

## Fire Equipment Development Needs

### Ratings for All Respondents Combined - Presented in Questionnaire Order

**Total ALL Questionnaire Responses = 666**

N = Number of Persons Responding to Each Question

	N	Overall Average	Males	Females
1 What government agency do you work with:				
2 Which agency do you work with:				
3 What state is your office in:				
4 What wildland fire organization are you attached to:				
5 What is your job title:				
6 Top 3 red card qualifications you fill during fire season:				
7 Years of experience in wildland fire protection:	666	16.6		
8 Gender:	654		591	63
9 Weight in pounds:	666	183.4		
10 Height in inches:	666	68.0		

See PowerPoint pie charts for statistical details on these first 10 variables.

N = Number of Persons Responding to Each Question

Rating Categories	N	Total Number Each Category			Valid % Each Category			Overall Average
		No Need	Low Priority	High Priority	No Need	Low Priority	High Priority	

Please rate the degree of need for development of new products or technology:

AERIAL OPERATIONS									
11a	Greater Consistency of drop height for airtankers.	518	62	383	73	12.0%	73.9%	14.1%	2.17
11b	Produce more consistent, accurate drop patterns.	521	46	374	101	8.8%	71.8%	19.4%	2.41
11c	Produce more consistent fixed wing drop patterns.	518	52	370	96	10.0%	71.4%	18.5%	2.35
11d	Deliver/retrieve fire supplies without landing.	528	70	316	142	13.3%	59.8%	26.9%	2.45
11e	Increase capacity Type 1 helicopter water drops.	520	105	319	96	20.2%	61.3%	18.5%	2.07
11f	Increase capacity Type 1 helicopter bucket drops.	517	108	308	101	20.9%	59.6%	19.5%	2.08
11g	Improve Type 1 helicopter/helibucket performance.	520	70	316	134	13.5%	60.8%	25.8%	2.41
11h	Increase accuracy Type 2 & 3 helicopter drops.	528	63	345	120	11.9%	65.3%	22.7%	2.39
11i	Increase capacity Type 2 & 3 helicopter bucket drops.	526	76	347	103	14.4%	66.0%	19.6%	2.29
11j	More accurate Type 2 & 3 helicopter bucket drops.	528	64	340	124	12.1%	64.4%	23.5%	2.42
11k	Increase capacity Type 2 & 3 helicopter bucket drops.	518	75	341	102	14.5%	65.8%	19.7%	2.26
11l	Improve reliability/quality of helicopter water bucket.	517	58	337	122	11.2%	65.2%	23.6%	2.41
11m	Improve quality flight helmet microphones/pigtails.	518	69	282	167	13.3%	54.4%	32.2%	2.56
11n	Develop cold weather flame-resistant flight suits.	508	81	286	141	15.9%	56.3%	27.8%	2.38
11o	Develop cold weather personal protective accessories.	517	52	255	210	10.1%	49.3%	40.6%	2.88
11p	More comfortable flame-resistant flight flight suits.	503	101	310	92	20.1%	61.6%	18.3%	2.06
11q	Develop contaminant-free helicopter fuel storage.	480	61	305	114	12.7%	63.5%	23.8%	2.40
11r	Improved helicopter seats to reduce spine injuries.	501	39	243	219	7.8%	48.5%	43.7%	3.06

11s	Develop multipurpose collapsible litter f/helicopters.	498	47	299	152	9.4%	60.0%	30.5%	2.71
11t	Improve mixing, handling, transport of retardants.	479	72	318	89	15.0%	66.4%	18.6%	2.16
11u	Improve quality of the flight helmet.	497	76	305	116	15.3%	61.4%	23.3%	2.31
11v	Improve environmental management of chemicals.	486	72	319	95	14.8%	65.6%	19.5%	2.14
11w	Improve snorkel systems for helitankers.	459	80	310	69	17.4%	67.5%	15.0%	2.00
11x	Improve aerial ignition systems for prescribed burns.	506	41	271	194	8.1%	53.6%	38.3%	2.92
11y	Improve rappel hardware for available helicopters.	458	78	273	107	17.0%	59.6%	23.4%	2.28
11z	Develop equipment for helibase management facilities.	467	74	280	113	15.8%	60.0%	24.2%	2.36

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ENGINES AND WATER TENDERS		N	Total Number Each Category			Valid % Each Category			Overall Average
			No Need	Low Priority	High Priority	No Need	Low Priority	High Priority	
13a	Improve compressed air foam systems.	563	45	323	195	8.0%	57.4%	34.6%	2.84
13b	Reduce noise levels for apparatus operations.	586	28	269	289	4.8%	45.9%	49.3%	3.29
13c	Improve engine mobility in rough and steep terrain.	595	15	286	294	2.5%	48.1%	49.4%	3.35
13d	Develop standardized engines across agencies.	600	63	214	323	10.5%	35.7%	53.8%	3.29
13e	Improve engines to meet HAZMAT exposure.	575	37	302	236	6.4%	52.5%	41.0%	3.00
13f	Improve storage capacity for equipment on engines.	593	22	258	313	3.7%	43.5%	52.8%	3.39
13g	Improve long-term chemical suppressants/equipment.	581	31	322	228	5.3%	55.4%	39.2%	3.00
13h	Improve electronic identifiers/locators for engines.	586	56	301	229	9.6%	51.4%	39.1%	2.84
13i	Develop a standardized family of engines.	593	39	219	335	6.6%	36.9%	56.5%	3.42
13j	Improve aspirated air proportioner foam system.	571	38	301	232	6.7%	52.7%	40.6%	2.98
13k	More clearly define role of water tenders in engines.	579	63	321	195	10.9%	55.4%	33.7%	2.70
13l	Include more safety features in engine design.	576	35	308	233	6.1%	53.5%	40.5%	3.02
13m	Improve foam application equipment for engines.	582	27	273	282	4.6%	46.9%	48.5%	3.24

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FOAM APPLICATION EQUIPMENT		N	Total Number Each Category			Valid % Each Category			Overall Average
			No Need	Low Priority	High Priority	No Need	Low Priority	High Priority	
15a	Improve application rate info for foam applicators.	546	47	336	163	8.6%	61.5%	29.9%	2.72
15b	Develop a towable foam application unit.	547	159	307	81	29.1%	56.1%	14.8%	1.76
15c	Improve specs and selection guide for foam systems.	546	51	347	148	9.3%	63.6%	27.1%	2.62
15d	Improve chemical suppressants f/engines & equipment.	555	45	304	206	8.1%	54.8%	37.1%	2.91

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WATER HANDLING EQUIPMENT		N	Total Number Each Category			Valid % Each Category			Overall Average
			No Need	Low Priority	High Priority	No Need	Low Priority	High Priority	
17a	Modify an All Terrain Vehicle to carry water.	589	48	281	260	8.1%	47.7%	44.1%	3.04
17b	Develop high-capacity hose maintenance equipment.	562	63	366	133	11.2%	65.1%	23.7%	2.46
17c	Develop identification system for marking fire hose.	549	59	374	116	10.7%	68.1%	21.1%	2.35
17d	Modify sprinkler technology to contain a fire.	573	43	333	197	7.5%	58.1%	34.4%	2.85

17e	Improve chemical suppressants used w/water equip.	573	44	321	208	7.7%	56.0%	36.3%	2.87
17f	Develop delivery systems f/ground chemical suppressants	566	48	355	163	8.5%	62.7%	28.8%	2.64
17g	Improve information on ground application rates.	556	50	382	124	9.0%	68.4%	22.3%	2.47
17h	Expand line of water handling accessories.	554	37	310	207	6.7%	56.0%	37.4%	2.93
17i	Improve lightweight hose with rugged characteristics.	588	12	187	389	2.0%	31.8%	66.2%	3.80
17j	Improve quick coupling fittings.	584	107	217	260	18.3%	37.2%	44.5%	2.86

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DOZER AND TRACTOR PLOWS		N	Total Number Each Category			Valid % Each Category			Overall Average
			No Need	Low Priority	High Priority	No Need	Low Priority	High Priority	
19a	Systems to correct environmental damage by dozers.	516	46	266	204	8.9%	51.6%	39.5%	2.95
19b	Improve communications with the dozer operator.	531	6	105	420	1.1%	19.8%	79.1%	4.11
19c	Protection of dozer operator from smoke and dust.	517	9	169	339	1.7%	32.7%	65.6%	3.76
19d	Improve towable cargo and water hauling capacity.	501	37	294	170	7.4%	58.7%	33.9%	2.84
19e	Develop a dozer blade to cut a narrower fireline.	510	94	260	156	18.4%	51.0%	30.6%	2.47
19f	Develop alternative construction techniques f/dozers.	505	59	293	153	11.7%	58.0%	30.3%	2.69
19g	Develop foam capacity for dozers.	504	95	294	115	18.8%	58.3%	22.8%	2.19
19h	Develop dozer brush rakes to construct control lines.	502	48	281	173	9.6%	56.0%	34.5%	2.79
19i	Improve dozer safety equipment.	497	16	210	271	3.2%	42.3%	54.5%	3.50
19j	Improve dozer identifier and locators.	500	26	225	249	5.2%	45.0%	49.8%	3.26
19k	Develop a fireline burnout system for dozer plows.	488	58	274	156	11.9%	56.1%	32.0%	2.65

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LINE CONSTRUCTION AND MOP-UP		N	Total Number Each Category			Valid % Each Category			Overall Average
			No Need	Low Priority	High Priority	No Need	Low Priority	High Priority	
21a	System to mark fireline on ridges & canyons from the air.	572	66	293	213	11.5%	51.2%	37.2%	2.77
21b	Develop standardized color-coded flagging for trees.	602	56	187	359	9.3%	31.1%	59.6%	3.50
21c	Develop means of cutting through heavy down fuels.	572	49	276	247	8.6%	48.3%	43.2%	3.01
21d	Transportable lightweight mechanical line digger.	580	112	264	204	19.3%	45.5%	35.2%	2.53
21e	Hand tools that are more effective and less fatiguing.	593	47	237	309	7.9%	40.0%	52.1%	3.26
21f	Power tools that are more effective and less fatiguing.	591	45	252	294	7.6%	42.6%	49.7%	3.21
21g	Develop lighter, more powerful chain saws.	595	47	223	325	7.9%	37.5%	54.6%	3.34
21h	Improve safety design of tools.	582	69	285	228	11.9%	49.0%	39.2%	2.80
21i	Improve equipment to build fireline w/minimal damage.	590	83	325	182	14.1%	55.1%	30.8%	2.53
21j	Improve the variety of fireline explosives.	565	71	330	164	12.6%	58.4%	29.0%	2.62
21k	Improve selection and capacity of firing devices.	584	27	297	260	4.6%	50.9%	44.5%	3.18
21l	Develop a mechanical line digger.	582	87	298	197	14.9%	51.2%	33.8%	2.64
21m	Develop portable lightweight sprinkler mopup system.	583	60	312	211	10.3%	53.5%	36.2%	2.78
21n	Improve foam technology for mopup.	585	57	310	218	9.7%	53.0%	37.3%	2.86
21o	Improve labor-saving technologies for mopup.	580	47	261	272	8.1%	45.0%	46.9%	3.16
21p	Update catalog on hand-held infrared sensing devices.	579	35	285	259	6.0%	49.2%	44.7%	3.12

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INFO COLLECTION & EVALUATION		N	Total Number Each Category			Valid % Each Category			Overall Average
			No Need	Low Priority	High Priority	No Need	Low Priority	High Priority	
23a	Develop fast, accurate resource location and allocation.	597	22	197	378	3.7%	33.0%	63.3%	3.71
23b	Develop lightweight, portable night vision device.	578	53	310	215	9.2%	53.6%	37.2%	2.90
23c	Improve Global Positioning System to locate persons.	603	16	226	361	2.7%	37.5%	59.9%	3.63
23d	FLIR system to collect fireline imagery at night.	572	23	246	303	4.0%	43.0%	53.0%	3.39
23e	Improve effective use of information dissemination.	579	28	244	307	4.8%	42.1%	53.0%	3.35
23f	Improve fire weather information dissemination.	592	13	191	388	2.2%	32.3%	65.5%	3.79
23g	Improve remote site 24-hour weather monitoring.	573	21	224	328	3.7%	39.1%	57.2%	3.53
23h	Improve use of fire weather data.	577	17	212	348	2.9%	36.7%	60.3%	3.62
23i	Fire detection system for unstaffed lookout towers.	567	79	295	193	13.9%	52.0%	34.0%	2.61
23j	Develop a real-time satellite fire detection system.	575	45	224	306	7.8%	39.0%	53.2%	3.30
23k	Develop maps with latitude and longitude grids.	593	26	190	377	4.4%	32.0%	63.6%	3.68
23l	Develop technology for locating fires from towers.	552	76	299	177	13.8%	54.2%	32.1%	2.58
23m	Develop lightning detection system to predict ignition.	568	45	261	262	7.9%	46.0%	46.1%	3.11
23n	Handheld infrared imager for ground fire location.	569	42	258	269	7.4%	45.3%	47.3%	3.14

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LOGISTICS		N	Total Number Each Category			Valid % Each Category			Overall Average
			No Need	Low Priority	High Priority	No Need	Low Priority	High Priority	
25a	Develop an integrated fire camp electrical system.	584	32	204	348	5.5%	34.9%	59.6%	3.58
25b	Improve methods of insect control around fire camps.	575	54	290	231	9.4%	50.4%	40.2%	2.89
25c	Improve sleeping bags and pads.	590	47	218	325	8.0%	36.9%	55.1%	3.35
25d	Develop one-person sleeping tents.	590	133	263	194	22.5%	44.6%	32.9%	2.42
25e	Fire camp modules for uniformity of equipment.	568	67	317	184	11.8%	55.8%	32.4%	2.71
25f	Improve hot and cold food containers.	566	54	284	228	9.5%	50.2%	40.3%	2.93
25g	Means of getting people/supplies to remote camps.	572	49	249	274	8.6%	43.5%	47.9%	3.12
25h	Improve safety for transporting liquid fuels.	567	43	289	235	7.6%	51.0%	41.4%	3.02
25i	System for tracking and displaying resource allocation.	570	26	248	296	4.6%	43.5%	51.9%	3.36
25j	Design items so they can be easily recycled.	588	39	255	294	6.6%	43.4%	50.0%	3.32

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PERSONNEL		N	Total Number Each Category			Valid % Each Category			Overall Average
			No Need	Low Priority	High Priority	No Need	Low Priority	High Priority	
27a	Improve fire shelters.	607	35	190	382	5.8%	31.3%	62.9%	3.75
27b	Improve single-unit headlamps.	612	24	185	403	3.9%	30.2%	65.8%	3.76
27c	Improve low heat-stress protective clothing.	612	19	179	414	3.1%	29.2%	67.6%	3.85
27d	Improve devices to protect face from radiant heat.	613	28	236	349	4.6%	38.5%	56.9%	3.48
27e	Non-fog goggles with scratch-resistant lenses.	620	17	154	449	2.7%	24.8%	72.4%	3.97

27f	Info on significance of carbon monoxide hazards.	603	27	292	284	4.5%	48.4%	47.1%	3.22
27g	Info on fine particulate hazards during firefighting.	604	25	287	292	4.1%	47.5%	48.3%	3.27
27h	Reduce exposure to smoke with breathing devices.	605	51	314	240	8.4%	51.9%	39.7%	2.91
27i	Improve reflective material for fire safety clothing.	605	48	263	294	7.9%	43.5%	48.6%	3.14
27j	Improve hardhats to meet impact, penetration, heat.	605	49	267	289	8.1%	44.1%	47.8%	3.17
27k	Equipment carrying vest of a tough fishnet fabric.	601	94	304	203	15.6%	50.6%	33.8%	2.62
27l	Improve the fireline pack for hand crews.	612	43	187	382	7.0%	30.6%	62.4%	3.59
27m	Fire-resistant clothing and gear for cold weather.	606	24	166	416	4.0%	27.4%	68.6%	3.85

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			No Need	Low Priority	High Priority	No Need	Low Priority	High Priority	
<b>TRANSPORTATION</b>									
29a	More use of All Terrain Vehicles (ATVs).	605	53	279	273	8.8%	46.1%	45.1%	3.08
29b	Specifications for vehicles for crew transport.	592	36	264	292	6.1%	44.6%	49.3%	3.28
29c	Evaluate suitability of the color of F.S. vehicles.	587	174	217	196	29.6%	37.0%	33.4%	2.29
29d	Establish standard markings and lighting for vehicles.	604	65	221	318	10.8%	36.6%	52.6%	3.22
29e	Improve existing systems to transport liquid fuels.	576	43	302	231	7.5%	52.4%	40.1%	2.99
29f	Develop Off Highway Vehicle (OHV) personnel carrier.	591	84	285	222	14.2%	48.2%	37.6%	2.75

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			No Need	Low Priority	High Priority	No Need	Low Priority	High Priority	
<b>DISPATCHING</b>									
31a	System for tracking and displaying resources.	584	23	201	360	3.9%	34.4%	61.6%	3.70
31b	Improve accountability for cache inventory.	570	31	270	269	5.4%	47.4%	47.2%	3.26
31c	Improve interface between dispatch and vehicles.	575	23	227	325	4.0%	39.5%	56.5%	3.51
31d	Improve means of locating people while off-duty.	580	80	233	267	13.8%	40.2%	46.0%	3.01

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			No Need	Low Priority	High Priority	No Need	Low Priority	High Priority	
<b>COMMUNICATIONS</b>									
33a	Improve communications systems in vehicles.	601	21	184	396	3.5%	30.6%	65.9%	3.77
33b	Improve the hand-held communication system.	609	15	135	459	2.5%	22.2%	75.4%	4.10
33c	Satellite or microwave links to reduce isolation.	604	16	141	447	2.6%	23.3%	74.0%	3.99
33d	VHF repeater for communication with helicopters.	567	30	202	335	5.3%	35.6%	59.1%	3.59
33e	Improve incident repeater systems.	586	19	167	400	3.2%	28.5%	68.3%	3.88
33f	Reduce dead spots in radio communications.	616	12	100	504	1.9%	16.2%	81.8%	4.30
33g	Establish common command channels among agencies.	603	14	156	433	2.3%	25.9%	71.8%	4.01
33h	Improve compatibility of communication equipment.	612	10	99	503	1.6%	16.2%	82.2%	4.32
33i	Improve radio mounts for vehicles.	585	44	303	238	7.5%	51.8%	40.7%	3.05
33j	Establish recycle power source for hand-held radios.	598	35	201	362	5.9%	33.6%	60.5%	3.58

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PREVENTION - GENERAL		N	Total Number Each Category			Valid % Each Category			Overall Average
			No Need	Low Priority	High Priority	No Need	Low Priority	High Priority	
35a	Improve spark arrester systems.	529	94	358	77	17.8%	67.7%	14.6%	2.08
35b	Develop a spark arrester guide.	529	102	334	93	19.3%	63.1%	17.6%	2.10
35c	Inspection process for residences/power lines/equip.	544	51	262	231	9.4%	48.2%	42.5%	2.99
35d	Improve the Smokey Bear suit.	534	158	237	139	29.6%	44.4%	26.0%	2.10
35e	Improve poster material to withstand weather.	540	79	275	186	14.6%	50.9%	34.4%	2.67
35f	Improve visibility of poster material.	530	85	296	149	16.0%	55.8%	28.1%	2.54
35g	Improve content of posters.	533	58	284	191	10.9%	53.3%	35.8%	2.74
35h	Improve resistance of posters to vandalism.	529	84	289	156	15.9%	54.6%	29.5%	2.53
35i	Improve bilingual posters and fire prevention materials.	533	99	289	145	18.6%	54.2%	27.2%	2.40
35j	Improve investigation tools and equipment.	526	34	248	244	6.5%	47.1%	46.4%	3.20
35k	Improve fire prevention audiovisual support equipment.	527	46	281	200	8.7%	53.3%	38.0%	2.91

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FUELS MANAGEMENT		N	Total Number Each Category			Valid % Each Category			Overall Average
			No Need	Low Priority	High Priority	No Need	Low Priority	High Priority	
37a	Info on cost/production of fuel management techniques.	549	30	268	251	5.5%	48.8%	45.7%	3.19
37b	Develop a system to gather and cut firewood/fuelwood.	539	65	277	197	12.1%	51.4%	36.5%	2.74
37c	Efficient method of reducing fuel in young plantations.	544	41	276	227	7.5%	50.7%	41.7%	3.01
37d	Improve ground ignition systems for prescribed burning.	549	38	286	225	6.9%	52.1%	41.0%	3.02
37e	Improve sprinkler technology f/retardant effect of water.	544	44	290	210	8.1%	53.3%	38.6%	2.95
37f	Improve aerial ignition systems.	539	41	266	232	7.6%	49.4%	43.0%	3.13
37g	Improve mixing/application guidelines for fuel gelling.	510	50	272	188	9.8%	53.3%	36.9%	2.83
37h	Develop a king-size (approx. 200 gallons) helitorch.	511	108	290	113	21.1%	56.8%	22.1%	2.11
37i	Develop minimal environmental impact fireline.	537	100	287	150	18.6%	53.4%	27.9%	2.34
37j	Improve material to cover machine and hand piles.	530	73	283	174	13.8%	53.4%	32.8%	2.60
37k	Chemical systems to replace hand line broadcast burning	537	69	268	200	12.8%	49.9%	37.2%	2.74
37l	System to pre-treat leave trees in underburning ops.	532	71	299	162	13.3%	56.2%	30.5%	2.58

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OTHER		N	Total Number Each Category			Valid % Each Category			Overall Average
			No Need	Low Priority	High Priority	No Need	Low Priority	High Priority	
39a	Improve the standard trauma kit.	537	26	267	244	4.8%	49.7%	45.4%	3.31
39b	Improve individual first aid kits.	570	26	220	324	4.6%	38.6%	56.8%	3.52
39c	Improve crew (belt) first aid kits.	558	24	212	322	4.3%	38.0%	57.7%	3.57
39d	Improve mass casualty equipment.	517	43	285	189	8.3%	55.1%	36.6%	2.92
39e	Improve Blood Borne Pathogens (BBP) equipment.	539	36	262	241	6.7%	48.6%	44.7%	3.12
39f	Improve injured employee transport system.	539	30	228	281	5.6%	42.3%	52.1%	3.38
39g	Improve equipment to mitigate HAZMAT exposures.	536	39	263	234	7.3%	49.1%	43.7%	3.12