Minnesota Department of Natural Resources

Fiscal Year 2016

Annual Report on Emergency Firefighting Expenditures

Foss Lake Fire, St. Louis County

DEPARTMENT OF NATURAL RESOURCES

Department of Natural Resources
Fiscal Year 2016 Report on Emergency Firefighting Expenditures

Executive Summary

Expenditures of state general funds for wildfire protection and emergency response by the Department of Natural Resources (DNR) totaled $24,449,145 in Fiscal Year 2016 (FY16). This included a demand on the Emergency Firefighting Open Appropriation of $17,709,549.

The state entered fall and winter of 2015 with near normal seasonal precipitation amounts. Drought was present in the northwestern part of Minnesota. Winter precipitation was above normal and Minnesota started the spring of 2016 with near normal conditions. The spring was marked by timely precipitation events that kept fire danger low until a significant run of fire weather during May 2016.

Mid-April and mid-May were notable for their rapid development of a period of very high to extreme fire danger. Statewide, Red Flag warnings were issued on 13 different days from April 9 to May 22. Of particular note, north central Minnesota had six different Red Flag events during this period, which is significantly above the 10-year average of three to four Red Flag events per year.

The 864 fires responded to by the DNR in FY16 burned 9,310 acres in Minnesota, considerably under the 20-year average of 35,051 acres.

The Division utilizes a mixture of ground and aerial resources to suppress fires. The ground fleet is composed of 207 engines and 46 tracked vehicles designed to access off-road and remote areas. Similarly, the Division uses several types of aircraft to provide tactical aerial firefighting support and intelligence to ground firefighters.

In FY16, the DNR responded with tactical firefighting aircraft to over 350 requests on more than 140 wildfires. In FY16, the DNR used a mix of aircraft procured under Exclusive Use and Call-When-Needed contracts, aircraft owned/operated by the Division, and aircraft obtained through interagency and partnership agreements.

Minnesota exchanged mutual aid support with multiple states and federal and provincial partners during the FY16 wildfire season. These reciprocal working relationships continue to be a critical response resource and opportunity for offsetting a portion of Minnesota's fire costs.

Department of Natural Resources
Annual Report on Emergency Fire Expenditures

Fiscal Year 2016

Purpose

The purpose of this report is to address the requirements of Minnesota Laws 2015, First Special Session, Chapter 4, Article 3, Section 3, Subdivision 4 which states in part:

> "By January 15 of each year, the commissioner of natural resources shall submit a report to the chairs and ranking minority members of the house and senate committees and divisions having jurisdiction over environment and natural resources finance, identifying all firefighting costs incurred and reimbursements received in the prior fiscal year."

State Funding for Emergency Firefighting

Emergency Firefighting Direct Appropriation: Laws of 2015 appropriated $7,145,000 the first year and $7,145,000 the second year for prevention, presuppression, and suppression costs of emergency firefighting and other costs incurred under *Minnesota Statutes,* section 88.12.

Emergency Firefighting Open Appropriation: Laws of 2015 further state in part that "the amount necessary to pay for presuppression and suppression costs during the biennium is appropriated from the general fund."

Under the authority of the Open Appropriation during Fiscal Year 2016 (FY16), $17,709,549 was expended.

Attachment 1 *shows state firefighting expenditures broken down between salary and operating costs.*

Reimbursements to the General Fund

Payments and Collections: The Department of Natural Resources (DNR) receives payments for certain fire-related activities. These include payments for supplies sold to local government units (e.g., fire departments) from the Interagency Fire Cache (Cache Sales authorized under *Minnesota Statutes,* section 88.065) and collections from responsible parties for starting illegal or negligent fires (Fire Cost Collections authorized under *Minnesota Statutes,* section 88.75). These receipts are deposited directly to the General Fund and are not used by the DNR.

In FY16, receipts came from the following sources:

- Cache Sales $175,526
- Fire Cost Collections $453,133

Special Revenue Fund: This is a temporary use of the state emergency fire appropriations and is included for complete disclosure. The DNR provides firefighters and aircraft to assist federal partners in-state, mobilizes firefighters for out-of-state assistance with national wildfire emergencies, and assists Great Lakes Forest Fire Compact partners. These costs are initially charged to the Emergency Fire Special Revenue Fund and reimbursement for dollars spent is invoiced as soon as practical. **During FY16, the DNR expended $4,370,469 of reimbursable costs for national mobilizations and Compact support.** The federal government reimburses federal costs and Fire Compact partners (adjoining states and Canadian provinces) reimburse their costs as well.

The Special Revenue Fund may be reimbursed above actual costs from out-of-state deployments. The revenue is generated by out-of-state mobilizations of equipment such as wildland fire engines and includes a portion of the fixed costs associated with this equipment. Fixed costs are paid from the emergency firefighting appropriation. Excess recovery revenue is periodically transferred to the General Fund; however, no transfer was made in FY16.

Total Reimbursement to the General Fund in FY16 from All Sources

• Cache Sales	$ 175,527
• Fire Cost Collections	$ 453,133
• Special Revenue, Excess Recovery	$ 0
• **Total**	**$ 628,660**

Fire Suppression and Presuppression

The success of the DNR's fire suppression strategy is largely due to aggressive initial attack. The goal is to keep fires small. Once a fire escapes initial attack, costs and damages increase exponentially.

Preparedness and suppression activities work together to reduce wildfire damages. Presuppression levels move on a continuum that is proportional to fire danger. Presuppression costs include activities undertaken in advance of fire occurrence to ensure more effective suppression. These activities include overall planning, recruitment and training of personnel, procurement of firefighting equipment and contracts, and maintenance of equipment and supplies. Suppression costs include activities that directly support and enable the DNR to suppress wildfires during times when fires are likely to occur, including the prepositioning of resources. As fire danger and fire occurrence increase, the resources that must be positioned for immediate response also increase. **Presuppression costs amounted to 36.4% of the direct and open fire appropriations in FY16.**

The DNR cost-coding structure provides accountability for fire expenditures. Costs are tracked by type of activity and location (to the administrative area level).

Attachment 2 *shows the percentages of fire expenditures allocated to prevention, presuppression, and suppression activities.*

Attachment 3 *shows the 10-year fire expenditure history.*

Planning and Readiness
Base costs for wildfire response are affected by general weather and precipitation patterns in addition to actual fire occurrence. A system for determining potential wildfire risks and establishing fire planning levels is used to guide the level of readiness week to week.

Attachment 4 *shows the criteria and planning levels currently in use.*

These planning level guidelines are reviewed and implemented at bi-weekly conference calls with fire managers from all agencies cooperating in Minnesota wildfire suppression efforts. The planning level, combined with daily fire danger indices, establishes the preparedness level needed to effectively respond to wildfires. Historically, about 80% of the state's wildfires occur during Planning Level III. Major fires also can and do occur at this level. FY16 had 269 days of possible wildfire danger, which is above average. Of the possible fire days, 72 were at Planning Level III or IV and 9 days had conditions that reached the highest planning level; Planning Level V.

Fire Occurrence and Causes

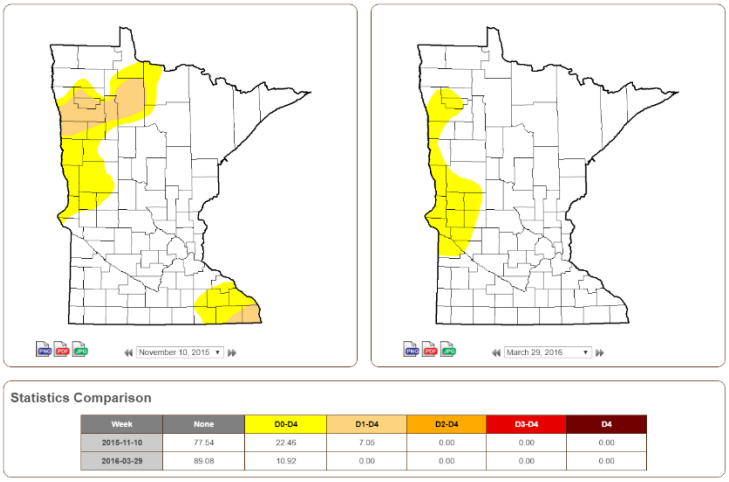
General Activity: In FY16, there were 864 fires which burned 9,310 acres. Historically, the state has experienced a 20-year average of 1,268 fires, burning about 32,051 acres annually.

Number of Fires By Cause				
	FY 2016	%	20 Yr. Ave.	%
Debris Burning	314	36%	446	35%
Incendiary/Arson	171	20%	366	29%
Misc./Unknown	164	19%	167	13%
Equipment Use	138	16%	134	11%
Campfires	43	5%	51	4%
Lightning	15	2%	21	2%
Smoking	14	2%	33	3%
Railroad	5	1%	50	4%
Total	864	100.0%	1268	100.0%

Attachments 5a and 5b *graphically illustrate fire history and causes.*

Fire Behavior and Climatology

The state entered fall and winter of 2015 with near-normal seasonal precipitation amounts. Drought was present in the northwestern part of Minnesota. Winter precipitation was above normal and Minnesota started the spring with near-normal conditions. The spring was marked by timely precipitation events that kept fire danger low until the significant run of fire weather during the month of May 2016.



Week	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
2015-11-10	77.54	22.46	7.05	0.00	0.00	0.00
2016-03-29	89.08	10.92	0.00	0.00	0.00	0.00

Normal to above-normal precipitation in the fall and winter of 2015 continued into the spring of 2016. About 22% of Minnesota was categorized as abnormally dry and 11% as moderate drought in November 2015. With above-normal precipitation, conditions improved into abnormally dry in only 11% of the state. The winter precipitation was 140% of average and temperatures remained slightly above normal.

Mid-April and mid-May 2016 were notable for their rapid development of a period of very high to extreme fire danger. Statewide there were Red Flag warnings issued on 13 different days from April 9 to May 22. Of particular note, north central Minnesota had six different Red Flag events during this period, which is significantly above the 10-year average of three to four Red Flag events per year.

The remainder of the spring into summer was marked by timely rainfall. Several record-setting rain events occurred producing one of the wettest summers on record for Minnesota.

To improve fire weather forecasting and preparedness, three more Remote Automatic Weather Stations (RAWS) were modified to the new Tri-leg format. This allows for easier maintenance and location changes, if necessary. The remaining stations will be modified to the new format in 2017. There are still 37 RAWS in Minnesota used for fire danger predictions and monitoring.

Cooperative Fire Response

In July through October of 2015, one of the most intense fire seasons on record to the western United States continued. Nationally, there was a critical shortage of resources to fight the fires. While the national fire activity in the summer of 2016 was considerably less than that of 2015, the DNR was still very active sending firefighting resources out of state. The DNR and other Minnesota Incident Command System (MNICS) agencies responded by mobilizing crews, aircraft, and overhead personnel to other portions of the country. These requests are supported through mutual aid agreements, with costs reimbursed to the state.

The DNR sent 140 regular agency state employees and 100 casual firefighters to aid in out of state firefighting efforts. They primarily worked on fires in California, Arizona, Washington, Colorado, Idaho, Montana, Wyoming, Utah, and Oregon.

In addition to aiding in firefighting efforts, the cooperative fire response also provides valuable training for Minnesota state personnel.

Note: Out-of-state firefighting assistance to other jurisdictions is reimbursed to Minnesota by the receiving partner agencies.

Interagency Fire Crew

Interagency All-Hazard Response

In early July 2015, a major windstorm created extensive damage in the Brainerd Lakes region with downed trees and power lines. The storm left several resorts and campgrounds devastated. The Minnesota Interagency Fire Center (MIFC) supplied 17 individuals to assist with blowdown clean-up in the Pillsbury State Forest. Additional requests for assistance were not received.

The DNR has an agreement with the MN Department of Health to utilize MNICS Incident Management Teams (IMTs) to manage receiving and distribution sites should the Strategic National Stockpile (SNS) be activated. The Center for Disease Control maintains the SNS which consists of large quantities of medicine and medical supplies to be made available if there is a public health emergency (e.g., terrorist attack, flu outbreak, or earthquake) severe enough to cause local supplies to run out. This past year, the MNICS teams participated in a drill to test for preparedness and look for potential improvements. The drill was a success and several recommendations resulted to improve the IMT response in the event of activation.

In-state Wildfire Response

As stated above, 864 fires responded to by the DNR in FY16 burned 9,310 acres in Minnesota, considerably under the 20-year average of 35,051 acres.

The DNR responded to numerous wildfires throughout the state. The current mix of aircraft, continued partnerships, and attention to wildfire preparedness helped keep the fires small and allowed most fires to be controlled within a 24-hour period.

Engine on initial attack, Lake Hattie fire, Beltrami County

Efforts to reduce the number of arson fires in Minnesota continued in FY16, including the increased presence of firefighting resources in problem areas and improved detection of fire starts via aerial detection and the ForestWatch system. The number of arson fires remain below the 20 year average.

Fire Fighting Fleet

The DNR maintains a fleet of engines and tracked vehicles. Engines are medium to large-sized pickup trucks, customized for wildland firefighting. They are deployed for firefighting on mostly dry, upland sites. Engines are driven directly to fire sites.

Tracked vehicles are custom built firefighting units driven by two endless metal belts, or tracks. They are designed to fight fires on wet to very wet sites, such as swamps. The DNR uses two basic models of tracked vehicles, the J-5 and the Muskeg. They are positioned on trailers and towed to a fire site.

Type 6 engine towing J-5 tracked vehicle

Engines - Many Forestry areas use heavy-duty half-ton trucks. These units are less expensive (both base and operating rates) than larger sized engines, yet serve as a maneuverable initial attack unit when equipped to handle a small slip-on (water tank and pump). The 1¼ ton medium pickup trucks are being replaced with 1½ ton medium pickups. Compared to the 1¼ ton truck, the 1½ ton offers additional capacity while the overall increase in cost is negligible. Fifteen trucks are being replaced in 2017. There was no truck fleet expansion in 2016.

Type	Size	Number
T7	½ ton HD	36
T6	1 ton	110
T6 – Service Body	1-¼ ton	36
T6 – Service Body	1-½ ton	9
T4	3 ton	16
Total Engines		207

Tracked Vehicles - The DNR fleet of 46 tracked vehicles is quickly aging. Maintenance of these machines is becoming costly and time consuming as parts are becoming harder to find. Indeed, the state is still operating a unit that was manufactured in 1972. Twelve J-5 vehicles in active status were manufactured in 1988. The newest J-5 vehicles were manufactured in 2008.

To update the fleet, the DNR has entered in to a contract with a manufacturer that will deliver three new J-5 style tracked vehicles; the first will be delivered in 2017. A similar situation exists in the muskeg fleet. The oldest muskeg was manufactured in 1993, and 8 of 11 total units were manufactured in or prior to 2006. The DNR Management Resources will begin developing a Request for Proposals for muskeg replacements early in 2017. If a successful bidder is found, replacement units could be delivered as early as 2019.

Type	Model	Number
J-5	Bombardier	14
J-5	Camoplast	21
Total J-5		35
Muskeg	Bombardier	7
Muskeg	Camoplast	1
Muskeg	Crostrack	3
Total Muskeg		11

Firefighting Aircraft

The Division uses several types of aircraft to provide tactical aerial firefighting support and intelligence to ground firefighters. In FY16, the DNR responded with tactical firefighting aircraft to over 350 requests on more than 140 wildfires. In FY16, the DNR used a mix of aircraft procured under Exclusive Use and Call-When-Needed contracts, aircraft owned/operated by the Division and aircraft obtained through interagency and partnership agreements.

The Division operates two light, fixed-wing airplanes that are used for aerial supervision on fires, fire detection, transportation, logistical and administrative support, and aerial photography. These include a Cessna 310 owned by the Division and a Cessna 206 owned by the United States Forest Service (USFS) that is on loan to the State through the Federal Excess Property Program.

In FY16, the Division contracted for four FireBoss airtankers (800 gallon single engine water-scooping), two Single Engine Air Tankers (SEATs - same airframe as the FireBoss but are ground-based airtankers on wheels), eight helicopters with water buckets, three light airplanes used for aerial supervision, and 15 light airplanes used for fire detection and tactical intelligence.

Interagency partnerships continue to be a key part of the Division's aerial firefighting program. The Red Lake Agency, with assistance from the Bureau of Indian Affairs (BIA), provided one helicopter, one FireBoss, and one SEAT in Bemidji. The USFS provided one helicopter and three float planes (Beavers) in Ely. The USFS also provided one CL-415 and three large retardant airtankers, with accompanying supervision aircraft, operating out of bases in Bemidji, Brainerd, Hibbing, and Ely.

The Division also obtains firefighting aircraft when needed from a variety of other sources, including: helicopters from the MN Army National Guard (five Blackhawks with 660 gallon water buckets and two Chinooks with 2,000 gallon water buckets); two helicopters from the MN State Patrol; CL-215s and/or CL-415s and aerial supervision aircraft from the Provinces of Ontario and Manitoba; and additional airtankers and helicopters from Federal agencies on National contracts and paid for by Federal partners.

Rural Fire Department Support

The Division of Forestry's Rural Fire Program (RFP) is a cost effective way of protecting communities, forests, and property for the residents of Minnesota. This program has been effectively and efficiently supporting rural communities of Minnesota for the past 37 years. This cooperative effort provides rural communities with low-cost equipment obtained through an agreement through the USFS, the Department of Defense (DoD), and the DNR Division of Forestry. Since January 2016, over 5,000 pieces of equipment and tools,

Example of DoD equipment to support a rural fire department in MN

including four fire trucks with a combined value of over 4.5 million dollars, were acquired to support Fire Departments and EMS services in the state. In FY 2016, the $220,000 allocated to this program benefited over 200 fire departments and emergency response teams.

The RFP also can purchase specific used equipment from the state fleet program and sell it to requesting communities. Items such as Type 6 engines, radios, and specialized tracked vehicles, are a few examples. In 2016, the state made 10 pieces of equipment available to rural fire departments throughout Minnesota.

Additionally, in cooperation with the USDA Forest Service, the state's Volunteer Fire Assistance (VFA) pass through grant program has been able to stretch budgets of rural communities to purchase much needed firefighter safety response equipment. This year, 206 Minnesota rural fire departments received $343,500 to purchase gear and equipment.

Training is conducted with the firefighters of Minnesota to provide them with the technical expertise to respond and suppress wildfires. Our VFA funding pays the tuition cost of fire departments at the annual Wildfire Academy. In FY16, this program assisted approximately 63 different communities with tuition reimbursement. Program staff assist with delivery of fire training; they also provide technical expertise for fire departments.

Attachments

Attachment 1 – State Fire Expenditures by Object Category for Emergency Fire Appropriations

Attachment 2 – Percentage of State Fire Costs in Prevention, Presuppression, and Suppression

Attachment 3 – Ten-Year Expenditure History of State Firefighting Costs

Attachment 4 - Guideline for Statewide Planning Level Determination

Attachments 5a and 5b – Graphical Representation of Wildfire History and Causes

Attachment 1

Emergency Fire Direct and Open Appropriations
State Expenditures by Category
FY16

Direct Appropriation*	$6,739,596
Open Appropriation	$17,709,549
Total	$24,449,145

Salary Costs	$12,373,818
Operating Costs	$12,075,327
Total**	$24,449,145

* Does not include $227,930 rolled forward to FY17

** Actual expenditures as of 10/03/2016.

Attachment 2

FY16
State Fire Cost Summary

By Type of Activity and Appropriation

	Emergency Firefighting Direct	Emergency Firefighting Open	Total Open and Direct Combined
Fire Prevention	4.2%	0%	**1.2%**
Fire Presuppression	43.0%	33.9%	**36.4%**
Fire Suppression	52.8%	66.1%	**62.4%**
Total	**100%**	**100%**	**100%**

Fire Prevention activities include public information and education, fire permitting, and operation of the Township Fire Warden system, plus advice and assistance to communities and homeowners to inform them about protecting their property in the event of a wildfire in their community (Firewise).
State Fire Prevention activities are supplemented by annual grants from the USDA Forest Service as follows:

- State Fire Assistance – approximately $600,000 (supports fire prevention and readiness).
- Volunteer Fire Assistance – approximately $300,000 (supports Rural Fire Department readiness).
- Cooperative Fire Assistance – approximately $300,000 (supports Firewise – Community Fire Protection activities).

Fire Presuppression includes activities undertaken in advance of fire occurrence to ensure more effective suppression. These activities include: overall planning, recruitment and training of personnel, procurement of firefighting equipment and contracts, and maintenance of equipment and supplies.

Fire Suppression includes direct action to suppress wildfires and other activities that directly support and enable the DNR to suppress wildfires during times when fires are likely to occur, including the prepositioning of firefighting resources.

Attachment 3: Ten-Year Expenditure History – State Firefighting Costs

Nominal Dollars By Source of Funds		FY 2007	FY 2008	(b)	FY 2009	(c)	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	10 Year Average
Emergency Fire-Direct		$7,319,596	$6,938,928		$7,388,440		$7,109,695	$6,928,432	$7,066,975	$7,184,311	$6,918,792	$7,363,656	$6,739,596	$7,095,842
Emergency Fire-Open		$16,518,294	$12,221,642		$11,695,791		$13,873,176	$8,558,008	$17,303,580	$23,373,476	$15,008,912	$18,971,895	$17,709,549	$15,523,432
Fire Activity Total		$23,837,890	$19,160,570		$19,084,231		$20,982,871	$15,486,440	$24,370,555	$30,557,787	$21,927,704	$26,335,551	$24,449,145	$22,619,274
Cost Recovery	(a)	$1,893,112	$3,636,908		$3,058,986		$3,007,734	$2,610,699	$1,523,872	$3,426,210	$602,622	$1,032,502	$628,660	€ $2,142,131
Net Cost to General Fund		$21,944,778	$15,523,662		$16,025,245		$17,975,137	$12,875,741	$22,846,683	$27,131,577	$21,325,082	$25,303,049	$23,820,485	$20,477,144
Reimbursable Mobilization Fire Costs	(d)	$4,317,572	$2,442,486		$2,014,520		$2,125,711	$2,204,635	$4,913,097	$4,451,095	$1,806,396	$2,106,290	$4,370,469	$3,075,227

(a)Fire Cache Sales, Fire Cost Collections, Permanent School Trust Fund - protection services reimbursement, excess recovery from Special Revenue Fund. Beginning in FY 02, Cost Recoveries were deposited to the general fund. In FY 10, School Trust Fund protection services were included retroactive to FY 2001. FY 2013 was the last year School Trust Funds were applied.

(b) $600,000 direct fire support that had been funded through the forest management account, moved to the emergency fire appropriation in FY 08

(c) $600,000 leave time (vacation, sick leave) attributable to fire activity that had been funded through the forest management account, moved to the emergency fire appropriation in FY 09.

(d) This is not a state Expenditure. Fire assistance to federal partners and other states that is reimbursed to the state. State CL-215 firefighting aircraft were sold in Janurary 2015.

(a) Cost Recovery Breakout $ 629,660

Fire Cost Collections -	$ 453,133
Fire Cache Sales -	$ 175,527
Excess Recovery, Sp. Rev.	$ 0

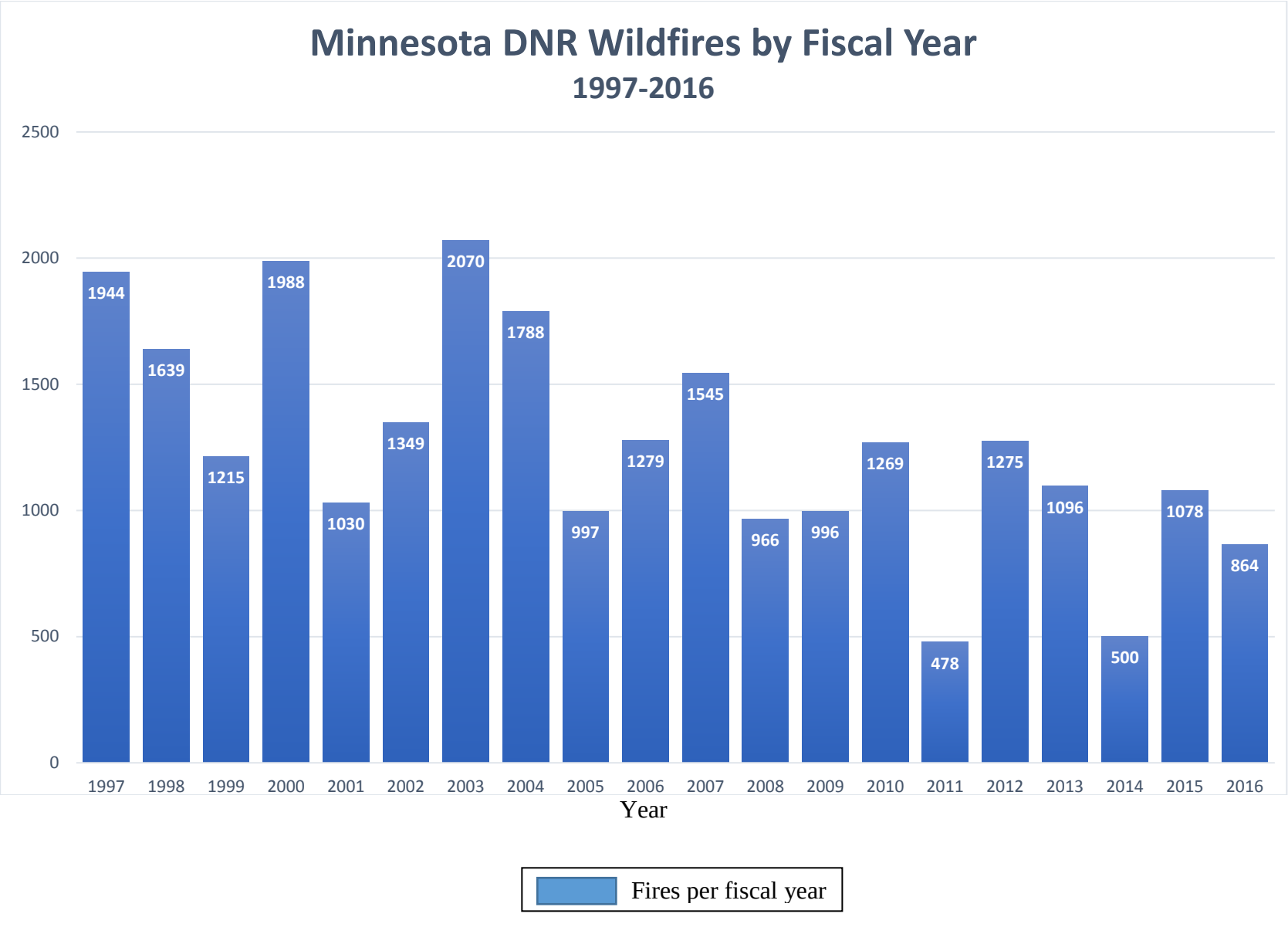
Note the major reduction in Cost recovery from previous years is due to School Trust Fund protection services no longer being included

ATTACHMENT 4 A GUIDELINE FOR STATEWIDE WILDFIRE PLANNING LEVEL DETERMININATION

	PLANNING LEVEL I	**PLANNING LEVEL II**	**PLANNING LEVEL III**	**PLANNING LEVEL IV**	**PLANNING LEVEL V**
BI (Q) spring, pre-green, floating 5 day average	Not applicable	0-45	46-70	71-95	96+
BUI (**after June 1**, floating 5 day average)	Not applicable	0-25	26-50	51-67	68+
ERC (Q) (alternate summer/fall indicator, after June 1, floating 5 day average)	Not applicable	0-15	16-29	30-36	37+
8-14 day Weather Forecast	Winter conditions, most of State snow covered, temps below freezing.	Normal conditions for season, adequate precip. expected	Less than normal precip. and RH, higher than normal temps forecast	Dry weather patterns persisting, no change forecast	Dry pattern intensifying. Unstable weather forecast leading to extreme fire behavior conditions.
MN Regional Planning Levels	All Regions/Agencies at P.L. I	One or more Regions/Agencies at P.L. II	Two or more Regions/Agencies at P.L. III	Two or more Regions/Agencies at P.L. IV	Two or more Regions/Agencies at P.L. V
Eastern Area Planning Level	I	I-II	I-III	I-IV	I-IV
National Planning Level	I-II	I-III	I-IV	I-V	I-V
Fire Occurrence (Initial Attack)	Rare, infrequent fire occurrence	Fires reported in scattered Areas. Generally less than 10 fires/day statewide.	Multiple Areas/Agencies reporting fires. 10 to 20 fires/day Statewide	Multiple Areas/Agencies reporting fires. 20 to 30 fires/day Statewide	Multiple Areas/Agencies reporting fires. 30+ fires/day statewide.
Fire Occurrence (Escaped fires)	None	None	1-2 fires requiring extended attack Statewide (with active fire)	3-5 fires requiring extended attack Statewide	5+ fires requiring extended attack Statewide
Sociopolitical Considerations	Statewide or Regional events such as fishing opener or the Fourth of July; natural events such as floods or windstorms; other unexpected or unusual events that may have large scale impacts should be considered.				
Resource Availability	Normal complement of personnel.	No shortages expected.	Moderate demand for some in-state resource types expected	Shortage of certain in-state resource types	Most in-state resources committed. Out-of-State assistance necessary.
In-State Mobilization	None	Less than 5% of statewide resources assigned out of home unit.	Some short term movement occurring, 5-10% of statewide resources assigned out of home unit.	10-20% of statewide resources assigned out of home unit.	20%+ of statewide resources assigned out of home unit.
Out-of-State Mobilization	If out-of-State mobilization is occurring or anticipated to occur, an 'A' designator will be applied at the current Planning Level.				

- Once Planning Level III has been reached in the spring, preparedness will not drop below that level until May 31 or later.
- Terms used above, which are calculated daily from weather and fuel measurements:
  - BI (Q) = **Burning Index**, fuel model Q: A measure of fire danger based on the probability of ignition and fire spread in a specified forest type.
  - BUI = **Build Up Index**: An indication of the dryness of larger sized woody fuels, which becomes a significant factor during a drought.
  - ERC (Q) = **Energy Release Component**, fuel model Q: A measure of the expected heat release from a fire, which will be experienced by firefighters on the fire line.

Attachment 5a



Attachment 5b