather trends logically allow for human ignitions to spread more quickly. However, since 2012 there appears to be a fairly obvious disconnect between the rapid increase in human caused ignitions from approximately 800 per year to 1200-1400 per year, and the number of acres burned per incident. This disconnect occurs regardless of weather trend, whereas during the same time period lightning ignitions are very closely correlated to average acres burned. The increase in wildfire suppression efficiency, which has been anecdotally observed by most land managers and land owners, as well as significant progress in fuels treatments on private and public lands with reliable human access may be substantial factors that have positively affected the increased effectiveness of human caused wildfire suppression. Likewise, the increasingly heavy fuel loads in more remote forested locations, facilitated by insect outbreaks and drought conditions, may be partially responsible for the increase in lightning caused wildfire acres.

Figure 3



The cause and effect relationships among weather patterns, longer term climatic trends, forest conditions, insect related tree mortality, ignition sources, and effectiveness of fire suppression attempts and strategies (let burn versus aggressive suppression for example) create an extremely difficult cause-and-effect relationship scenario. Although anecdotal analysis might offer some ability to speculate with regard to the effectiveness of human management of the complex forested ecosystems across Montana, caution should be exercised in how any of this data is interpreted and used for future action. Lacking any better information, there does seem to be some positive response (fewer acres impacted) from almost two decades of improving fire suppression and control as well as fuels management near human activities. The rapid increase in human caused ignitions over the past decade is also reason for concern.