Massachusetts Fire History Working Paper

Revised Draft

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Introduction

This note is an initial summary of key data on Massachusetts' 20th century forest fire history. We reach back into history for several reasons. First, it is useful to see whether major fire years are synchronous across states or not; and if so, to associate those with weather conditions to the extent we can. Second, the history can yield clues to important associations with weather that might not be evident from a short period of records. Analyzing this kind of information is subject to the usual caveats – especially for the older data – completeness and accuracy of coverage cannot always be assured. For example, it is easy to find in the literature widely differing estimates of the area for the same fire! Most importantly, we must take care in making casual extrapolations to the future. Ultimately we hope to analyze circumstances surrounding the very largest fires in the region, and hope to use the annual fire occurrence data to identify years when those occurred.

In a separate working paper, we analyze individual fire data from 2000-2011. This enables us to describe details on fire season, causes, and geographic distribution, but do not give us a long enough time period to answer some of the questions raised in the present paper. Also, the fires of 1947 are discussed more thoroughly in a separate working paper on the regional fire outbreak of that year.

As a policy matter, the number of acres burned annually may not be a sensible way to discuss policy. A year is an arbitrary unit of time. Would it make more sense to think in terms of area burned per decade or even longer, given resource and property values

involved? Also, in this research we are searching for general empirical regularities to the extent they can be observed. Our purpose is not to develop methods for prediction.

Our data source for forest fire history is records as supplied by the Fire Protection Division of the Massachusetts DCR . We received valuable assistance from the Forest History Society and Massachusetts Department of Conservation and Recreation (MA DCR) archivist Sean Fisher in filling in some of the older data.[1] Unfortunately, the Commonwealth has long reported its fire data on a fiscal year basis, making comparisons of peak years with neighboring states impossible without extensive reconstructions of the data which are not feasible for this project.

For important details after 1991 we rely on standardized reports by the USFS, which are based on information reported by the states. The recent Massachusetts data pose a mystery: Massachusetts reports far more fire per unit area than other states in the region. It has consistently reported more fires and area burned than Maine, which has five times as much forest land. Connecticut, which has about 60% of Massachusetts' forest area, reported a cumulative area burned for 1984-2010 only 26% as much as Massachusetts. We need to understand this better. Are more rural fires not in forest reported in Massachusetts? Is Massachusetts' reporting system more thorough than are neighboring states? Is there another explanation?

> *"My hypothesis that it relates to the fact that Massachusetts relies on fire towers for detection more than other states do now and that the open burning period and times coincide with the highest fire danger periods during the year.*
>
> *I suspect that it records fires that are not wildfires burning in forested land that are not included in Maine, as an example. Open burning laws are drastically different between Massachusetts and other New England states. The Cape and islands in Massachusetts are the most flammable vegetation type in New England under current ignition/climate/fuel type patterns"* (Bill Patterson, pers. comm. to LCI, Dec 2011).

[1] This tabulation relies on an unpublished report by Agostino, which in turn used internal forestry reports. Several errors and uncertainties must be noted. First, in the major fire years of fiscal 1946 and 1948, the reports did not include the largest fires in their tables, ostensibly because they were awaiting "final data." The estimated areas of those fires were noted in a footnote but not tallied in the Agostino tabulation. From the record it seems that "final data" never came, though a search of files might unearth it. In the tables and charts for this report, the estimates on these largest fires are inserted into the proper fiscal years. There are several likely typos to be noted: The number of fires for 1965 and 1966 are identical; also, for 1976, the area burned and number of fires are identical numbers. These numbers are used in this report. Several data points were not available to Agostino, and these are left blank in this summery.

Fire History

In common with nearby states, Massachusetts experienced severe forest fire conditions during the 1910s and 1920s (Fig. 1). During these years area burned averaged roughly 40,000 acres per year. The 1930s were far more calm, and then a minor period of severe fire occurred in the 1940s. According to the records, 1946 was a worse fire year in Massachusetts than was 1947, though its fire numbers in 1947 were extremely high[2]. The next bad year was 1957, when the famous Plymouth fires burned more than 12,000 acres, and ran extremely fast before high winds. The Great 1960s Drought was associated with a substantial upswing in area burned and fire numbers. Area burned roughly doubled from 1960 to 62, and then doubled again two years later. In 1963, firefighters had to face almost 13,000 fires. The Drought got even worse in 1964, but area burned declined somewhat, to just under 18,000 acres and 14,000 in 1965.[3] Another period of drought in the early 1980s boosted annual area burned to a level almost as high as the peak caused by the 1960s drought.

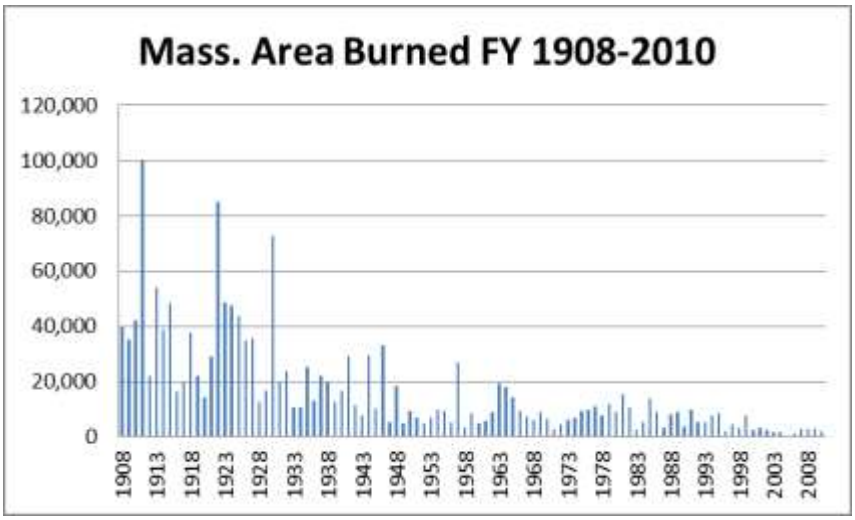
A cumulative total of 1.7 million acres burned from 1908 to 2010. Roughly half of this occurred before 1931. Much was in surface fires, much consisted of re-burns in fire-prone areas. More importantly, up to the 1950s at least, a significant part of the area reported as burned was not forest at all but was pasture, grassland, shrubland, or regeneration. Still, this is a notable amount compared to the state's current total of 3.2 million acres of forest.

Since 1984, annual area burned in Massachusetts was 0.12% of forest area, much higher than other New England states. Much of the difference, however, could be due to more through reporting.

[2] See Appendix 2 where monthly data are re-formatted to calendar years for the late 1940s only.

[3] WAP comment : Keep in mind that this was the time when Mass. open burning regulations were revised from old practice in the early to mid 1960s of allowing homeowners to literally burn leaves in the street in the fall (I recall doing that in Hingham in Plymouth county) to restricting burning to "brush burning during the spring.

Figure 1.



Fire numbers follow a very different time pattern than area burned. Reported fires increased through the mid 1960s then declined quite rapidly after the early 1980s (Fig. 2). In many years, fire numbers seem high relative to the state's forest area. In recent years, fire sizes have been very low, consistent with nearby states.

Figure 2.

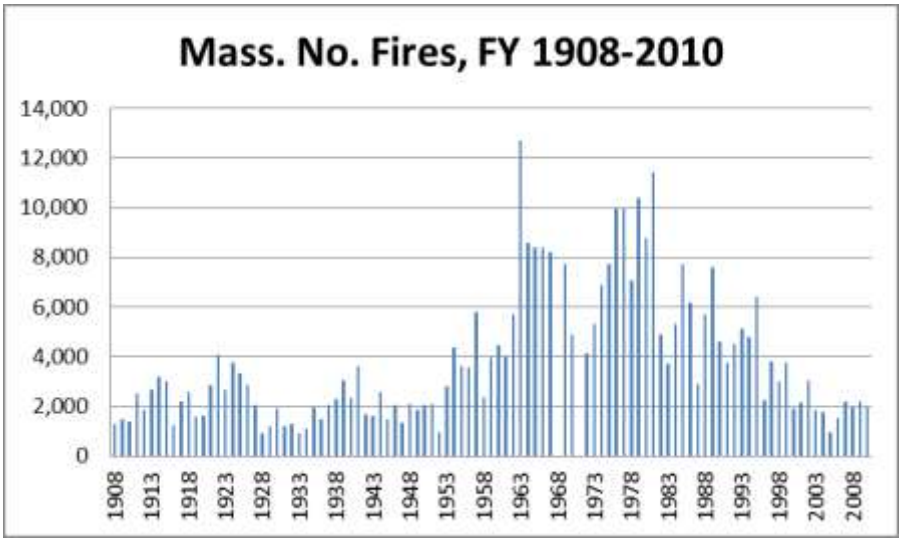
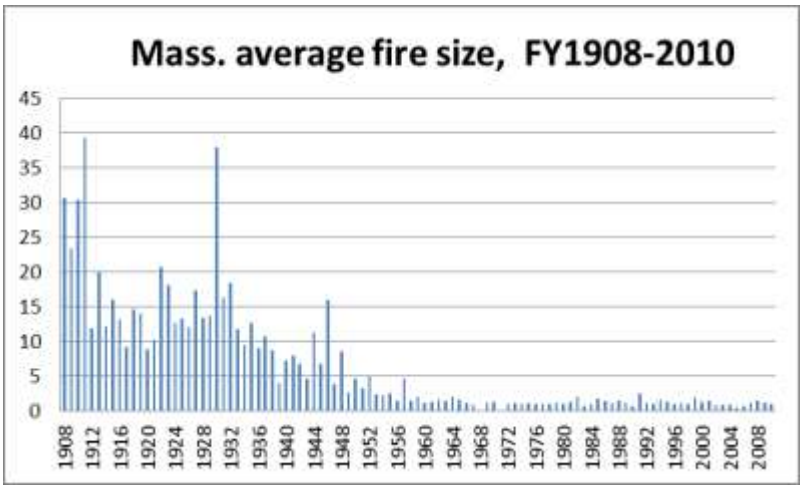


Figure 3.



The decadal averages display the highs of the period up to 1930, then a steady decline after the 1940s (Fig. 4, Table 1).

Figure 4.

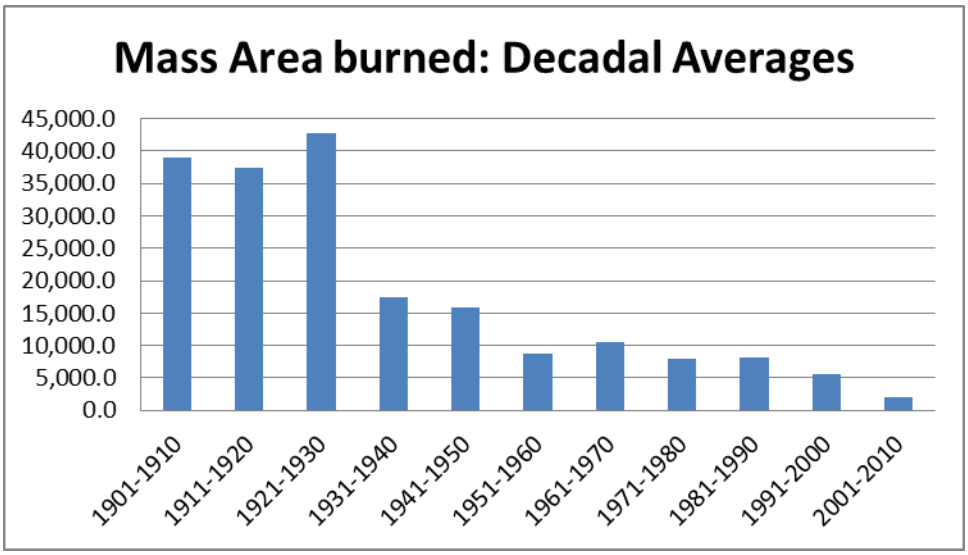


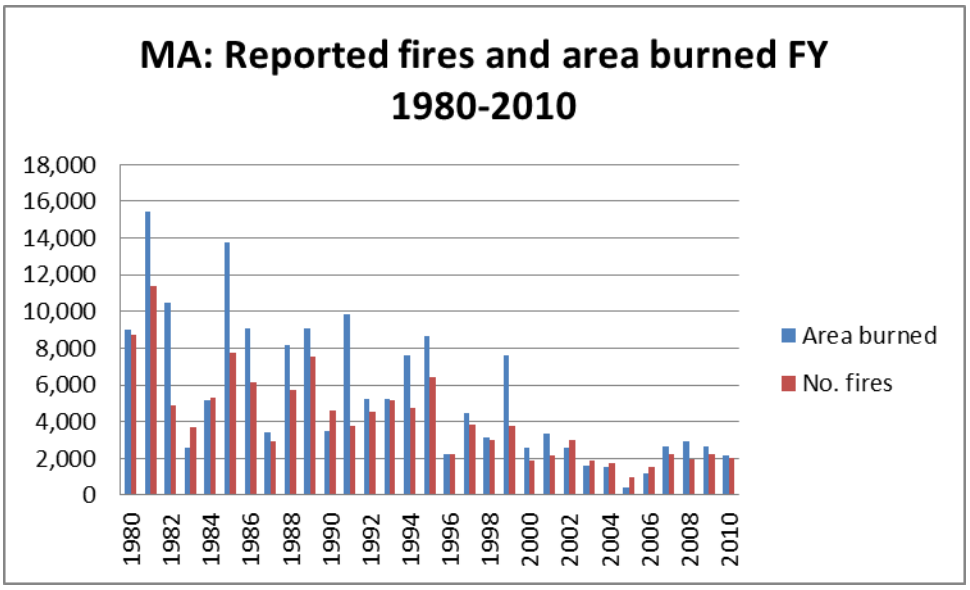
Table 1.

Decadal Averages	Mass.		
	1908		
Year	Area Burn	No. Fires	Ave size
	acres		
1901-1910	38,992.0	1,390.0	28
1911-1920	37,337.3	2,240.2	17
1921-1930	42,661.0	2,560.4	17
1931-1940	17,443.0	1,769.1	10
1941-1950	15,829.1	2,035.3	8
1951-1960	8,694.2	3,399.1	3
1961-1970	10,425.3	7,627.6	1
1971-1980	7,946.1	7,799.0	1
1981-1990	8,077.8	6,000.4	1
1991-2000	5,660.1	3,936.6	1
2001-2010	2,115.9	1,969.4	1

Note: first decade begins in 1908.

To see the pattern more closely in recent years, we present a plot since 1980 (Fig. 5). For these years, through the late 1990s, area burned exceeded 8,000 acres in several years, followed by a near-disappearance of fire in 2005. A variety of factors doubtless played a role in the dramatic shift to lower burning levels after 1930. Improved detection and suppression, enforcement of regulations, stronger rural fire departments and more professionalized suburban ones, and changing agricultural land use patterns all contributed. Railroads caused some 40% of fires in the 1910s, but changes in locomotives and reductions in service largely eliminated this source of ignitions by the early 1950s. These are discussed in more detail below. As we will see below, weather may have played a role as well.

Figure 5.



Variability and Extreme Value Analysis

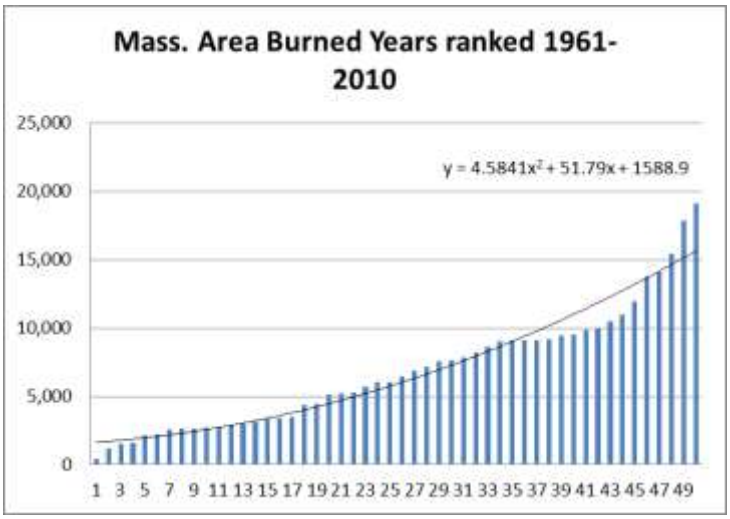
Measures of variability and extremes show that since 1970, Massachusetts' fire experience has displayed a lower level, and lower variability than in the period as a whole (Table 2). The largest fire post 1970 was half the size of the largest fires of the late 40's. The compression of the size distribution may be related to more effective detection and suppression.

Table 2.

Periods	Area Burned (acres)	No. Fires
1944-2010		
Maximum 1944-2010	33,056.0	12,727.0
Mean	7,695.9	4,693.2
Median	6,858.0	4,001.0
SD same	5,836.1	2,814.3
Ave + 1 SD	13,532.0	7,507.4
Ave + 2 SD	19,368.1	10,321.7
Ratios:		
Max /mean	4.3	2.7
Mean/Median	1.1	1.2
CV	0.8	0.6
1970-2010		
Maximum 1970-2010	15,430.0	11,413.0
Mean	5,962.7	4,853.4
Median	5,210.0	4,554.0
SD same	3,676.3	2,706.9
Ave + 1 SD	9,639.0	7,560.2
Ave + 2 SD	13,315.3	10,267.1
Ratios:		
Max./ mean	2.6	2.4
Mean/median	1.1	1.1
CV	0.6	0.6

Here, we analyze ranked annual area burned since 1961. This is half a century but that is not the reason. It seems that omitting the fires of the early 60's would omit important information. The correct time period for this analysis would be subject to differences of opinion, as there is no objective guideline. The amplitude of swings in fire area burned and fire numbers has been quite high, though the shape of the curve when burn years are ranked is fairly flat by comparison with other Northeastern states. But it does include a more steeply rising leg for the higher numbers.

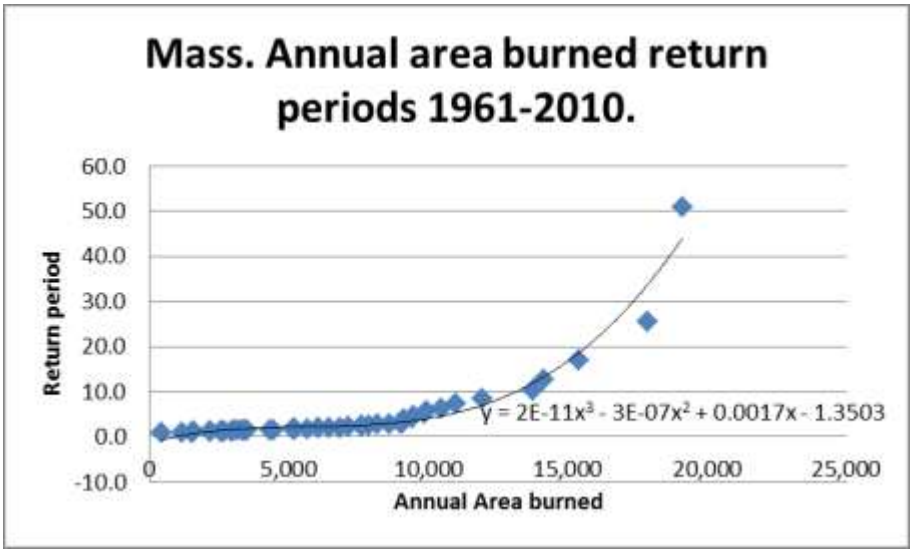
Figure 6.



Return Periods

In assessing flood risks, engineers use return periods to estimate how frequently a given level of flooding might occur. Usually in that field the 100 year return interval is used as a design factor. This analysis suggests that a fire year of 16,000 acres would likely recur every 20 years based on experience since 1961. This is more frequent that would be suggested by estimated return periods for major drought. More importantly, it is much higher than the average annual burn for this period.

Figure 6A.



Fires by season

At present we have no long-term data to analyze fire occurrence by seasons. For experience since 2000, see the separate working paper on individual fires.

Large fires

We would like to be able to assemble a long statewide list of large individual fires, especially for the years since 1960. This will have to await another occasion. See below for the Cape Cod / southeast Massachusetts area.

Detailed Analysis 1984-1020

Over the 1984-2010 years, almost 100,000 forest fires were reported in Massachusetts, burning a cumulative total of 124,000 acres. In this total were included almost 1,500 patches 10 acres and larger, covering an aggregate 64,000 acres. Fire at this rate is not material relative to the total area of the state, but it must yield cumulative ecosystem effects when continued over long periods. It is likely that these are concentrated in particular fire-prone areas (cf, e.g., Parshall and Foster 2002). Much of this burning consists of ground fires, and not stand-replacing events, though the large burns in coastal sand plains are often stand-replacing. Calculations of long-term fire rotations alone do not capture either the huge shift in fire levels over time or the grainy structure of the fire size distribution.

Table 3.

Mass					
NUM	Cum 1984				
Class A	to 2010	PERCENT		In 27 seasons…	
Class B	68,570	69%		10 a & Larger	
Class C	29,398	30%			
Class D	1,337	1%		1474	patches
Class E	98	0%			
Class F	37	0%			
Class G	2	0%			
TOTAL	0	0%			
	99,442	100%			
ACRES					
Class A	17,689	14%			
Class B	42,216	34%			
Class C	29,998	24%		64434	acres
Class D	14,727	12%			
Class E	17,145	14%			
Class F	2,564	2%			
Class G	0	0%			
TOTAL	124,339	100%			

For convenience we reproduce a chart of the data for 1984 to present. Area burned followed a bumpy but clearly declining trajectory over this period (Fig. 7). By far the greater number of fires were smaller than ¼ acre, and their share of the total has increased, indicating successful control actions (Fig. 8). A considerable portion of the annual area burned consists of the few fires that burn to larger sizes (Figs. 9 and 10). Area burned by fires larger than 10 acres have declined but fluctuates from year to year (Fig. 11).

Figure 7.

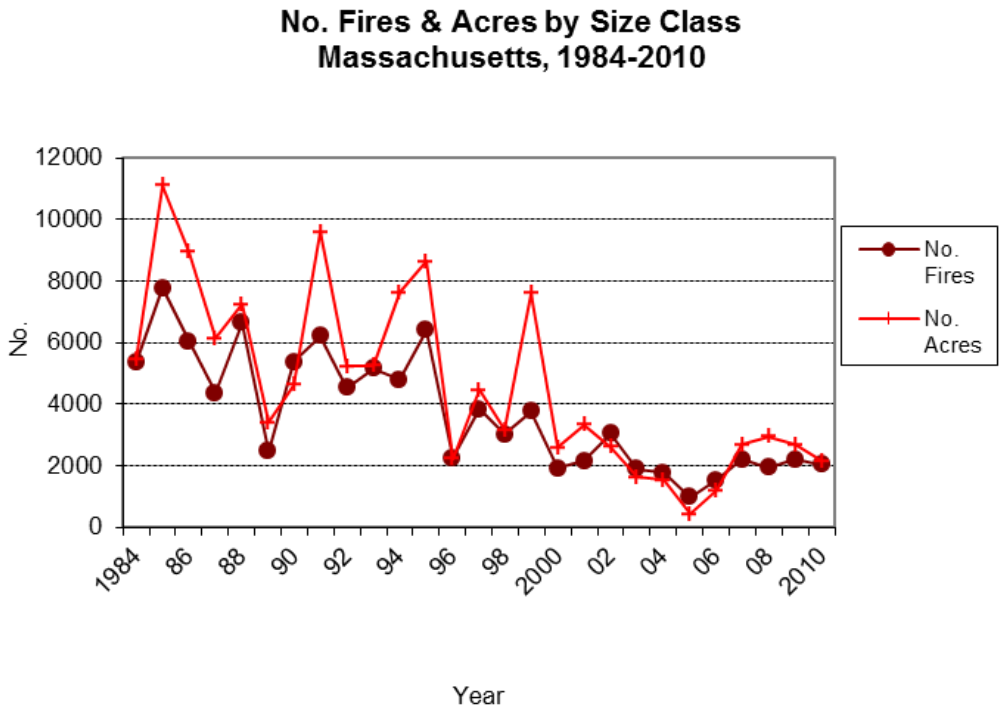


Figure 8.

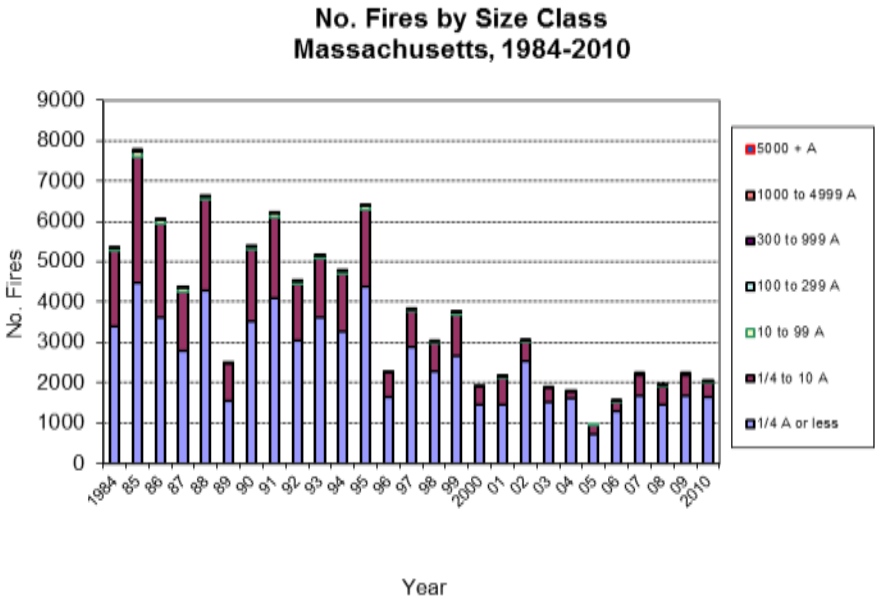


Figure 9.

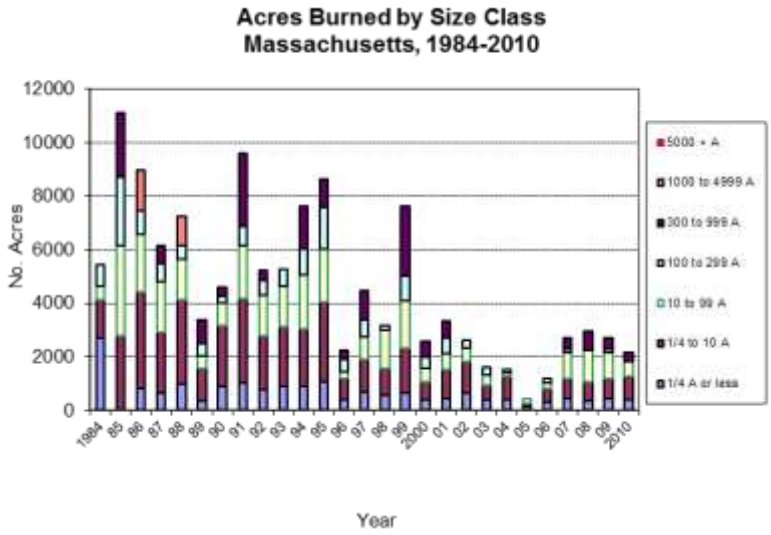


Figure 10.

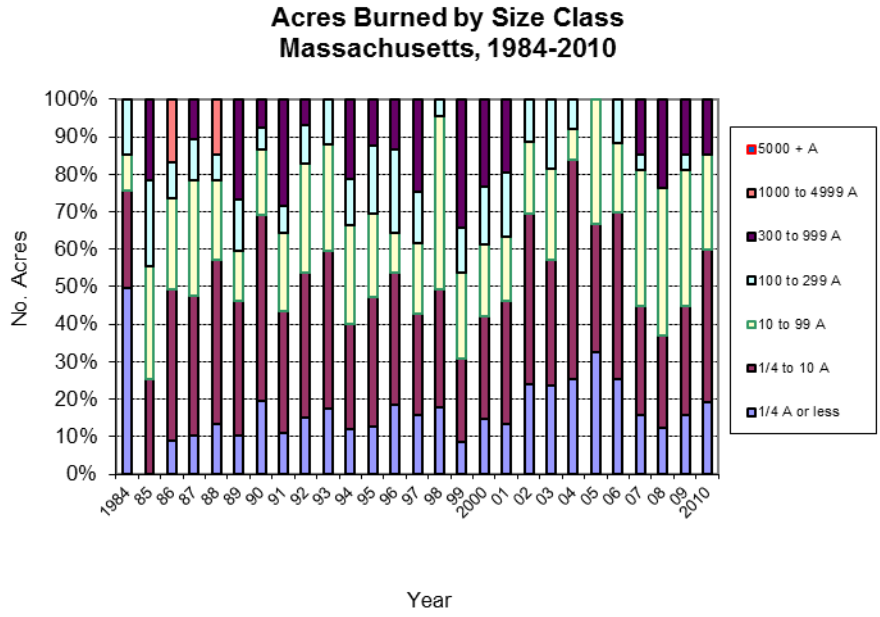
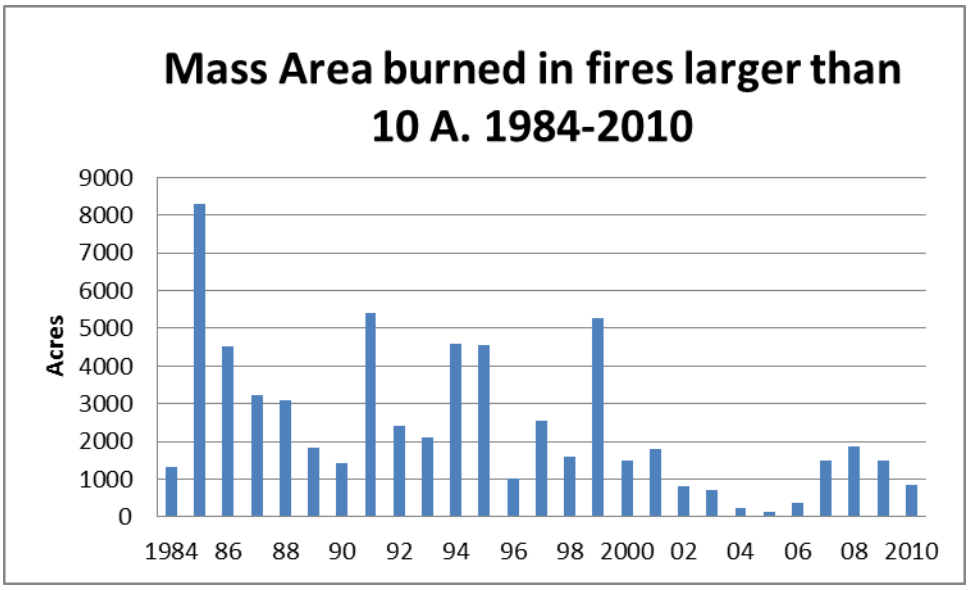


Figure 11.



Fire Occurrence and Weather: Exploratory Analysis

A long-term climate database maintained by NOAA enables us to extract monthly weather data for three climate zones of Massachusetts since 1895. Because the fire history, as noted above, is in terms of fiscal years, comparisons between this information and annual fire histories cannot be made, until the fire data can be reformatted into monthly and calendar year form. For many years, underlying records would make this possible. In a separate memo on the droughts of the late 1940s and the mid 1960s, more detail on those experiences is provided (in prep.).[4]

It is useful to examine fire season rainfall data to check for correspondences between rainfall anomalies and severe fire years. There is a strong correspondence between the drought periods of the late 1940s and the mid 1960s and elevated fire experience.

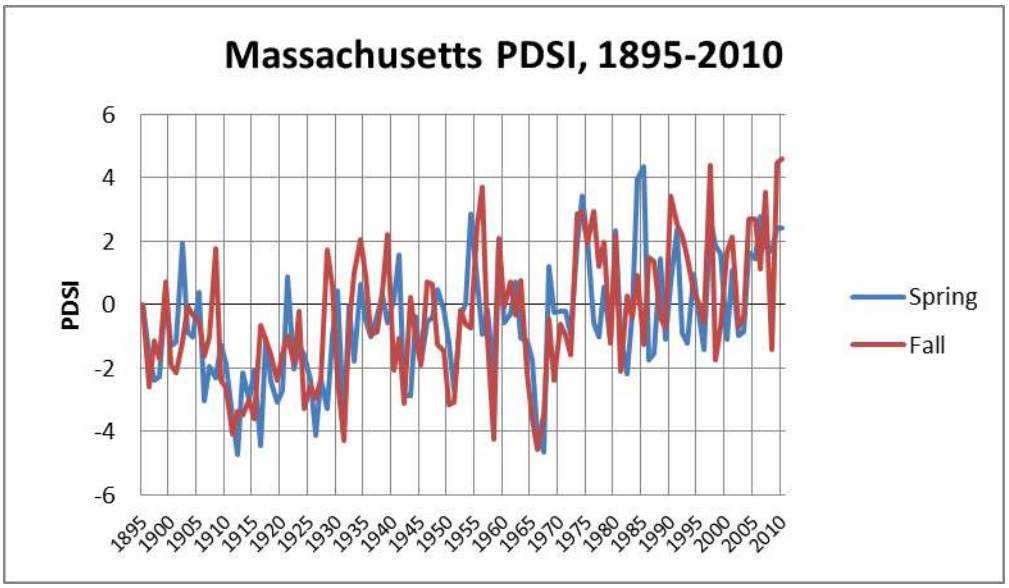
We analyzed NOAA data on the Palmer Drought Severity Index (PDSI) for spring (April, May, June) and fall (September, October) fire seasons. The contrast between the 1910s and 1920s and the last 4 decades is striking. In the 1910s and 1920s, 14 of 20 spring seasons had PDSI of minus 2 or lower; while during the entire period since 1970, only 1 spring has been that dry (Table 4) . A similar pattern holds for the fall seasons. The chart (Fig. 12) illustrates this pattern in more detail.

[4] To remind once again, some compilations of fire data miss the largest fires of calendar 1946 and 1947 and give a misleading indication of fire response to drought in those years as well as the longrun history of extreme fire years.

Table 4. Massachusetts statewide PDSI data summary

SUMMARY											
Apr May Jun	1901-1910	1911-1920	1921-1930	1931-1940	1941-1950	1951-1960	1961-1970	1971-1980	1981-1990	1991-2000	2001-2010
lower than minus 2	3	8	6	0	3	1	2	0	1	0	0
minus 2 to zero	5	1	3	6	6	5	6	5	4	5	2
zero to plus 2	2	1	1	4	1	2	2	2	2	4	4
plus 2 or higher	0	0	0	0	0	2	0	3	3	1	4
Sep Oct											
lower than minus 2	3	5	6	1	3	1	5	1	0	0	0
minus 2 to zero	6	5	2	4	4	5	4	2	4	3	3
zero to plus 2	1	0	2	3	3	1	1	3	4	4	2
plus 2 or higher	0	0	0	2	0	3	0	4	2	3	5

Figure 12.



In southeast Massachusetts, the dry periods of the late 1940s and the mid 1960s stand out clearly (Table 5, Figs. 13 and 14). Over the century, rainfall totals in this zone increased by more than 1.5". This is likely one reason why the number of large negative rainfall anomalies has been low since the 1960s.

Table 5. Massachusetts Zone 3 PDSI data

SUMMARY											
Apr May Jun	1901-1910	1911-1920	1921-1930	1931-1940	1941-1950	1951-1960	1961-1970	1971-1980	1981-1990	1991-2000	2001-2010
lower than minus 2	3	8	6	0	3	1	2	0	1	0	0
minus 2 to zero	5	1	3	6	6	5	6	5	4	5	2
zero to plus 2	2	1	1	4	1	2	2	2	2	4	4
plus 2 or higher	0	0	0	0	0	2	0	3	3	1	4
Sep Oct											
lower than minus 2	5	6	7	0	3	2	3	2	0	1	0
minus 2 to zero	4	2	1	5	7	4	5	3	5	4	2
zero to plus 2	1	2	2	3	0	1	2	3	4	4	2
plus 2 or higher	0	0	0	2	0	3	0	2	1	1	6

Figure 13.

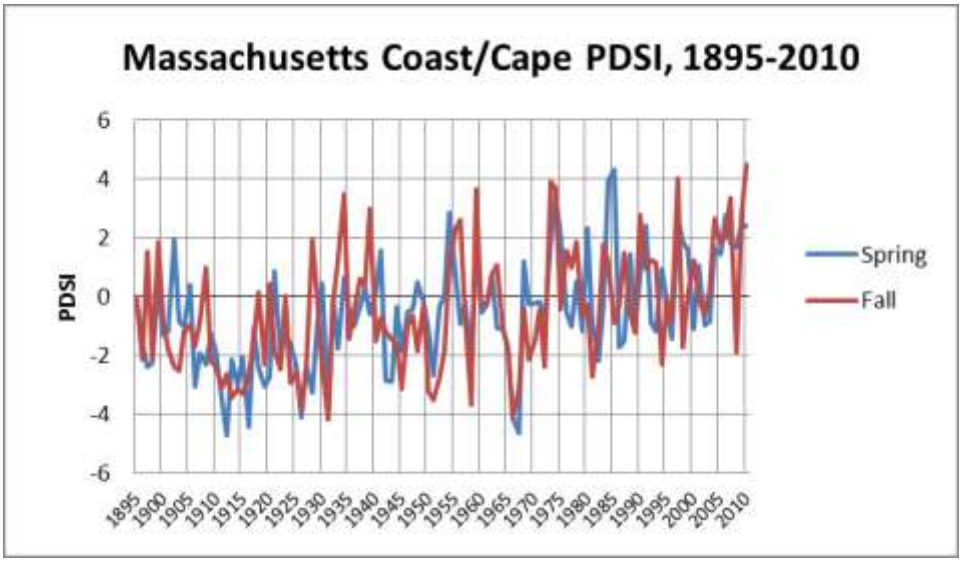
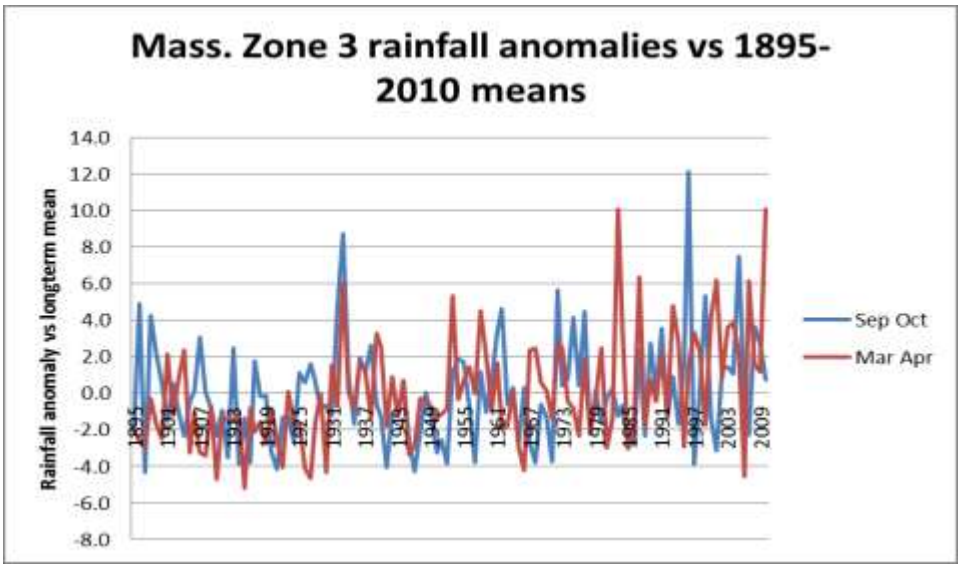


Figure 14.



Why are There Fewer Forest Fires?

The association of fire history with the weather will remain murky. But many factors were associated with the declines in forest fire experience in the state.

Suburbanization Spreads -- Since the post war baby boom in the 1950s and 1960s people have been migrating from the cities to the suburbs. This means fires are noticed sooner. It also brings the professionalization of outlying suburban fire departments.

Road access improves -- In 1930, 52% of the state's roads were improved (paved), By 1959, of a much larger total mileage, more than 91% were improved (Stat Abs of US.). This is key for prompt access for heavy equipment like fire engines.

Logging changes – After the mid 20's, logging plummeted, leaving less slash in the woods and less equipment-related ignition. Since the 50's machinery and methods have changed, making sparks less likely, Also, utilization in the woods is typically much more complete, leaving less slash for a fire hazard than was true in the teens and 20s. At that time numerous portable sawmills left behind piles of slash and sawdust that were recognized fire hazards.

Forests are less flammable – According to Emery Gluck of Connecticut State Forestry, **"**With the absence of fire, copious understory hardwood saplings seed in, creating an understory canopy that shades the fuels further and increase the humidity, lessens with wind in the understory and thus lengthens the time for fuels to dry out. Unlike in the West or other places with conifers proliferating in the understory where fuel load increases with the absence of fire, our forests become *less* flammable with the absence of fire."

Grasslands decline -- By the middle of the 19th century, much of the state's original forest had been cleared. Since then, forests have been steadily reclaiming farmland. Connecticut's forests of oak, hickory, maple, birch are probably less fire-prone than the previous pastures and haylands.

Changes in Agriculture – Related to above, the decline in number of farms likely has reduced the number or rural activities involving burning of fields and debris.

Fire burn permits enforced -- A fire burn permit system was established in the early 1900s. Over time this system was backed with stronger government support and today all towns require residents to obtain an open burning permit prior to burning. Open burning is prohibited when fire danger risk is high.

Smokey the Bear educates -- In the early 1900s it was commonplace to throw cigarettes out the window and leave campfires unattended. Education and publicity have altered the American mentality – who hasn't heard that "only you can prevent forest fires"?

Coal-Burning Trains disappear-- Railroad fires were commonplace early in the century. Electrification of railroads after the 1920s, and shrinkage of the rail net after the 1950's, nearly eliminated this risk.

Fire Warden System improved. – Periodic improvement in the fire warden system lilely contributed to early detection and suppression.

Technology improves -- In the early 20th century, a number of technological advancements changed the face of forest firefighting, not the least of which was the internal combustion engine and thus – fire trucks and high volume pumps. Other advancements in fire fighting technology include portable gasoline-powered pumps, radio communication, aircraft, satellite imagery for lightning detection, among many others. Widespread cellphone use now results in many prompt fire reports.

Special Case of Southeast Massachusetts

The forests, and use history, and weather patterns of southeastern Massachusetts seem well suited to support forest fires. As expressed by Northeast Forest and Fire Management (2009, p. 9):

> *"Very large wildfires may still occur on Cape Cod every 30 to 50 years…, instead of intervals of 10 to 20 years (Patterson and Ruffner 2002). Long intervals between fires may heighten the danger to the public, as fuels build up and people are prone to forget about the risk of wildfire and become complacent about controlling flammable accumulations of fuels around dwellings and other structures."*

Some of these fires have made regional news (see box)

Plymouth, MA, Sept. 13. – Acres of what was beautiful woodland early in the week is now a stretch of blackened, smoky ground. The brush fires which sprang into activity with yesterday's gale devastated a great section of Plymouth County, swept away scores of frame buildings, stampeded cattle and horses, killed off immense numbers of birds and imperiled the lives of many people. The probable losses are heavy, exceeding $150,000 in this county alone.

The fire, which had spread out fully ten miles east and west yesterday, is still spreading. Tonight a shift of wind to the southwest bids fair to help out the hundreds of tired fire fighters, who had to battle for their homes. MRS. JOSEPH A. BROWN, of Long Pond, dropped dead from excitement when the fire threatened her house. *New York Times* 1900-09-14.

It appears that ignitions by artillery and small arms firing ranges made Camp Edwards a hotbed of ignitions, until such training was halted in the late 1940s. That reservation now sports a modern fire management plan.

Without long-term lists from the entire state it is impossible to say whether the fires in this region have always been the largest in the state (Table 6). In our separate analysis of individual fires since 2000, however, the fire experience in southeast Massachusetts has

been very mild compared to the balance of the state. Interpretation of this fact remains an open question for us.

Table 6. Examples of wildfires occurring on Upper Cape Cod, Massachusetts, USA, within the Last 150 years (Patterson and Ruffner 2002, and Grenier 2006).

Year	Towns	Acres
1866	Sandwich	4,000
1937	Bourne & Falmouth	1,500
1887	Bourne, Sandwich, Mashpee, & Falmouth	25,000
1938	Sandwich	5,000
1909	Bourne & Falmouth	10,000
1938	East Sandwich	1,500
1923	Bourne & Sandwich	17,000
1946	Camp Edwards	50,000 (sic??)
1930	Barnstable County	16,600
1959	Camp Edwards	3,000
1932	Sandwich	400
1964	Sandwich, Bourne and Otis	1,300

Year	Towns	Acres
1932	Sandwich	1,500
1964	Sandwich and Bourne	1,300
1932	Sandwich	2,500
1982	Camp Edwards	2,280
1935	Mashpee	1,300
1985	Camp Edwards	900
1936	Mashpee and Falmouth	400
1985	Camp Edwards	700
1937	Bourne and Falmouth	700
1983	Camp Edwards	1,334
1937	Bourne	400
1988	Camp Edwards	1,480
1937	Mashpee	250
1997	Camp Edwards	700

Source: Northeast Forest & Fire Mgt LLC, Wildland fire protection and preparedness plan for Maple Hill Swamp… Sandwich Massachusetts, 4 June 2009. 82 pp. Note: The figure of 50,000 A for Camp Edwards in 1946 is not substantiated in other sources.

Other valuable background on this area is found in Howard, 2005, and other sources listed in references below.

Tentative conclusions

1. Massachusetts experienced extreme fire losses through the 1920s, then entered a period of much lower fire experience, after which numbers and areas burned continued to fall.

2. This step change in fire activity doubtless had many causes. These included shifts in rural land uses, effective burn permit systems and fire control efforts, upgrading rural and suburban fire services, changing timber harvest levels and methods, and other factors.

3. We would like to know in greater detail why Massachusetts reports far more fire activity relative to its forest area than do neighboring jurisdictions. Or, why the others report less.

4. After the 60s drought, several high burn years occurred. The shape of the area burned curve, ranked by years, displays the incidence of unusually large fire years that is roughly consistent with experience elsewhere in the region.

5. There has been a high degree of success in keeping most fires to very small sizes, yet the ones that escape control continue to account for a large portion of annual area burned.

6. Weather appears to be a material factor in explaining fire experience when the 1910s and 1920s are contrasted with the post 1970 years. Rainfall in SE Massachusetts is higher on average than earlier in the 20th century, and incidences of spring and fall drought have been less severe since the late 60s. Without re-formatting FY data to calendar years, and obtaining monthly information, detecting correspondences to weather will be elusive.

7. Elevated fire experience in the late 40's, and especially the Great 60s Drought are probably more than a coincidence. Weather experts believe that droughts of the magnitude of the 1960s Drought can recur in this region on average once in 50 years. If so, conditions that could support high area burned and fire numbers will recur.

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Appendix Table 1.

Southern New England forest fire history data. Massachusetts is FY's. See note at end of table.

	Connecticut		Massachusetts (FYs)		Rhode Island		**Total Southern**	
	Area Burned (acres)	No. Fires	Area Burned (acres)	No. Fires	Area Burned (acres)	No. Fires	Area Burned (acres)	No. Fires
1900								
1901								
1902								
1903								
1904								
1905	30,000	8,000						
1906	4036	125						
1907	4387	109						
1908	18430	283	39,672	1,289				
1909	14779	339	35,083	1,496				
1910	47,000	834	42,221	1,385				
1911	65,000	978	99,693	2,536				
1912	16,000	526	22,072	1,851				
1913	24,000	695	53,826	2,688				
1914	41,463	1,056	38,975	3,181				
1915	103,555	1,443	48,389	3,008				
1916	21,000	487	16,198	1,225				
1917	40,000	1,090	20,020	2,175				
1918	35,000	1,026	37,638	2,553				
1919	24,000	715	22,045	1,566				
1920	11,400	400	14,517	1,619				
1921	20,000	689	29,221	2,849				
1922	83,000	1,137	85,241	4,099				
1923	20,900	708	48,602	2,672				
1924	28,528	1,013	47,522	3,735				
1925	23,834	865	43,876	3,310				
1926	21,644	743	34,675	2,860				
1927	17,921	579	35,400	2,029				
1928	14,313	598	12,516	930				
1929	10,667	591	16,569	1,198				
1930	55,866	1,367	72,988	1,922				
1931	13,495	992	19,510	1,195				
1932	9,953	1,160	23,783	1,293				
1933	3,175	661	10,467	893				
1934	3,517	757	10,446	1,103				
1935	7,321	1,500	25,338	1,996				

1936	3,316	896	13,192	1,466				
1937	7,238	1,508	22,249	2,066				
1938	6,931	1,444	20,067	2,280				
1939	3,054	893	12,487	3,061				
1940	4,184	1,099	16,891	2,338				
1941	10,599	2,039	28,966	3,624				
1942	9,993	1,363	11,287	1,667				
1943	7,931	1,640	7,606	1,621	5208	328	20,745	3,589
1944	10,009	1,514	29,380	2,579	4414	577	43,803	4,670
1945	3,161	767	10,150	1,484	3513	228	16,824	2,479
1946	4,575	1,265	33,056	2,062	5481	396	43,112	3,723
1947	4,422	931	5,264	1,326	2846	345	12,532	2,602
1948	1,335	531	18,200	1,834	976	209	20,511	2,574
1949	1,630	501	5,000	1,844	1916	367	8,546	2,712
1950	1,997	575	9,382	2,032	4135	293	15,514	2,900
1951	2,214	468	7,053	2,091	10778	262	20,045	2,821
1952	4,408	801	4,849	964	5742	269	14,999	2,034
1953	1,857	547	6,909	2,790	585	168	9,351	3,505
1954	2,439	628	9,703	4,380	1142	192	13,284	5,200
1955	2,210	639	9,223	3,620	708	128	12,141	4,387
1956	1,443	347	5,311	3,565	642	124	7,396	4,036
1957	4,441	1,056	2,967	5,781	1145	244	8,553	7,081
1958	1,122	465	3,426	2,374	181	81	4,729	2,920
1959	1,974	452	8,432	3,951	216	93	10,622	4,496
1960	967	355	5,069	4,475	1008	124	7,044	4,954
1961	969	250	5,685	4,001	478	100	7,132	4,351
1962	2,818	577	9,092	5,709	2432	117	14,342	6,403
1963	3,708	873	19,114	12,727	1110	152	23,932	13,752
1964	3,570	943	17,881	8,579	1203	366	22,654	9,888
1965	2,236	716	14,138	8,397				
1966	1,966	615	9,490	8,397				
1967	1,139	308	7,166	8,214				
1968	2,361	582	6,075					
1969	1,462	399	9,139	7,745				

1970	2,476	555	6,473	4,879	1102	793	10,051	6,227
1971	1,382	593	3,015	na				
1972	673	328	4,344	4,127				
1973	1,044	462	6,069	5,338	521	747	7,634	6,547
1974	869	460	6,858	6,872	774	886	8,501	8,218
1975	2,652	889	9,424	7,749	902	999	12,978	9,637
1976	3,031	986	9,949	9,949				
1977	2,964	1,170	10,982	9,942	794	713	14,740	11,825
1978	2,453	1,402	7,861	7,065				
1979	2,338	1,455	11,950	10,396				
1980	1,781	1,494	9,009	8,753				
1981	3,918	2,683	15,430	11,413				
1982	1,843	1,386	10,487	4,887				
1983	833	1,100	2,618	3,690				
1984	3,858	1,541	5,168	5,302	407	149	9,433	6,992
1985	3,874	1,471	13,777	7,755	454	197	18,105	9,423
1986	3,481	1,117	9,110	6,162	376	110	12,967	7,389
1987	2,141	905	3,418	2,912	184	116	5,743	3,933
1988	*3,421*	*1,336*	8,164	5,721	569	246	12,154	7,303
1989	*2,782*	*1,006*	9,099	7,569	254	191	12,135	8,766
1990	1,297	512	3,507	4,593	173	142	4,977	5,247
1991	1,679	610	9,862	3,765	269	194	11,810	4,569
1992	489	262	5,210	4,515	81	102	5,780	4,879
1993	473	182	5,250	5,153	227	136	5,950	5,471
1994	1,048	318	7,631	4,783	482	127	9,161	5,228
1995	473	182	8,630	6,392	120	132	9,223	6,706
1996	94	34	2,225	2,254	136	85	2,455	2,373
1997	611	89	4,460	3,819	120	114	5,191	4,022
1998	135	33	3,158	3,020	192	104	3,485	3,157
1999	1,733	345	7,603	3,750	182	152	9,518	4,247
2000	616	89	2,572	1,915	81	99	3,269	2,103
2001	501	203	3,335	2,148	272	177	4,108	2,528
2002	*702*	*159*	2,615	3,036	317	181	3,634	3,376
2003	*132*	*90*	1,617	1,879	90	80	1,839	2,049
2004	*64*	*66*	1,524	1,766	81	70	1,669	1,902
2005	*255*	*302*	417	962	93	104	765	1,368
2006	*427*	*360*	1,186	1,536	123	114	1,736	2,010
2007	*266*	*344*	2,687	2,203	60	106	3,013	2,653
2008	*927*	*450*	2,941	1,938	145	142	4,013	2,530
2009	*287*	*361*	2,687	2,203	60	106	3,034	2,670
2010	*472*	*423*	2,150	2,023	63	94	2,685	2,540

This tabulation relies on an unpublished report by Agostino, which in turn used internal forestry reports. Several errors and uncertainties must be noted. First, in the major fire years of fiscal 1946 and 1948, the reports did not include the largest fires in their tables, ostensibly because they were awaiting “final data”. The estimated areas of those fires were noted in a footnote but not tallied in the Agostino tabulation. From the record it seems that “final data” never came, though a search of files might unearth it. IN the tables and charts for this report, the estimates on these largest fires are inserted into the proper fiscal years. There are several likely typos to be noted: The number of fires for 1965 and 1966 are identical; also, for 1976, the area burned and number of fires are identical numbers. These numbers are used, however, in this report.

Appendix Table 2.

Monthly and Annual Data, 1945-1949. The annual totals here do not match those in previous table as they are on a calendar year basis while above table is fiscal years.

Massachusetts Fire Outbreaks of 1946 and 1947 --Corrected Data							
	Months						
	1945	**1946**	**1947**	**1948**	**1949**	Month Totals	Percent
Jan	3	11	26	0	82	122	0.2%
Feb	16	16	694	0	35	761	1.0%
Mar	1,671	3,977	1,131	326	1,282	8,387	11.1%
Apr	7,224	27,400	1,570	1,325	1,714	39,233	51.8%
May	217	1,552	1,346	762	516	4,393	5.8%
June	38	39	28	14	382	501	0.7%
july	50	174	23	13	387	647	0.9%
aug	26	17	24	42	506	615	0.8%
sep	9	6	22	656	54	747	1.0%
oct	81	52	19,280	100	186	19,699	26.0%
nov	50	77	54	144	130	455	0.6%
Dec	0	141	100	8	1	250	0.3%
							0.0%
totals	9,385	33,462	24,298	3,390	5,275	75,810	100.0%
Mar & Apr	8,895	31,377	2,701	1,651	2,996	47,620	
% Mar & Apr	95%	94%	11%	49%	57%	63%	
	Note: this table presents data formatted to calendar years and						
	corrected from previous tabs which inadvertently omitted the						
	largest fires of 1946 and 1947.						

Hard to find map – here for ref.