National Park Service
U.S. Department of the Interior

Fire Management Program Center
Boise, Idaho

Fire Management Program Center

FY2001 Wildland Fire Report

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Cover Picture: Sulfur Fire in Yellowstone National Park on September 27, 2001.
Picture taken by John Cataldo, Former Fire Use Module Crew member.

Prepared By: Dale Miracle, Fire Equipment & Facilities Specialist

National Park Service Regions

The map pictured above depicts the National Park Service regions. The following list identifies the corresponding park clusters serviced by Support Offices (SOs). Not all SOs are staffed with fire management personnel. Support Office fire management staff may support parks from other clusters.

Alaska Region (AKR)
- Alaska Support Office (AKSO)

Intermountain Region (IMR)
- Intermountain Support Office - Denver (IMSO-DE)
- Intermountain Support Office - Santa Fe (IMSO-SF)

Midwest Region (MWR)
- Midwest Support Office (MWSO)

National Capital Region (NCR)
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Northeast Region (NER)
- Allegheny Support Office (ALSO)
- Chesapeake Support Office (CHSO)
- Boston Support Office (NESO)

Pacific West Region (PWR)
- Columbia Cascades Support Office (CCSO)
- Pacific Great Basin Support Office (PGSO)
- Pacific Islands Support Office (PISO)

Southeast Region (SER)
- Appalachian Support Office (APSO)
- Atlantic Coast Support Office (ATSO)
- Gulf Coast Support Office (GCSO)

Regional Accomplishments

Alaska Region

Fire Activity

The 2001 fire season for NPS units in Alaska was very light. Only four wildland fires were reported. The unusual nature of this season was highlighted by the fact that Katmai National Park and Preserve was the most active unit with two fires. One fire was suppressed at 1.5 acres and the other fire categorized as wildland fire use burned two acres. One fire burned two acres in Yukon-Charley Rivers National Preserve and another fire burned 6,238 acres in Denali National Park & Preserve. Both of these fires were categorized under wildland fire use. This was the first year that fires in Alaska NPS units were categorized under wildland fire use.

Total: 4 fires 6,243.5 acres burned

Herron Fire, Denali Nat'l Park

All wildland fire management staff members of the Eastern and Western Areas as well as Brian Sorbel, Fire GIS Specialist, Alaska Support Office were either dispatched on wildland fire assignments, details or both this season to assist with fulfilling the NPS commitment to interagency wildland fire management and to continue to gain skills, experience and qualifications. A primary objective is to develop the leadership skills and qualifications so a NPS Type II crew can be assembled. This will enable NPS personnel to gain wildland fire experience once basic training has been received and encourage NPS staff to participate in wildland fire management activities.

Jan Passek, Western Area FMO departed in May for Zion National Park via Santa Fe. Dan Warthin did an excellent job on a detail to serve as the Acting Area FMO. John Cataldo and Larry Weddle also did an excellent job assuming various duties of the FMO.

Marsha Henderson was dispatched with the Alaska Type I Team to the World Trade Center Incident. The Governor of Alaska and the interagency wildland fire community recognized the Team for their efforts upon their return to Alaska.

Fire Management Plans

Continued negotiations by Marsha Henderson, Eastern Area FMO, with Regional Environmental Compliance personnel resolved "impairment" issues in the Wrangell-St. Elias National Park & Preserve Fire Management Plan (FMP) and Environmental Assessment. The FMP is awaiting final approval. Janet Hobby, Eastern Area, began work on the Gates of the Arctic National Park & Preserve Fire Management Plan and Environmental Assessment with approval expected by the fire season of 2002. Larry Weddle began work on the Denali National Park & Preserve Fire Management Plan and Environmental Assessment. Approval at Denali NP/P is anticipated to take longer but is expected in 2002 due in part to the extensive Environmental Assessment of the Front Country Hazard Fuels Reduction Project. The Western Arctic Parklands Fire Management Plan(s) and Environmental Assessment(s) are to be completed next.

Fire Effects

Burn Area Field Work, Yukon Charley Rivers Nat'l Preserve

Remotely sensed burn severity products were derived for several 1999 fires in Yukon-Charley Rivers National Preserve using the Normalized Burn Ratio (NBR). Brian Sorbel, Regional Fire GIS Specialist and the Eastern Area wildland fire management staff collected field measurements of burn severity through the Composite Burn Index (CBI) for comparison with the NBR. Results are encouraging particularly when the potential large size of fire in Alaska is considered. Burned areas in Denali NP/P and WEAR will be assessed in 2002.

Rural Fire Assistance

Karen La May, Wildland Fire Management Program Assistant managed the Rural Fire Assistance (RFA) program. The interagency wildland fire community allocated RFA and Volunteer Fire Assistance (State/USDA) funds. Six communities adjacent to NPS units received approximately $65,000 in supplies and equipment to assist their Volunteer Fire Departments.

Wildland Urban Interface and Hazard Fuels Management

Brad Cella, Regional FMO continues to serve on the Alaska interagency committee that coordinates wildland urban interface and hazard fuel management proposals. Since about 90% of NPS lands are in fire management areas that provide for the natural fire regimes to maintain vegetation communities and fuel complexes, the NPS does not anticipate a

large hazard fuels management effort. The EA for the Denali Frontcountry Hazard Fuels Project continues to work its way through the compliance process. Small scale hazard fuel activities occur to protect remote cultural resource sites and public use cabins on NPS lands. A limited number of communities are adjacent to or within NPS unit boundaries and none were identified at high risk from wildland fire during the statewide analysis. The NPS will work with communities that potentially could be affected by fires from NPS units and express an interest in developing a proposal for the wildland urban interface program. This includes coordinating with other wildland fire management and land management agencies for projects that involve multiple land jurisdictions.

Resources to be Protected

Stacie McIntosh was hired as a term Cultural Resource Specialist for the Western Area and Jennifer Tobey was hired as a term Cultural Resource Specialist for the Eastern Area. Their primary objective is ensure that the NPS FMPs and activities to protect culture resources comply with Section 106 of the National Historic Preservation Act (as amended); evaluate structures and potential cultural resources to assist park staff with determining the appropriate wildland fire management protection level; and recommend actions to protect cultural resources if fuels treatment is needed. Once the appropriate protection level is determined than programmatic hazard fuel management at these sites can be initiated. Ms. McIntosh successfully prepared and negotiated a programmatic agreement among Wrangell-St. Elias NP/P, Yukon-Charley NP, and Gates of the Arctic NP/P, the Advisory Council on Historic Preservation and the Alaska State Historic Preservation Officer regarding implementation of the Fire Management Plan and Section 106 Compliance. Ms. Tobey is nearing completion of field work and documentation for structures within Lake Clark NP/P.

Personnel

Sharon Alden was hired by the NPS as the Fire Weather Program Manager duty stationed at the Alaska Incident Coordination Center in Fairbanks. Ms. Alden has extensive experience with fire meteorology in Alaska and the contiguous United States.

Brian Sorbel, Fire GIS Specialist reported to duty at the Alaska Support Office in February, 2001. Brian Hatfield was hired as permanent-less-than-fulltime wildland fire management staff member for the Eastern Area and Larry Weddle was hired as permanent-less-than-fulltime wildland fire management staff member for the Western Area as Fuels Management Technicians.

Intermountain Region

Central Office

In 2001 several new employees were hired - Evelyn Roadway, Art Latterell, Len Dems, Janet Passek, Dave Hammond, Eva Long, Linda Kerr, Ben McGrane and Scott Girouard – in positions as Clerical Assistant, Wildland Fire Management Specialist, GIS Specialist, Compliance Specialist, Fire Ecologist, and Contract Specialist. Later in the year, Janet Passek moved to ZION as the FMO and Bob Lineback replaced her. Jeanie Harris accepted the position of Regional FIREPRO Budget Analyst.

Projects for this year included development and implementation of National Fire Plan Orientations for IMR Superintendents, participation in DOI Cohesive Strategy development, national program reviews at GRCA and SAGU, a regional program review at BIBE, and incident reviews for Bircher and Pony fires at MEVE. A particular problem experienced during this year's fire season was the shortage of Fire Use Managers to support park wildland fire use assignments. As a significant fire season was wrapping up in September, the Branch of Fire and Aviation became a major contributor to the NPS response in the 9/11/01 disaster.

MAC groups were activated in all four geographic areas within the IMR this season.

The Fire GIS personnel supported Inventory and Monitoring Program Vegetation Mapping at BAND, FLFO, GRTE, ROMO and the Colorado Plateau area. They also provided project and program support to BIBE, BITH, ELMA, CHIC, ROMO, LAMR, DINO and FLFO. In addition, a prototype Fire and GIS Workshop was designed and tested.

Central Office Aviation activity included conducting regional aviation program reviews at BIBE, GLCA, GRCA, ORPI, YELL, and MEVE. A new FAIRSHARE helitack program was initiated at ZION, and existing programs at BAND, MEVE, GRCA, and GRTE were supplemented under the National Fire Plan. A Powerpoint program for general aviators concerning Temporary Flight Restrictions (TFRs) and flight safety in vicinity of wildland fires was developed. The program was adopted by the FAA and various aviation organizations such as the Experimental Aircraft Association. A servicewide project was initiated to automate aviation qualifications and certification for "all risk" via the SACS. An A-76 study was initiated to evaluate aircraft acquisition for BIBE (helicopter), IMRO (fixed wing), and YELL (fixed wing).

The Intermountain Region hired three new fire ecologists. One lead fire effects monitor successfully competed for a newly established fourth fire ecologist position. Intermountain Region has an interagency fire effects crew with employees from the

National Park Service and the Forest Service. We will have an interagency fire monitoring plan on-line sometime this fiscal year. Thirty-six park areas are being served with fire ecology/fire effects monitoring capabilities from ten established fire effects crews.

Intermountain Region fire effects crews provided expertise for prescribed fire, wildland fire use, resource management activities, preparation of burn plans, vegetation mapping, interagency fire effects and fire training, fire management planning, and completed suppression assignments. Intermountain Region has two monitoring plans on-line and several more in preparation.

Intermountain Region has implemented pilot sampling for manual fuels treatments at several parks. The region has reported 2,890 plot visits in the past ten years. The Intermountain Region provided personnel for an interagency training opportunity for Delaware, Maryland, and West Virginia Fish and Wildlife Service personnel. Intermountain Region fire effects and ecology personnel presented several professional papers at the George Wright Society and local ecological symposia.

Wildland Fire

Colorado Plateau Cluster - Numerous significant incidents occurred in parks in the Colorado Plateau Cluster in 2001. A siege-like season at the GRCA North Rim resulted in numerous large fires, with about 10,000 acres burned under Wildland Fire Use Implementation Plans. DINO also experienced an active fire season; near the end of fire season, an escaped BLM prescribed fire came into the park, resulting in varying degrees of resource damage. ELMA was able to complete an interagency fire management plan with the BLM-Albuquerque Field Office. ZION experienced more fires in 2001 than in any previous year, including a successful major Wildland Fire Use incident while in National Planning Level 4/5. MEVE completed field work for burned area rehabilitation for the Bircher and Pony fires of 2000. Work to correct severe suppression impacts is continuing on the Fort Ranch Fire at GOSP, through a burned area rehabilitation project. The following parks hosted management teams within the Cluster:

IMT2	FUMT
GRCA	GRCA (5)
	DINO
	ZION

Rocky Mountain Cluster - Most activity was experienced at GLAC and YELL during this fire season. Both parks experienced large cross-boundary fires with their cooperators that were long duration and required intensive coordination. In addition, President Bush visited ROMO on a trip designed to support National Fire Plan initiatives during the fire season. GRTE managed two natural ignitions.

Team Assignments within the Cluster:

IMT1	**FUMT**
GLAC	YELL (2)
YELL	

Southwest Cluster – Large fire occurrence was not as extensive this year in comparison with other years. GUMO sustained one large fire that was rained-out as the IMT arrived. An entrapment investigation related to the 2000 Monument Fire at PECO was conducted. The fire facility at SAGU neared completion. LAMR and BITH enjoyed substantial accomplishment on fuels targets. BAND continued work to improve interagency coordination. Team Assignments within the Cluster:

IMT2
CAVE

IMR Fuels Program

In 2001, Fire Management Officers submitted fuels and prescribed fire projects with the expectation that the aftermath of the Cerro Grande fire would have limited impact on their programs. Requests for funding were made by July or August before the extent of the damage from internal and external political forces was taken into account. In addition, fuels funding was operating under NTE caps, essentially rewarding the most optimistic planners. As a result, in 2001 there were 101 hazard fuels reduction projects approved in the IMR, and 40 resource management projects. Combined targets totaled over 69,000 acres. This was 275% of the highest annual report of treated acres, in 1999. 2001 funding for these projects was in excess of $5.2M. Some projects funded in 2001 were those that had been impossible to implement during the landmark 2000 fire suppression siege that resulted in major legislation and created what is known as the National Fire Plan. In addition, 101 projects were submitted for WUI funding, a new initiative under the NFP, with a price tag of $3.5M. An undetermined number of projects were duplicate requests for both funding sources.

Inputs of more money and positions may be expected to result in outputs of more acres. 2001 was not normal, however. A number of impediments out of the control of parks greatly reduced production capability. First, the Department of Interior's moratorium on prescribed fire within NPS resulted in the loss of the fall 2000 and spring 2001 prescribed fire seasons in the Intermountain Region. Second, a delay in release of new National Park Service prescribed fire planning guidelines until May 25, 2001, resulted in schedule conflicts between prescribed fire planning and suppression readiness for park fire staffs. Third, new DO-12 Compliance standards for the National Environmental Policy Act implemented in January 2001 required project-level NEPA, an unplanned impact that parks were not warned to expect. Fourth, there were key vacancies in key programs. In a hot fire job market fueled by new National Fire Plan dollars, a combination of factors resulted in inability to retain incumbents and inability to compete for new employees --

(1) NPS lagged behind USFS and BLM in recruitment, (2) an agency hiring freeze occurred with the change in administrations in Washington and no NPS Directorate in place, and (3) the Human Resource Franchise was unable to meet planned timeframes for recruitment with new position descriptions. A fifth factor was an active fire season in much of the West, that was initially thought would be a repeat of the 2000 season; National Preparedness levels were at 4 and 5, and the National MAC Group restricted prescribed fires. Sixth, the events of 9-11 resulted in major changes in airspace management, which significantly altered the ability to use aircraft in support of prescribed fires. Again, the National MAC Group shut down prescribed fires for a time as a result of homeland security concerns and lack of coordination between government departments. It should not be surprising then, that the parks in Intermountain Region produced less than 10% of target acres. Parks that made significant accomplishments despite all the hurdles were Big Thicket National Preserve, Bryce Canyon National Park, Lake Meredith National Recreation Area, Bighorn Canyon National Recreation Area, and Grand Teton National Park. Significant mechanical treatment or burn preparation work was accomplished at Chickasaw NRA, Chiracahua National Monument, Grand Canyon National Park, Mesa Verde National Park, Rocky Mountain National Park, and Zion National Park.

A contract for NEPA Compliance for WUII projects at 11 parks within the Region was initiated mid-summer and work is just being completed on the last parks in spring 2002. Lack of state-of-the art fuels reporting and budget systems significantly impacted program management within the IMR.

Fire Use Module Summary

Kim Thomas and her colleagues at the Northern Rockies Coordination Center continued to serve as a clearinghouse for dispatch of IMR Fire Use Modules. Following a National Office directive, Fire Use Modules were committed to fuels treatment projects through July. At a 7/31 meeting, module members raised safety concerns, since most had not been on fires of any kind by then. An active wildland fire use season throughout the Region kept the modules busy from August to October. Significant support for park wildland fire use incidents was made by modules from other regions, including the Black Hills, Buffalo River, and Cumberland Gap Fire Modules. In addition, the Stanislaus National Forest module was used on fires at the Grand Canyon.

2001 IMR FIRE USE MODULE ASSIGMENTS - Compiled by Kim Thomas

#	DATES	AGENCY	REQ TYPE	INCIDENT NAME	INCIDENT #	FUM	BAND	SAGU	YELL	ZION
1	4/17-22	USFS	RX	GILA NF ASSIST	NM-GNF	BAND(2)	6			
2	4/25-27	NPS	RX	BLUE CR	ZION #2	ZION(7)				3
3	4/30-5/2	USFS	RX	SANTA FE ASSIST	NM-SNF	BAND(3)	3			
4	5/7-11	USFS	RX	DIXIE NF ASSIST	UT-DIF	ZION(6)				5
5	5/9-11	USFS	RX	SANTA FE ASSIST	NM-SNF	BAND(3)	3			
6	5/26-6/10	NPS	RX	2101	BITH #11	BAND(3)	16			
7	5/29-6/10	NPS	RX	2101	BITH #11	ZION(6)				13
8	6/11-16	NPS	RX	EAST CR RIDGE	BRCA #6	ZION				6
9	6/18-7/1	NPS	RX	CLEAR/ TRAP	ZION #5	ZION				14
10	6/18-7/1	NPS	RX	CLEAR/ TRAP	ZION #5	SAGU(3)		14		
11	6/18-7/1	NPS	RX	CLEAR/ TRAP	ZION #5	BAND(4)	14			
12	6/24-30	NPS	RX	WOLF RIDGE	GRTE #12	YELL			7	
13	7/2-12	NPS	RX	ESTES INTRFACE	ROMO #22	YELL			11	
14	7/5/01	NPS	IA-SUPPRSN	ZION NP - IA		ZION				1
15	7/9/01	NPS	IA-SUPPRSN	ZION NP - IA		ZION				1
16	7/9-24	NPS	RX	HANCE/ WATSON	GRCA #17&21	BAND(6)	16			
17	7/9-24	NPS	RX	HANCE/ WATSON	GRCA #17&21	SAGU(2)		16		
18	7/16-30	NPS	RX	LOOP	BRCA #9	ZION				15
19	7/17-8/2	NPS	RX	LOOP	BRCA #9	YELL			16	
20	7/31/01	NPS	IMR FUM MTG CEDAR CITY			ALL				
21	8/1-16	NPS	RX	2101	BITH #2	BAND(5)	17			
22	8/1-16	NPS	RX	2101	BITH #2	SAGU(4)		17		
23	8/4-10	NPS	RX	CEDAR CANYON	LAMR #11	ZION(6)				7

2001 IMR FIRE USE MODULE ASSIGMENTS - Compiled by Kim Thomas

#	DATES	AGENCY	REQ TYPE	INCIDENT NAME	INCIDENT #	FUM	BAND	SAGU	YELL	ZION
24	8/7-15	NPS	WFU	VISTA	AZ-GCP	YELL(6)			9	
25	8/13-15	NPS	RX	CLEAR/ TRAP	ZION #5	ZION				3
26	8/16-29	NPS	IA – WFU	LANGSTON	UT-ZIP	ZION				14
27	8/19-9/5	NPS	WFU	HOOVER	CA-YNP	SAGU		18		
28	8/19-9/6	NPS	WFU STONE, SULPHUR, FALCON		WY-YNP	YELL			19	
29	8/22-9/1	USFS	WFU	MONUMENT	MT-GNF	BAND	12			
30	9/1-11	NPS	WFU	SWAMP RIDGE	AZ-GCP	ZION				11
31	9/8-23	NPS	WFU	EAST CR RIDGE	BRCA #6	ZION				16
32	9/10-12	NPS	RX	ROMO		YELL(6)			3	
33	9/13-10/1	NPS	WFU	SWAMP RIDGE	AZ-GCP	YELL(6)			19	
34	9/13-26	NPS	WFU	TAR	CA-KNP	SAGU		14		
35	9/14-17	NPS	WFU	SWAMP RIDGE	AZ-GCP	ZION				4
36	9/19-23	NPS	RX	EAST CR RIDGE	UT-BCP	ZION				5
37	9/25-10/1	NPS	RX	CEDAR CANYON	LAMR #11	BAND(3)	7			
38	9/25-10/10	NPS	WFU	SWAMP RIDGE	AZ-GCP	ZION(8)				17
39	10/3-8	NPS	WFU	SULPHUR	WY-YNP	YELL			6	
40	10/5-21	NPS	WFU	BIGGS FLAT	MT-LCF	BAND	17			
41	10/9-11	NPS	RX	SCI. SCHOOL	WY-GTP	YELL			3	
42	10/22-11/2	NPS	WFU	SWAMP RIDGE	AZ-GCP	ZION				12
43	11/5-10	NPS	RX	E.CR RIDGE/ LOOP	BRCA #6&9	ZION				6

TOTAL DAYS IMR FIRE USE MODULES ON ASSIGNMENTS: 436

Bandelier	111
Saguaro	79
Yellowstone	93
Zion	153

Alpine Hotshot Crew

Lakeview Complex, End of Shift

The 2001 season was another busy one as far as fire assignments were concerned. The crew was available from late May through early October having operational assignments on 19 fires, which took them to eight western states and covered over 15,000 miles in vehicles in the process. The crew had very little time to perform project work having spent 95 days of the season on wildland fire assignments. The project work that was performed was Wildland Urban Interface hazard fuel reduction for Rocky Mountain National Park, hazard fuel reduction at Mesa Verde National Park during a severity assignment and a prescribed fire burn prep at Bryce Canyon NP by a module of 10 Alpine. Prescribed fire support was limited to a miniscule amount of support on the Arapaho-Roosevelt NF.

Alpine Hotshot Crew Workload Distribution, 2001

Year	Number Of Fires	% Time Wildfire Suppression	% Time Prescribed Fires	% Time Other Projects
2001	19	90	3	7

Alpine Hotshot Crew Wildland Fire Assignments

Fire Name	Location/Agency	Dates
Menafee	San Juan NF, CO	6/11-12
Sundance	Ute Mtn. Agency, CO	6/24-25
North Red Creek	Pike-San Isabel NF, CO	6/30-7/2
Book Cliff	Grand Jct. BLM, CO	7/3-5
Castle Peak	Grand Jct. BLM, CO	7/5-7
Brown Springs	Salt Lake Disp, UT	7/16-17
Beef Hollow	Utah State, UT	7/17-19

Alpine Hotshot Crew Wildland Fire Assignments

Fort Ranch	Utah State, UT	7/20-21
Y Mountain	Uinta NF, UT	7/22-25
Snowshoe	Salmon-Challis NF, ID	7/25-30
Elk Mountain II Complex	Black Hills NF, SD	8/4-10
Lakeview Complex	Lakeview BLM, OR	8/11-13
Quartz Complex	Oregon Dept. Forests, OR	8/14-19
Horse Creek	Wallowa-Whitman NF, OR	8/19-25
Little Joe	Gallatin NF, MT	8/29-9/4
Fridley	Gallatin NF, MT	9/4-13
Salt	Gifford-Pinchot NF, WA	9/18-27
West Hell	Black Hills NF, SD	9/29-10/1
Poe	Rawlins Distrcit BLM, WY	10/2-3

Midwest Region

Summary

Fire Season 2001 was another busy year for the Midwest Region. The moratorium on prescribed fires was lifted allowing parks west of the 100th meridian to complete fall burns. New regional positions were hired (position titles and locations are found later in the report). Parks and staff continued to show their support and commitment for fire by sending out single resources as well as entire crews. The Midwest Region sent out approximately 361 people on 137 assignments. Parks that sent out resources included: OZAR, INDU, WICA, VOYA, BADL, BUFF, SACN, ISRO, SLBE, HOSP, THRO, and the MWRO.

Fire Management Planning

With the advent of the National Fire Plan, there is an increased effort to write new or revise park Fire Management Plans (FMPs). Regrettably, no new FMPs were signed off on, although 2 FMPs (Herbert Hoover and Badlands) have gone through regional and public review, and their FONSIs (Finding of No Significant Impacts) are being written. Another FMP (Apostle Islands) has gone through regional review but not public review. We have 22 FMPs that are in various stages of completion. Using the Regional contracting officer, we were able to contract 11 FMPs. In addition, there are another 11 FMPs, written by park and regional staff. We expect all of these plans to be completed in 2002.

Prescribed Fire

A total of 18,953 acres were treated with prescribed fire in 2001. Until the moratorium was lifted in May, parks in the Midwest Region located west of the 100th meridian were not permitted to burn. This greatly impacted some of the

parks slated to conduct research burns and thus postponed these burns until spring 2002. The fall burns that took place were predominantly west of the 100th meridian and totaled 6,906 acres. With a full year of burning in 2002, the total acres burned will increase significantly.

Rural Fire Assistance

Through the Rural Fire Assistance program, eighty-six rural and volunteer fire departments within the Midwest Region were provided wildland firefighting training and equipment. A total of $267,000.00 was allocated to the Midwest Region for distribution through this program. Funds were distributed by the thirty active fire parks and the Midwest Regional Fire Office. This program increased park and adjacent cooperator relationships by offering the funding for training and Personal Protective Equipment (PPE) with direct contact with the involved parks.

Wildland Urban Interface

In fiscal year 2001, the Midwest Region identified a total of thirty wildland urban interface (WUI) projects in five states. Nineteen of these projects encompassed 2,387 acres in eight different National Park Service units. The other eleven of these projects were identified as areas where WUI assessments were necessary. Five projects totaling 144 acres were completed in fiscal 2001. The unfinished projects will carry over into fiscal 2002.

Hazard Fuels Reduction

Six parks in the Midwest region combined for a total of 648 acres in mechanical fuel reduction. These parks were Hot Springs NP, Fort Smith NHS, Effigy Mounds NM, Indiana Dunes NL, Mount Rushmore NM and Devils Tower NM. These acres were treated in a variety of methods, which included chipping and building piles for burning. These projects included storm-damaged areas from ice such as Fort Smith and Hot Springs to boundary protection at Indiana Dunes and Devils Tower. The mechanical treatment areas at Mount Rushmore and Devils Tower will be burned in the winter when there is sufficient snow cover. There were also hazard fuel burns in the region, which was covered under the prescribed fire section.

Fire Modules

The Black Hills and Buffalo Fire Use Modules programs continue to grow and expand in both work assignments and recognition. The work performed by these

Modules reached many levels: local, interagency, regional, and national. The variety of assignments was beneficial in providing Module members with detail and training opportunities. They also continued to be recognized and requested on a national level, having worked seven wildland fire use fires in 2001.

Buffalo Fire Use Module Summary

The 2001 season for the Buffalo Fire Use Module was a busy year. The Module assisted with thirty-three prescribed fires for a total of 30,739 acres, three wildland fire use for resource benefit fires for a total of 14,860 acres, and eight wildland fires for 5,294 total acres. The Buffalo Module completed preparation on fifteen prescribed fire units for 2,530 chains and nine mechanical fuel reduction projects totaling 88 acres. The Buffalo Module also assisted with writing 13 prescribed burn plans.

Bison Flats Prescribed Burn

The module spent a lot of time hiring personnel and using detailers to fill open positions but still managed to stay available as a national resource. The module worked in eleven states and assisted fourteen NPS units, four USFS forests, one state agency and one Department of Defense (DOD) base. Work summary percentages included: prescribed fire (64%), hazard fuels reduction (1%), fire use for resource benefit (24%), and wildland fire (11%). This year saw a decrease in mileage driven from 25,000 to 20,000 miles.

Interagency assistance included: Arkansas Game and Fish, Kisatchie National Forest, Ozark National Forest, Mark Twain National Forest, Ashley National Forest, Salmon-Challis National Forest, and Eglin Air Force Base.

Black Hills Fire Use Module Summary

It was a very productive season for the Black Hills Module as they continued to make new contacts and see more interest in their abilities. The Module assisted with twenty-six prescribed fires for a total of 11,385 acres, four wildland fire use for resource benefit fires for a total of 7,321 acres, and seven projects totaling 1,013 total acres.

The 2001 season allowed most Module members opportunities for individual development, in the form of assignments away from the Module group. The continuously expanding season provided for a long, challenging, and enjoyable experience for the Module. Work summary percentages included: Wildland Fire Use for Resource Benefits (35%), Management Ignited Prescribed Fire (13%), Prescribed Fire Preparation (10%), Hazardous Fuels Reduction (17%), Travel

(15%), and Suppression (10%). The rest of the time was spent with administrative duties, training, all risk incidents, and physical training.

Interagency assistance included: Black Hills National Forest, Chequamegon-Nicolet National Forest, Gila National Forest, Superior National Forest, Big Stone National Wildlife Refuge, Craig District Bureau of Land Management, and Custer State Park.

Fire Ecology


Bison Flats Prescribed Fire, Team Monitoring Plots

Fire ecology was greatly enhanced in this region with the hiring of three eco-regional fire ecologists. These positions correspond to the I&M (Inventory and Monitoring) networks (Great Lakes, Heartland and Northern Great Plains), and are duty-stationed at Voyageurs, Ozarks, and Wind Cave. They were created to provide support for the parks within these areas. Their duties include supervision of the fire effects crews, fire effects data analysis, NEPA compliance, acting as a liaison to resource management, providing science-based input into fire management, and assisting with fire management planning.

The fire effects monitoring continues to be a large emphasis in the fire ecology program. There is four fire effects crews operating within the Midwest Region: Voyageurs, Ozarks, Wind Cave, and Indiana Dunes. Their primary strategy is the monitoring of permanent vegetation plots to ensure that prescribed fire objectives are being met, and that unwanted effects are not occurring. Across all programs, there were a total of thirty-three plots installed and read in areas to be treated with prescribed fire, and 167 plots that were read postburn. The programs continue to grow. The Ozark crew began installing plots at Buffalo this year. The Northern Great Plains crew began incorporating nested-frequency protocols to better sample the herbaceous layer, and began using non-standard techniques to monitor tree mortality at Devils Tower, and smooth brome in Badlands. The Indiana Dunes fire effects monitoring crew has been assisting with vegetation mapping at Effigy Mounds and Indiana Dunes.

A continuing problem for fire effects is the lack of coverage in the tallgrass prairie region. The regional fire ecologist has been working on coordinating with the Long Term Ecological Monitoring (LTEM) group at Wilson's Creek to coordinate their vegetation monitoring programs. This past year we reached an

agreement on coordination of our two programs, contingent on the hiring of FIREPRO positions, specifically a fire ecologist and two fire effects crewmembers. The coordination of these programs is on hold until these positions are hired.

For 2001, the region had three fire research projects funded through FIREPRO: a fire history of floodplain forests in Ozarks, a study of the fire effects on paleontological resources in Badlands, and a study of the fire effects on exotic species in Theodore Roosevelt.

In summary, this past year showed evidence of fire management receiving more science-based information to better manage resources. An encouraging trend in the region is an increased coordination between fire and resource management. With the new ecoregional ecologist positions, and continued growth of the fire effects programs, more ecological information will be provided to fire and resource management staffs to help the parks provide better stewardship of their resources.

New Midwest Regional Office Fire Employees

The 2001 season saw a staffing increase for the Midwest Regional Fire Office as the national fire plan placed an emphasis on wildland urban interface, hazard fuels reduction, accountability, rural fire assistance, and public information. The following positions were filled and have already proven to be an asset to the region's fire program.

Wildland Fire Management Specialist – Doug Alexander, Omaha, NE
Budget Analyst – Janelle Smith, Omaha, NE
Fire Information and Education Specialist – Kathleen Harter, Omaha, NE
Wildland Urban Interface Coordinator – Paul Mancuso, St. Paul, MN
Term NEPA Planner – Nick Chevance, Omaha, NE
Fire Weather Meteorologist (EACG) - Steve Marien, St. Paul, MN
GIS Specialist – Kathie Hanson, Madison, WI

Involvement increased with newly funded positions, projects, and local interagency coordination centers:

INDU – Air Ops/Equip. Tech
Biotech
Dispatcher
Dispatcher - Fairshare
Engine Foreman (2)
Firefighter (3)

WICA – Assistant FMO
Clerk, FUM
Ecologist

Engine Foreman
Helitack – Fairshare

VOYA – Biotech
Dispatcher – Fairshare
Ecologist

BUFF – Clerk, FUM
Engine Foreman (2)
Converted 3 seasonals to subject-to-furlough
Fire Information and Education Specialist

OZAR – Dispatcher, Fairshare
Engine Foreman
Ecologist
Fire Information and Education Specialist

National Capital Region

In 2001 the National Capital Region continued to support local, regional, and national fire suppression operations by mobilizing 193 firefighters and overhead to 24 fire incidents. Over 50 new NCR and Americorps firefighters were trained. With the addition of a GS-11 Assistant Fire Management Officer, NCR has its first full time dedicated wildland fire program manager. The position's primary duties center around revising park fire management plans, working with interagency partners on wildland urban interface issues and the development of prescribed fire programs in four NCR parks. Allen Biller from the BLM Alaska Fire Service accepted the AFMO position in August and has contributed significantly to the NCR program since then. Under the Rural Fire Assistance Program, NCR parks were able to provide equipment and training support for nine rural fire department.

Northeast Region

As a result of the National Fire Plan, several enhancements occurred within the Northeast Region. The addition of Barb Stewart, Fire Education, Information and Prevention Specialist will greatly expand the efforts of parks in informing the public and partners on the effects of wildland fire in the eastern ecosystems. Doug Wallner's position is no longer a shared position with the Southeast Region. Doug will assume leadership of

hazard fuels, wildland urban interface and fire effects. The FIREPRO parks also saw an increase in staffing as a result of the National Fire Plan, with extensions of appointments to key suppression positions. These staffing enhancements should position the Region to implement the directives of the National Fire Plan.

The Rural Fire Assistance Program was major step forward in building strong interagency partnerships with our bordering communities. Shenandoah National Park assisted 17 volunteer fire departments for a total of $141,000; Delaware Water Gap assisted 12 VFDs in Pennsylvania and New Jersey; Cape Cod National Seashore assisted five communities and extended a water and hydrant system; Acadia National Park distributed $30,000 to VFDs in Maine and assisted Saint-Gaudens with assistance to the town of Cornish, NH; and New River Gorge assisted communities in West Virginia with supplies and conducted training. The Rural Fire Assistance Program was an outstanding success and hopefully will continue.

The entire region experienced a drought during 2001, with several states receiving less than 50% of normal precipitation. Acadia National Park recorded the driest year on record and Delaware Water Gap had a 12" deficit in moisture. With the lack of snowfall this winter, spring fire season may come sooner and be more intense than normal. During the fire season of 2001, the Northeast Region mobilized a total of 465 resources to assist the national effort.

Planning efforts were emphasized at Cape Cod, Shenandoah and Fire Island to complete compliance work for hazard fuel projects. Delaware Water Gap is working closely with the State of New Jersey on a project at a state park. Fire Management Plan efforts were directed at Shenandoah, Saratoga Battlefield, Minute Man Historic Park, Cape Cod Seashore and Fredricksburg. The Northeast Region utilized a cost-share term employee to assist parks with their FMPs.

Pacific West Region

GRBA

The park made numerous efforts throughout the year to recruit potential applicants for three Forestry Technician positions. Contacts were made with the Pueblo, Navajo and Apache tribes in New Mexico, including tribes from Nevada, Utah and California. Also contacted were the following Colleges and Universities: Dixie College, Great Basin College, Southern Nevada College, Tuskegee University, Colorado State, Southern Utah University, University of Utah, University of Wyoming, Montana State, New Mexico State, Oregon State, and Humboldt University.

A total of 34 fires were entered into the Shared Applications System (SACS) at the National Interagency Fire Center. Of those fires reported, the park responded to 23 fires.

These fires were either suppressed fires within Park administered lands, Mutual aid areas, (identified within the Interagency Agreement) or false alarms. The remaining 11 fires were support action fires.

The largest fire, at 614 acres was the "Granite Fire" which by all indications was started by lightning. A park employee reported the fire on August 18, 2001. Through GIS it was determined that 539 acres were inside GRBA park boundaries and 75 acres were on Humboldt-Toiyabe National Forest System Lands. The fire was converted to a Type 3 Incident on August 19. At the peak of the fire there were over 225 personnel working. The Granite fire burned vegetation in the following fuel types; White fir, ponderosa pine, mahogany, spruce, sagebrush, and grass. The Granite Fire was contained on September 1 and declared out on December 31, 2001.

A Rural Fire Assistance proposal was submitted in the fall of 2000, to assist the Baker Volunteer Fire Department with training, purchasing personal protective equipment, a fire engine and other supplies. The park received $12,000 and this was allocated for training, ($4,000.00) and purchase of personal protective equipment ($8,000).

YOSE

The fuels program consisted of 153 acres of fuels mechanically-reduced around eight developed areas in the Park: El Portal, Foresta, Crane Flat, Hodgdon, Hazel Green, Wawona, Mariposa Grove and Yosemite Valley, 3578 piles burned, and 34 acres of Prescribed burning (11 at YV-13, 23 @ YV-12). For Wildland Fire Use, 27 managed Fire Use fires occurred for 9,400 acres. The Hoover was the largest Fire Use action in the country, at 9,300 acres, and burned for almost 5 months. Mike Beasley was hired as the Prescribed Fire Specialist in October. The DEIS/FMP is 90% complete. The new NPS burn plan format was implemented and disseminated.

SEKI

During fiscal year 2001, fire and aviation management's main goal was hiring followed by orientation of the new staff into the Sequoia/Kings Canyon organization. With implementation of the National Fire Plan, turnover and creation of new positions resulted in significant staff changes.

Our prescribed fire program came back on line in late June, with the ignition of the Bear Hill burn in Giant Forest. Activity was very limited due to two factors, again we chose to concentrate on staff hiring and orientation, and the burn plan revision process was complex and time consuming.

Fire use actions, after limited activity the past couple of years, picked up considerably. Twenty-one fire use fires were managed, with two of them (Burnt Fire and Tar Fire,) requiring fairly significant time commitments of staff from inside and outside the park.

The National Fire Plan led to creation of wildland urban interface initiative (WUII) projects. Two of these projects are now funded and planned for implementation in '02

due to the work undertaken in ’01. They are the Grant Grove/Wilsonia project, and the Southern Sierra Geographic Information Cooperative (SSGIC).

The San Joaquin Unified Air Pollution Control District (Air District) implemented new rules governing collection of fees for fire use and prescribed fire acres treated, and governing coordination between the Air District and district fire agencies. A considerable number of issues were raised in ’01 through the coordination rule. Much work between the Air District and fire agencies is planned for ’02 to work on the issues identified.

The Southern Sierra Fire Managers group continued to move forward with the creation of an MOU that will allow for better cooperation amongst federal fire agencies in the southern Sierra for both fire projects and non-fire emergencies. We will have the MOU finished in ’02. The aforementioned SSGIC project finished year two of its three-year funded project. Agencies in the southern Sierra covering roughly five million acres are coordinating creation of unified data layers so that fuels treatment analysis can occur over agency boundaries by watersheds.

JODA

The monument completed a 1,300 prescribed fire on October 2, 2001. Helicopter ignition was used on the NPS land during the peak burning period. Cooperation with adjoining private landowners, state and federal agencies meant that no soil disturbance or constructed line was needed to safely contain the fire.

The fire appears to have accomplished all objectives, including the reduction of sagebrush and western juniper and the rejuvenation of native bunchgrass. Personnel from the BLM, USDA-FS, Oregon Department of Forestry, and local fire contractors assisted with the fire.

WHIS

Exciting and challenging best describe the year 2001 for fire management at Whiskeytown. They constructed and maintained a record number of shaded fuelbreak acres, completed a complex urban interface prescribed fire, supported an active regional wildland fire season, and began revising their fire management plan. With additional funding from the National Fire Plan, Whiskeytown was able to expand the fuels management program, upgrade the preparedness program, and develop a quality education, research, and prevention program.

The highlight of 2001 was the successful completion of the Sunshine prescribed burn. The Sunshine burn was a complex urban interface burn, which took 10 shifts to complete. It provided a challenge to the staff with sensitive smoke issues, powerlines, road closures, highly visible fire effects, and holding concerns along the boundary (private property and structures).

In 2001 the Whiskeytown Urban Interface Plan was implemented. Based on the National Fire Plan, the Whiskeytown Urban Interface Plan is a three-year project to reduce fuels in strategic areas of Whiskeytown that will enhance fire-safe communities. They were able to complete the construction and maintenance of 563 acres of shaded fuelbreaks. They exceeded the acreage goal for 2001 and completed 50% of projects planned for 2002. In addition to the 563 acres of manual treatment, Whiskeytown burned 119 acres of piles after receiving a national exemption during the post Cerro Grande moratorium on prescribed fire. After the lifting of the moratorium, fire staff revised the burn plans, and we were able to successfully execute the Sunshine prescribed burn of 720 acres, for a total of 1,402 acres of fuels treatments.

Whiskeytown fire staff worked with California Department of Forestry and Fire Protection, and Western Shasta Resource Conservation District fire and fuels partners to establish an interagency shaded fuelbreak system in Western Shasta County. In 2002 two critical interagency fuelbreaks outside of the NPS Whiskeytown NRA boundary (Buck, Zog Mine Road) were completed under Whiskeytown fire staff leadership. The expanded fuelbreak acreage and the ability to work outside of administrative boundaries was made possible by new federal funds to be used on community "Fire-Safe" projects.

All work was accomplished utilizing crews from National Park Service (NPS), USDA Forest Service, California Department of Forestry and Fire Protection (CDF), California Conservation Corps (CCC), local private contract crews, and the Western Shasta Resource Conservation District.

Interagency Agreements

USDA-FS- Redding Smokejumpers	$80,000.00
USDA-FS- Shasta Trinity Forest	$40,000.00

Cooperative Agreements

California Department of Forestry	$21,000.00
California Conservation Corps	$193,240.00

Federal Assistance Agreement

Western Shasta Resource Conservation District	$20,000.00

Contracts (Local crews)

Firestorm Wildland Fire Suppression Inc.	$355,200.00
Eagle Pass Reforestation Inc.	$187,798.00

WHIS Fire Use Module

The Whiskeytown Fire Use Module had a rebuilding year in 2001. Acting Leader Rick Russell retired in early September. New members were added and others left for new opportunities and challenges. The Fire Use Module was able to accomplish its primary mission of providing multi-skilled professionals in the areas of planning, fire behavior, monitoring, ignition, holding, and suppression to the Pacific West Region and other National Park Service partners.

The Module traveled to Grand Canyon for a wildland fire use assignment on the Vista Fire in July. The Module performed ignition and monitoring on two major prescribed burns at Lava Beds and Whiskeytown in October. The Whiskeytown Fire Use Module also served in a variety of single resource overhead assignments in wildland fire suppression during the National Preparedness Level V period of 2001.

The new core of Module members, Brad Reed, Patrick Lookabaugh, Brandon Dethlefs, and Josh Faulkner have greatly expanded their expertise in planning and monitoring. As the Module continues they look forward to a productive 2002.

Arrowhead Hotshot Crew

The 2001 fire season was also the 21st season for the Arrowhead Hotshots. The crew started on May 6th and terminated on November 8th with 100 days committed to fire assignments. The crew worked 20 suppression fires for a total of 26,492 work hours. There was one Wildland Fire Use fire and one prescribed fire assignment for the crew in 2001. The following agencies were supported by the crew on these assignments: NPS-Pacific West Region, BLM-Nevada, BIA-Oregon, California Department of Forestry, and USDA-FS-Region 5. Due to the large amount of time spent assigned to fire assignments in 2001 there were very few opportunities for any other project work.

Arrowhead Hotshot Crew Workload Distribution

Year	Number of fires	% Time Wildland Fire Suppression	% Time Prescribed Fires	%Time Other Projects
2001	20	85	5	10

Arrowhead Hotshot Crew Wildland Fire Assignments – 2001

FIRE NAME	AGENCY	STATE	DATES
Siegal	Carson City BLM	**NV**	5/12-15
White	Sequoia NF	**CA**	5/22-25
Devil	LMU – CDF	**CA**	5/28-6/1
Big	Shasta-Trinity NF	**CA**	6/2-5
Wilsonia	Kings Canyon NP	**CA**	6/9-10
Summit – fire use	Sequoia NP	**CA**	6/10-11
Hemlock	San Bernardino NF	**CA**	6/14-22
Cliff Creek Complex	Sequoia NP	**CA**	7/3-4
Arroyo	Los Padres NF	**CA**	7/6-7
Gorda	Los Padres NF	**CA**	7/8
Big Stump	Kings Canyon NP	**CA**	7/9
Bald Peter	Warm Springs BIA	**OR**	7/13-25
Canyon	Modoc NF	**CA**	8/11-13
Blue	Modoc NF	**CA**	8/14-22
Highway	Sequoia NF	**CA**	8/22-9/2
Hyampom	Shasta-Trinity NF	**CA**	9/3-4
Star	Eldorado NF	**CA**	9/5-10
Treasure	Tahoe NF	**CA**	9/10-13
Crawford	Klamath NF	**CA**	9/17-22
Swillup	Klamath NF	**CA**	9/23-26
Moore	TCU – CDF	**CA**	10/28-31
Sherman Creek – RX	Sequoia NP	**CA**	10/17-18
Sherman Creek – RX	Sequoia NP	**CA**	10/28

Southeast Region

Summary of all fire activity during the 2001 Calendar Year:

	NUMBER FIRES	NUMBER ACRES
SUPPRESSION	118	64,957.0
SUPPORT ACTION	154	.0
NATURAL OUTS	35	30.1

Summary of all fire activity during the 2001 Calendar Year continued:

PRESCRIBED FIRES:	NUMBER FIRES	NUMBER ACRES
PLANNED IGNITION	16	51,023.3
UNPLANNED IGNITION	16	7,830.0
TOTAL PRESCRIBED FIRE	52	58,853.3
FALSE ALARMS	22	

Big Cypress National Preserve

The Big Cypress Fire and Aviation Division accomplished 34,196 acres of prescribed fire treatment. Most of this year's burning was accomplished during the early wet season period (June- July).

There were 815 acres burned in lightning fires this year, and 26,953 acres burned in human-caused fires. The human-caused total included the Bear Island fire (24,315 acres) which was ignited by an abandoned campfire. This fire closed Interstate Highway 75 (alligator alley) for a period of time (6 ½ hours) due to smoke causing visibility problems. Large air tanker and helicopter support was used extensively on this fire. Hotshot crews, contract fire engines, and Panther Refuge personnel, as well as local resources participated in the suppression effort.

They responded to a number of mutual assistance fires with the Florida Division of Forestry, Fakahatchee Strand State Preserve and with the Florida Panther National Wildlife Refuge. Also assisted these cooperators on prescribed burns. Most of the fire staff participated in Western fire assignments.

Members of the Division participated in the SW Florida Urban Interface committee, the South Florida Interagency Wildland Fire Council, and with the local interagency Fire Prevention committee.

They provided OAS basic aviation safety training, S130, S190, and S217 as well as an annual fire refresher. More than twenty SCA members attended the basic firefighter training.

Deep Lake Fire Station became operational this year and was staffed on a seven day basis during the fire season.

Great Smoky Mountain National Park

CY 2001 was a particularly busy year. The emphasis of accomplishing all aspects of the National Fire Plan, coupled with other factors, significantly impacted the Park's ability to implement its prescribed fire program. Personnel that normally were assigned to prescribed fire projects devoted much time to the newly established Wildland Urban Interface Projects, the Rural Fire Assistance Initiative, and filling vacant positions. Other factors negatively affecting the Park's prescribed fire accomplishments included an atypically high wildland fire workload, a new endangered species issue, time spent filling vacant positions, and the park's commitment of fire fighting personnel to the national fire emergency in the West.

A total of 9,887 acres of parkland burned in 2001. The Park managed 11 wildland fires for 8,702 acres. One of these fires was the Sharp Fire (7,580), which was the largest in the Park's history. Six prescribed fires were accomplished for 1,185 acres. The Ekaneetlee Fire (6 acres) was the only wildland fire managed for resource benefits. In addition to an existing mechanical/fire hazard fuel project, a new one under the WUI was accomplished. Ten cooperating departments were assisted under the Rural Fire Initiative. Fifteen positions were either established or enhanced.

National Fire Plan Accomplishment

Wildland Urban Interface Initiative

--- One normally funded project was completed; approximately 0.25 miles of boundary were treated.

--- One specially funded WUI project was completed. Under this project an additional 25 acres and 1.2 miles of park boundary were treated. This work was accomplished by using a crew of ADs, three different FUMs and regular GRSM fire employees.

Staffing

--- Fifteen positions were either newly established or enhanced.

--- Three new positions were established: Fire Ecologist, Fire Program Clerk and Fuels Technician.

--- Five positions were converted from STF to PFT. These included the Engine Foreman, FET Leader/Assistant Leader and FUM Leader/Assistant Leader.

--- Seven positions were converted from temporary to STF including two in Preparedness, three on the FUM, and two on the FET.

Wildland Fires

--- The park suppressed 11 fires totaling 8,702 acres. The Sharp Fire burned 7,580 acres and is the largest fire recorded in the park's history. A Type II Incident Management Team from FL was brought in to manage the fire.

--- The Park assisted on 43 fires. Approximately 125 individuals were dispatched to help with these fires most of which occurred during the August national fire emergency in the West.

--- One lightning-caused fire was managed for resource benefits. The Ekaneetlee Fire was in a very remote section of the park and burned 6 acres. Both the GRSM and the CUGA FUMs worked on this fire.

Prescribed Fires

--- Seven prescribed fires were accomplished for a total of 1,185 acres. Burn goals included perpetuating rare plants, reducing hazardous fuels in the WUI and ecosystem maintenance. Of these, the Stony Ridge fire is noteworthy. This fire was a 506-acre woodland burn that was the largest in the Park's history. Although smaller in size than what is planned for, it does represent the type of landscape-sized burns that are scheduled for this and future years.

Knoxville Tanker Base

--- The base had an atypically busy year with the total number of dispatches being about 145.

--- Approximately 115 of them occurred during the fall season during which time many individuals were detailed to the Base to manage the workload. At one point in time, seven tankers (plus Lead Planes) were assigned to the Base.

Great Smoky Mountain Fire Use Module

SUMMARY

Total RX acres: 7,092
Total Wildland Fire acres: Near 50,000
Total Wildland Fire Use acres: 10,650

NPS UNITS ASSISTED BY THE FUM

Great Smoky Mountains NP (GRSM)
Gulf Islands National Seashore (GUIS)
Dinosaur National Monument (DINO)
Kings Mountain NMP (KIMO)
North Cascades (NOCA)
Mesa Verde NP (MEVE)
Little River Canyon NP (LIRI)
Grand Canyon NP (GRCA)
Everglades NP (EVER)

INTERAGENCY ASSISTANCE

Eglin Air Force Base (FL)	Craig District, BLM (CO)
Cherokee National Forest (TN)	Sumter National Forest (SC)
Worland District, BLM (WY)	Burns District, BLM (OR)
Bridger-Teton NF (WY)	Shoshone NF (WY)
Wyoming State	FL Division of Forestry

WILDLAND FIRE USE

Incident Name	Location	Size Class	Positions Filled by FUM
Glory	NOCA	E	FEMO
Vista	GRCA	F	CRWB (T), FFT1
Swamp Ridge	GRCA	F	CRWB (T), FALB
Tower	GRCA	F	CRWB (T),FEMO
Ekaneetlee	GRSM	A	ICT4

PRESCRIBED FIRES

Incident Name	Location	Acres	Positions Filled by FUM
Pine/Oak	LIRI	274	RXB2, RXI2, FFT1, FEMO
Brown's Mtn.	KIMO	393	RXB2, RXI2, FEMO
Cade's Cove	GRSM	680	RXB2, RXI2, FEMO, ENGB
Eglin AFB	EAFB	603	RXB2, RXI2, FEMO, ENGB
Goforth RX	CherokeeNF	1700	RXI2, FEMO, ENGB
Lost Cove	CherokeeNF	1270	RXI2, FEMO, ENGB, PLDO
Low Gap	CherokeeeNF	2	FEMO, RXI2
Pine Island	EVER	302	RXI2, FEMO, ENGB, SOF2
Presswood	CherokeeNF	1275	RXI2, FEMO, ENGB
Stony Ridge	GRSM	506	RXI2, PLDO, FEMO, FFT1
Turkeybeard	KIMO	67	RXB2, RXI2, FEMO

WILDLAND FIRES

Incident Name	Location	Acres	Positions Filled by FUM
Bear Creek	EAFB	2500	FEMO, ENGB
212/136	EVER	20	ENGB, FFT2
Smokemont	GRSM	30	ICT4 (T), FEMO, FFT2
Green Mtn	GRSM	2200	ICT4
Wolf Pen III	GRSM	40	ICT4 (T)

Out of the core season, GRSM FUM personnel served as ICT4 (T), HECM, HECM (T), ENGB, CRWB(T), FFT2, and FEMO while detailed to other NPS units. Four people worked 14 separate fires for approximately 45,000 acres. Four of these fires were project fires in OR, WY and WA.

HAZARD FUEL REDUCTION

Hazard fuel reduction was performed at GRSM and KIMO.

Everglades National Park:

In calendar year 2001, Everglades National Park had 44 fires totaling 34,055 acres within the Park. The Park also provided assistance to the Florida Division of Forestry with 11 fires in the cooperative mutual threat zone along the eastern park boundary. They also had 13 external responses for fire assignments starting in May within Florida, extending through the western summer fire season and ending in November when the last of the park resources returned from fall fires in the Appalachians. Some of those 13 external incidents involved multiple resources and some were single resource assignments.

Overall this was a very active fire year for Everglades with continuous fire activity (suppression, wildland fire use and prescribed) from early April through late August.

The greatest overall acreage by fire management dimension was in prescribed fire where they had 16 prescribed burns totaling 14,903 acres. Next were suppression fires with 11 fires on NPS lands totaling 11,334 acres. Wildland fire use fires were statistically last where 17 fires burned a total of 7,818 acres.

Fire Suppression

The largest fire of the year in the Park started on May 08, 2001 and was named the Lopez Fire. The fire originated from an agricultural field immediately adjacent to the Park boundary in East Everglades. Though investigated by both NPS and Florida Division of Forestry arson investigators, no positive fire cause could be determined. It was most likely an accident created by farm worker activities. This fire eventually totaled 8,427 acres and was managed by an in-park Type 3 Incident Management Team. Suppression activities included the use of national resources including Type 1 crews, Type 1 air tankers, both Type 1 and Type 2 helicopters and a Single Engine Air Tanker. This fire occurred during high drought conditions prior to the onset of the natural fire season. The fire burned through about 3,000 acres of endangered Cape Sable Seaside Sparrow habitat during prime nesting season and severely impacted 50-100 small, isolated hardwood hammocks embedded in the grass prairies. Objectives established during the suppression effort were met in that the fire was successfully constrained from burning a much larger area of active Cape Sable Seaside Sparrow habitat, and impacts to major hammocks within the fire perimeter were reduced through suppression efforts.

The second largest suppression fire was the Cattail Fire, a lightning caused fire in the East Everglades that started on June 8. It burned a total of 2,038 acres. This fire was not considered a candidate for wildland fire use due to location, private lands, improvements and highways threatened. This Type 3 fire was an interagency suppression effort that also involved the use of national level resources: T1 Airtanker, SEAT, T2 Helicopter. Extreme fire behavior was observed on this fire, including an 800’ fire whirl. The

approach of a violent afternoon thunderstorm during the second operational period triggered rapid evacuation of the fireline by firefighting resources.

Of the eleven suppression fires within the Park a total of two were lightning caused and the remainder incendiary. Two suppression fires, one within the Park (Mustang Fire, 623 acres) and one in the mutual threat zone (DOF212136, 55 acres) were the result of vehicular arson connected with either suicide or homicide incidents.

There was also significant fire activity immediately adjacent to the Park. In early April the DOFPITT fire managed by Florida Division of Forestry (DOF) in the Dade Corners area burned 1,300 acres over the course of several days. This fire closed major highways, jumped major highways, threatened two prison facilities and several commercial establishments. The western flank of the fire was held at the C31 Canal immediately on the eastern boundary of Everglades NP. Everglades personnel assisted in the burnout and holding on that flank. Type 1 Airtankers were used on that fire. At the end of April the DOF Little Ceasar Fire burned over 11,000 acres immediately to the east of Everglades NP south of Florida City. Once again Park resources held the western flank of that fire in cooperation with DOF. This fire closed both access highways to the Florida Keys several times during a week long period, threatened a prison and burned in or threatened Cape Sable Seaside Sparrow habitat. T1 Airtankers, SEAT and T1 and T2 helicopters were used in suppression efforts.

Wildland Fire Use

The largest wildland fire use fire was the second largest fire of the year in Everglades NP. The Squawk Creek #2 fire was one of two lightning fires that occurred on June 2. This fire burned for five days and eventually reached 4,134 acres in size. The separate Squawk Creek #1 fire burned for one day, for a total of 552 acres and came within 200 yards of joining the Squawk Creek #2 fire. Both of these fires were monitored, and Squawk #2 was managed under a Stage 2 Wildland Fire Implementation Plan. Although these fires occurred only 7 miles from the Lopez fire and less than one month later, they occurred after the onset of summer rains resulting in a mosaic burn in the grass prairies and minimal impacts to hardwood hammocks.

Another large wildland fire use fire was the Onion Key Bay fire that burned 2,472 acres over the course of several days in late June. This fire burned in remote coastal prairies in the NW area of the Park.

Prescribed Fire

The largest management ignited prescribed burn was in Pineland Blocks C&E where 2,442 acres were burned starting on June 7. Collectively nine prescribed burns were conducted in the Pinelands of ENP in June and July totaling 9,466 acres. We met almost all burn objectives in the Pinelands this year and most of the burns conducted successfully met the objectives. There was one small experimental prescribed burn for exotic plant treatment conducted in January which did not meet the planned objectives.

The fuels had been treated with herbicide the previous summer, but failed to burn despite ignition during a cold front passage as prescribed. In late July and August six more exotic treatment burns were conducted in remote coastal prairie areas of the Park. These were also follow-up treatments of areas that had been treated by air with herbicides primarily to control invasion of Old World Climbing Fern and Florida Holly, both exotics. These burns were by and large successful, but there is a continuing need for combination treatments in this area in the future.

Issues surrounding Cape Sable Seaside Sparrow (CSSS) habitat management precluded several other planned prescribed burns from occurring this year in the northernmost area of the Park. Meetings were conducted with the USFWS and cooperative researchers regarding CSSS issues this year. One CSSS meeting in May was prompted by the Lopez fire. A second meeting, in November, was a "Cape Sable Seaside Sparrow Fire Management Symposium" that was funded by direct appropriations in the Farm Bill. That meeting produced a draft of a five-year fire and research management strategy for the CSSS. That plan is being circulated now for final review and will be forwarded to the USFWS for compliance approval and issuance of a "Biological Opinion". USFWS, numerous cooperative researchers and federal and state fire management agencies participated in this symposium.

Private landowner issues and the wait for exotic plants to be treated by resource management staff precluded other prescribed burns that had been tentatively planned in the East Everglades area of the park.

The Park utilized both the Cumberland Gap Fire Use Module and the Great Smoky Fire Use Module for assistance in completing prescribed burns. We also had SE Regional Fire Ecologist Caroline Lansing on two different details to assist us with prescribed burn planning.

Changing requirements for prescribed fire planning required extra time for us to adapt our plans to meet new requirements.

Severity and Statewide Coordination

This year was the third in a row for high fire potential in the Park, with extended periods of drought and consequent stepped up preparedness levels. Three major pre-suppression and/or severity accounts were activated to assure availability of fire suppression resources. These accounts were activated in February, April and May. Severity was managed by a Type 3 incident organization from within the Park, supplemented by various single resource overhead.

Among other single resources the severity accounts were used to fund Type 1 handcrews, Type 2 & 3 Helicopters, a Single Engine Airtanker and other single resources staged in the park during various parts of the season.

The Park was an active participant in the statewide fire readiness mobilization of the 2001 fire season. Fire Management Officer Bob Panko was designated as the NPS Liaison to the statewide interagency unified command team. Unified ICs for this team were from the National Forests in Florida and Florida Division of Forestry headquarters, both located in Tallahassee. During a two week period at the height of activity Dave Lentz from the Intermountain Region was resource ordered in to be an on-site Liaison Officer with the unified command in Tallahassee. The Governor declared a state of emergency due to fire danger statewide which was quickly followed as in previous years, by FEMA declarations issued for many counties of the state. Various type 1 and 2 aviation resources were staged throughout the state, some strategically located to support both Everglades and Big Cypress. The utilization of national level resources for active fires and staging was expedited by participation within the statewide unified organization and was coordinated closely with Big Cypress National Preserve who also experienced major fire activity and utilized national level resources.

The Fire Effects Monitoring program continued throughout the year, established numerous new plots in the park and monitored post burn plots. The Fire Effects crew also traveled to Gulf Islands National Seashore to monitor plots post burn that had been established last year and to install additional plots.

Fire Management Plan

In November a contract was signed with Mangi Associates to update the Everglades Fire Management Plan and programmatic Environmental Assessment. The initial meeting with the vendor was held in December. The late year shutdown of internet based email and internet access has hampered the progress of this update.

Expanded Staffing

In January we received confirmation that the permanent and subject to furlough staffing had been considerably expanded in the Everglades Fire & Aviation program. Since our normal fire suppression season commences in late November/December we already had a full complement of seasonal employees on board when the additional positions were authorized. We have been working extremely hard in recruiting and filling these positions since February. We have had mixed success. Some positions were filled by April. Multiple registers were obtained from the Denver franchise throughout the year. Initial registers had very few qualified candidates. There has already been upward movement of some of our initial permanent hires within our own ranks. Unfortunately for us, a number of people who we hired who subsequently declined due to receiving other job offers or even transferred to better paying jobs after a short period of employment with us.

Attempts have been made to hire firefighter positions with alternative hiring authorities as well, with minimal success. Despite numerous contacts with the national contractor hired to assist in recruitment, we don't think we got many candidates as a result of their efforts. We personally conducted a campaign that included letters, emails and phone

contacts with state level wildland fire management agencies throughout the southern area. We also made numerous contacts with college placement advisors in forestry schools. Contacts were also made with NPS and local Job Corps centers, but unilaterally it seemed their placement advisors were going to require a lot of individual time from park staff to succeed in getting candidates from them. We plan a more personal campaign this year with all of the above.

Staffing and recruitment will continue to be a major workload for us in the coming year. It is critical for us to continue utilization of the Denver franchise as a recruitment source that has direct hiring authority.

Our Fire Program Assistant position, which was vacant for half of the year 2000, was finally announced through Park Human Resources in late November (due to delays in classification review) and was not filled until April 2001. We had several detailers in to assist through that period.

In late summer our Fire Ecologist position was approved and recruitment was initiated through the Denver franchise.

Natchez Trace Parkway

WILDLAND FIRE SUPPRESSION

The Park experienced 10 wildfires during 2001 with a total acreage of 6.5 acres burned in the Park and an additional 27.0 acres burned within the protection zone. The number of wildfires decreased 590% and acreage decreased 731%. The 6.5 acres burned within the Park and its protection zone during the year is summarized below.

Park Wildland Fires:

Size Class:	Acreage:	Number of Fires in 2001:
Class A:	0 - 1/4 acre	8
Class B:	1/4 - 9 acres	2
Class C:	10 - 99 acres	0
Class D:	99 – 299 acres	0
Total		10

Out-of-Park Interagency Fire Dispatches

A total of 15 Park personnel were dispatched to 10 interagency wildland fire incidents in five states. These dispatches were Lost Lake, Buffer, and Race Track Fires in Mississippi; Western Support and Star Fires in California; Icicle Complex and Salt Lake Fires in Washington; Red Bird Fall and Eastern District FEMA Fires in Kentucky and Knoxville Staging in Tennessee.

Interagency cooperation continued during 2001. One Park employee served as Supply Unit Leader on the Southern Area Type I Overhead team on three mobilizations.

Training

There were a total of 10 wildland fire-training opportunities in 2001 involving 17 attendances by 13 employees. Annual firefighter refresher training was provided for firefighters from the Park.

Basic Firefighter training was provided for 24 volunteers from Tupelo District volunteer fire department cooperators in Mississippi and nine volunteers from the cooperators of Horseshoe Bend National Military Park in Alabama. Basic Incident Command System Training was provided to park employees of Horseshoe Bend.

One park employee is a trainee in the national fire management-mentoring program.

Administrative goals

The Park Fire Management Program expanded from seven to twenty positions in 2001. The monthly fire safety newsletter continued.

Three Wildland Urban Interface (WUI) projects were completed in the Tupelo District on 36 acres of Park land.

Under the Rural Fire Assistance initiative personal protective equipment and training materials were purchased for 43 cooperating volunteer fire departments. Distribution of the materials was accomplished for 12 cooperators in the Tupelo District.

Prescribed Fire

Park prescribed fire personnel and equipment supported Tombigbee National Forest and the Noxubee National Wildlife Refuge on two occasions. One hazard fuel prescribed burn was accomplished on 10 acres of Park land.

Cumberland GAP NHP – Fire Use Module

It was an extraordinary first season for the Cumberland Gap Fire Use Module. They came on in early April as a brand new crew. Almost immediately, they were taking part in a normal module work and training load. As the season progressed, the module managed to set up the crew office and cache, ordering and organizing everything that a module might need for regular business.

Among the achievements of their first season: The module assisted Everglades National Park for three weeks in burning approximately 3,950 acres. The crew took part in prescribed fire planning in the Great Smoky Mountains National Park and Kings

Mountain National Military Park. Six weeks were spent in the Great Smokies assisting with a six acre wildland fire use fire, prescribed fire preparation, prescribed fire planning, pile burning, and WUI. While Shawn Nagle detailed with the Yellowstone module during a full month of heavy activity, the rest of the crew took a trip to Zion and Yosemite for the Cougar, and Hoover Fires. Various other project work included hazardous tree removal in Cumberland Gap and Everglades, assisting Cowpens National Battlefield by setting up parameters for a future prescribed fire program, and several weeks of one or two individuals from the FUM assisting the Smokies Fire Effects crew in their fire effects monitoring work.

PROJECTS

Project name	**Project type**	**Host Unit**	**Dates**	**Accomplishments**
Ekaneetlee	WFRB	GRSM	4-28/5-2-01	6 acres
Turkey Beard	Prep.	KIMO	5-27/30-01	40 chains
	WUI	KIMO	5-30/6-3-01	2 acres
Ski Mountain	WUI	GRSM	6-4/8-01	3 acres
Tab Cat	Plan	GRSM	6-4/6-01	
Pinelands I1	MIPF	EVER	6-13/14-01	450 acres
Boyscout	MIPF	EVER	6-15	200 acres
Pinelands A	MIPF	EVER	6-18/20	1800 acres
Headquarters	MIPF	EVER	6-23/27-01	1500 acres
Ski Mountain	Pile Burn	GRSM	7-9-01	1 acre
Bypass	WUI	GRSM	7-10/22-01 and 9-14/28-01	18 acres
Pinnacle	Hazard tree	CUGA	8-1/3, 6/8-01	3 acres
Parameters	Plan	COPN		
Cougar	Wildfire	ZION	8-19/20-01	1 acre
Hoover	WFRB	YOSE	8-21/9-2-01	8500 acres
Wash Ridge Spur	Prep.	GRSM	9-15/17-01	40 chains
Vista(Nagle assist YELL Module)	WFRB	GRCN	8-8/15-01	1056 acres
Sulfur(Nagle assist YELL Module)	WFRB	YELL	8-16/18-01 9-1/4-01	700 acres
Stone (Nagle assist YELL Module	WFRB	YELL	8-20/31-01	116 acres

ACCOMPLISHMENTS SUMMARY

Project Type	# of Assignments	Days on Assignment	Accomplishments
WFRB	5	42	10,378 acres *
RX Fire	5	12	3,951 acres
RX Preparation	2	7	80 chains
WUI	3	37	23 acres
Planning	2	7	
Fire Effects Plots	15	15	**

*Includes acres from Nagle assist to YELL module

**Assist GRSM Fire Effects crew in plot layout, monitoring and data input

Southeast Region Fire Effects Monitoring Program

Park Effects Team	**Parks Covered**	**01 Plots Installs**	**01 Plots Rereads**	**02 Proposed Installs**	**02 Proposed Rereads**	**Total # of Monitoring Types**	**Total # of Existing Plots**
EVER	EVER	14	47	52	48	6	47
	GUIS	6	14	10	11	3	17
	CANA	4	0	4	4	1	4
	TIMU	0	0	4	4	1	0
Totals	**4**	**24**	**61**	**70**	**67**	**11**	**68**
GRSM	GRSM	14	4	12	10	8	73
	BISO	0	0	3	6	2	6
	MACA	0	0	4	4	2	4
	COSW	0	0	4	4	1	4
	KIMO	0	7	4	4	2	7
Totals	**5**	**14**	**11**	**27**	**28**	**15**	**94**
NATR	NATR	8	4	20	49	1	53
	VICK	0	0	18	0	3	0
	LIRI	0	6	4	5	2	6
Totals	**3**	**8**	**10**	**40**	**54**	**6**	**59**
BICY	BICY	**14**	**15**	**16**	**63**	**3**	**120**
SER TOTALS	**13**	**60**	**97**	**153**	**212**	**35**	**341**

Fire Management Program Center

Fire Program Planning

Fire Management Program Center staff provided budget presentations at the National Fire Management Meeting. The staff also conducted three FIREPRO steering committee meetings. They worked with regional staff to conduct FIREPRO audits at the following parks:
Grand Canyon National Park
Big Bend National Park
Yosemite National Park
Saguaro National Park

Staff participated on the following Fire Use Management Team assignments:
Vista Fire, Grand Canyon National Park
Hoover Fire, Yosemite National Park
Biggs Fire, Lewis & Clark National Forest

In cooperation with the contracting officer in the Pacific West Region, FMPC staffs were able to replace older fire vehicles through the Working Capital Fund program. Vehicles were prioritized on a yearly replacement cycle based on years of service and condition of vehicles. The following were ordered for 2001 replacements:

PARK	TYPE	COST
JOTR	Heavy Eng	211,392.00
GRTE	Heavy Eng	185,711.00
LAMR	Heavy Eng	182,876.00
BAND	Light Eng	89,421.00
CACO	Light Eng	91,970.00
MEVE	Light Eng	87,395.00
SHEN	Light Eng	97,371.00
NERI	Light Eng	88,100.00
NATR	Light Eng	86,094.00
EVER	Light Eng	88,625.00
EVER	Light Eng	88,625.00
GRCA	Light Eng	88,100.00
YELL	Light Eng	93,655.00
BAND	FUM Carrier	
WHIS	FUM Carrier	
YELL	FUM Carrier	
ZION	FUM Carrier	
CUIS	Tender	117,308.00

Each year FMPC staff coordinates with other DOI agencies to determine priorities for the DOI Wildfire Facilities Construction Funding based on critical health and safety needs and/or program expansion considerations. Seven parks received funding for maintenance of existing structures or new construction of fire facilities this year. This year's total was $3,616,752.00.

Fire Operations and Safety

Work continued with the Departments of Agriculture and Interior, and with the Chiefs of Personnel for the 5 federal wildland fire agencies, on getting draft Supplemental GS-401 Standards approved by OPM, with meetings and conference calls. A DOI/FS decision was made to get the GS-401 Supplemental Standards approved by OPM prior to distributing the "Interagency Fire Program Management Qualifications Standards and Guide", since the GS-401 is the selected series for professional wildland fire management.

Provided several presentations on the above "Standards and Guide" to various groups, including the NPS National Fire Management Officers' meeting in Reno.

Work continued throughout the year developing a prevention component in the FIREPRO budget analysis process. The FIREPRO steering committee approved the proposed process, with finalization to be completed in 2002.

In mid-year, a new position was established at the FMPC under the Fire Operations Program, entitled "National Safety and Prevention Specialist". This position was subsequently encumbered by Al King, from the Intermountain Regional Office.

The SAFE Initiative was concluded with the retirement of the SAFE Program manager; a status of all projects was done in January. The Federal Fire & Aviation Safety Team (FFAST) took over most of the Initiative efforts, and addressed several key items that had not been accomplished.

A national "6 Minutes for Safety" program was developed and published on the NWCG Safety & Health Working Team website. This was widely announced and used by field units throughout the wildland fire community, and was/is deemed a strong success. It was subsequently reviewed and updated by the original interagency task group, which developed it, in preparation for the 2002 season. Coordination was done with the national daily situation report, announcing the daily "6 Minutes for Safety" topic.

Further revision work was done with the SAFENET program; due to state concerns, a disclaimer was added as to the invalidated nature of the contents. In addition, a data analysis was completed and a report, including lessons learned was prepared.

A new interagency "Annual Fire Refresher Training" program was drafted, with an interagency task group chaired by the NPS Safety & Prevention Specialist. The final

product is a website providing a centralized resource for instructors of refresher training. The website is scheduled to be launched on March 11, 2002.

An interagency "Fire Safety Alert" system was established, whereby safety bulletins, advisories, and alerts are input into electronic mail systems from federal and state agencies, with the intent of getting critical safety information to the lowest levels in the organizations in the least amount of time.

The draft "Interagency Fire Medical Standards" pilot project was deferred for several months, pending the hiring of a national program manager, which USFWS accomplished in early fall. The NPS is instrumental in implementing the pilot test program in the Southwest; much preparation work was accomplished with personnel and fire management officers in IMRO and related parks.

Through the NWCG Safety & Health Working Team, work was initiated with the Canadian Interagency Forest Fire Center to revise the newly developed Canadian interactive CD-ROM training program, "Wildland Fire….Safety on the Fireline". This revision, to be completed in early 2002, will make the excellent Canadian product more germane to U.S. fuels and firefighting, with primary use for refresher training, as identified in the syllabus mentioned above.

Significant efforts continued with the NWCG's Incident Operations Standards Working Team in finalizing new crew typing standards and revising the Fireline Handbook. Revised length of assignment standards were approved by NWCG in Jan. 2001.

The Rural Fire Assistance Program was emphasized throughout the first year of implementation, with successful assistance to numerous rural fire departments by NPS units throughout the U.S.: $1.55 million was distributed, primarily in training and personal protective equipment.

The National Fire Operations Program Leader was a member of the 30 Mile Fire Fatality Management Evaluation Review Board; subsequent assistance continues to the Forest Service, and follow-up actions taken by several NWCG Working Teams.

Work continued on revisions to RM-18.

The National Fire Operations Program Leader assisted with several park program reviews.

The National Fire Operations Program Leader spent over 5 weeks on fire assignments as an ICT2. The National Safety and Prevention Specialist spent 2 weeks on fire assignments as a PSC2 trainee.

Fire Communications and Education

One of the key aspects to implementing the National Fire Plan is communications. To meet this need, in November 2000 the document *National Park Service Communications for the National Fire Plan: Living With Fire In The 21st Century* was completed. It provides background information and direction to the field units of the National Park Service. This plan was distributed electronically both internally to the NPS as well as to interagency partners and at various meetings. It currently resides on the internal fire website, The Fire Line so the National Park Service audience can continue to access it.

In addition to communicating about the National Fire Plan, there was a need for better internal and external communications for the National Park Service Fire Management Program overall. In November 2000, detailers were assigned to the Fire Management Program Center to create the FireNet website, http://www.nps.gov/fire. The initial launch contained basic information about the wildland fire program, the National Fire Plan, fire information, structural fire, and fire aviation. The web team continued to post new information well into 2001 even as they returned to their home units. In February 2001, the National Fire Management Conference was held in Reno, Nevada. Powerpoint presentations, summaries, and other materials from the conference were posted on FireNet within a day of their presentation at the conference, providing access to conference materials to field personnel and our interagency partners, (whether they attended or not) for months afterward.

By March 2001 a standard position description was created for new Fire Education, Prevention, and Information Specialists. Most of these new specialists were in place by the end of the fiscal year. The eighteen positions cover a wide range of parks, several regions, and the national office. Their primary purpose is to coordinate internal and external fire information, education, and prevention programs in order to present an integrated interdisciplinary fire program within the National Park Service.

Once again, the annual summer fire season presented a number of opportunities for interagency collaboration. During 2001, when Planning Level 5 was reached, an interagency communications center was opened at the National Interagency Fire Center. National Park Service employees, including FMPC Fire Communications and Education staff, representatives from our partner DOI agencies and USDA Forest Service employees staffed the center. Media opportunities were extensive and included on base interviews, filming of fire supplies being shipped out to support the field, and the

Modular Airborne Fire Fighting System. In addition, the Communications and Education staff served as information officers on two fires, one in Utah and one in Wyoming.

Throughout the year, many products were created as a result of the efforts of the Communications and Education staff in addition to the FireNet website. These products included a bookmark promoting the website, and a video titled People, Parks, and Fire. The NPS Fire Communications and Education staff also acted as lead on the Department of the Interior interagency brochure *Fire Careers*. 75,000 brochures were distributed throughout the DOI community.

Communications and Education continue to be a critical part of the overall fire program, telling the story of fire in the National Park Service.

ROSS Accomplishments

The ROSS Project has accomplished the following during 2001: (1) Training for Phase 1 (loading the database with resources) completed in each geographic area except California: (2) Ability to show resource status: (3) Alpha testing on Phase 2 (basic Dispatch): (4) Design completion on add-on modules for Dispatch: (5) Implementation of a national help-desk for ROSS and DMS.

Fire Ecology Program

Significant program growth occurred during 2001. Many new field ecologists were hired. Monitoring programs and fire management planning were the two primary program accomplishments. Two significant Fire Ecology program-planning efforts were initiated in 2000. A Strategic Plan is being developed and a Business Needs Analysis is identifying requirements for a new information management application to replace the existing database/analysis tool.

Listings of Fire Ecologists and other Fire Ecology Program information may be found at:

http://inside.nps.gov/fire/ecology/index.htm

Satellite imagery was once again utilized for determining effects of wildland fires (and selected prescribed fires). [Thanks to Nate Benson who provided the following reports in the attachment section:]

NPS BURN SEVERITY MAPPING

OVERVIEW

Operational 30-meter burn severity mapping at a national scale is unprecedented for a federal agency such as the National Park Service (NPS).[1] The NPS has established an operational cooperative project with U.S. Geological Survey Biological Resource Division (BRD) and the EROS Data Center (EDC) to produce and deliver a suite of post-fire GIS and cartographic products for NPS. This represents an implementation phase following research begun in 1995 by BRD and NPS. EROS Data Center will produce a set of standardized map products and GIS data set using primarily Landsat 7 ETM+ 30-meter resolution image data. These products will include burn severity assessments, final fire perimeter, and tabulation of areas burned per severity classes and vegetation types. EDC is also responsible for distribution and storage of this data. NPS is responsible for selecting burns to map, field validation of burn severity assessments, coordinating training in remote sensing and field validation methods, and providing funds to EDC that support burn severity mapping, distribution of results, and data archiving. Carl Key (BRD) and Nate Benson (NPS) will oversee development and implementation of the burn severity mapping program, provide quality control for map products, support analysis of field validation data, and conduct training in remote sensing and field validation methods.

Key Program Participants

NPS	BRD	EDC
Nate Benson	Carl Key	Zhiliang Zhu
Brian Sorbel		Donald Ohlen
Tim Sexton		Steve Howard
Dick Bahr		Randy McKinley
Brad Cella		
Paul Reeberg		

YEAR 2001 EXPENSES

- **NPS:**
  - In Fiscal Year 2001, NPS allocated $250,000 to purchase satellite scenes and pay for production of burn severity maps of fires for 2000 and 2001; NPS was unable to transfer the money to EDC until the end of September; therefore not much of the money was expended in FY2001. EDC was able to carry over this funding.

[1]Burn severity is the degree of environmental change caused by fire, or the result(s) of fire. It is the cumulative effect of fire on ecological communities comprising the landscape. The GIS and cartographic products that this program produces will delineate final fire perimeter and provide more thorough information on the range of effects within the burn than any other tool federal land management agencies are currently using. It will help define lasting impacts and environmental responses from fire, to prepare for long-term management of burned areas. Because many fires cannot be closely monitored while active, post-fire evaluations will also yield insight into fire behavior across varying topography and vegetation, thus contributing basic information for research and modeling.

As of November 30, 2001 EDC has spent $10,374 on salary, travel, and purchasing Landsat scenes.

- Nate Benson spent approximately 20% ($12,000) of his time developing, implementing, and coordinating the NPS Burn Severity Mapping Program and conducting training on remote sensing and field validation methods.
- NPS fire effects modules were trained in ground validation methods. Some modules were able to collect ground validation data. Approximately $50,000 was spent in labor costs to collect this data; the fire effects modules absorbed these costs.

- **BRD:**
  - Carl Key (BRD researcher and developer of NBR/CBI) spent 35% ($25,000) of his time and $5,000 in base support funds assisting NPS with the Burn Severity Mapping program.
- Park Oriented Biological Support grant - $16,000
  - Supported training for NPS/EDC/BRD employees.
  - Supported travel costs for Carl Key and Nate Benson to attend conferences and meetings.
  - Purchase Landsat scenes for severity mapping at Bandelier National Monument and Glacier National Park.
- Joint Fire Science - $12,000 (Funding Mr. Key received to support other projects; however these projects also supported the NPS Burn Severity Mapping Program)
  - Supported writing of remote sensing and field validation methods for FIREMON web site.
  - Purchased equipment to support burn severity mapping.
  - Supported travel to meetings.

- **EDC:**
  EDC through the FIREVIEW project provided approximately $14,000 to demonstrate proof of concept to FMLB and support burn severity mapping in NPS units.

ACCOMPLISHMENTS FOR 2001

Burn Severity Assessments Completed in 2001

Assessment Type	Park Unit	Fire Year	Size (acres)	Number of Fires*	Funding Source
Initial	Yukon Charlie	1999	154076	5	NPS
Initial/Extended	Bandelier	2000	47650	1	BRD
Initial/Extended	Big South Fork	2000	7365	4	NPS
Extended	Glacier	2000	2742	2	BRD
Extended	Grand Canyon	2000	27700	2	Fireview
Extended	Grand Teton	2000	9455	4	Fireview
Extended	Jewel Cave	2000	84782	1	Fireview
Initial/Extended	Mesa Verde	2000	28504	2	NPS/Fireview

Burn Severity Assessments Completed in 2001

Assessment Type	Park Unit	Fire Year	Size (acres)	Number of Fires*	Funding Source
Extended	Wind Cave	2000	1136	1	NPS/Fireview
Initial/Extended	Yellowstone	2000	6257	4	NPS/Fireview
Initial	Yosemite	2001	8016	1	NPS
Intial	Glacier	2001	71000	1	BRD
Initial	Grand Canyon	2001	9242	3	NPS
Initial	Grand Teton	2001	4470	1	Fireview
Initial	Yellowstone	2001	13477	8	NPS
TOTAL	11 NPS Units		475872	40	

*****Includes fires 10 acres or greater and fires adjacent to park service units.

Ground Validation Plots Installed 2001

NPS Unit	# of Plots Installed
Bandelier	5
Big South Fork	8
Glacier	20
Grand Canyon	54
Grand Teton	60
Mesa Verde	31
Yellowstone	26
Yukon Charlie	118
TOTAL	318

Training/Presentations in 2001

- Remote Sensing and Field Validation Methods Training, Los Alamos NM, 8/28-30/01
- Remote Sensing and Field Validation Methods Training, Glacier NP MT, 9/25-27/01
- Burn Severity Presentation on Alaska, NPS GIS Conference, Primm Valley NV, 12/6/01
- Burn Severity Training, Fire GIS Workshop – Primm Valley NV, 12/10/01
- Burn Severity Presentation, RX92- NCTC Virginia, 1/25/01
- Burn Severity Presentation, National FMO Conference (Pacific West Region), 2/28/01

Training/Presentations in 2001 continued

- Burn Severity Presentation, NPS inventory and Monitoring group, Ft. Collins, 3/9/01
- Burn Severity Presentation, NPS Fire Ecology Steering Committee, Tallahassee, FL 5/2/01
- Remote Sensing Training, Yellowstone National Park WY, 9/19/01
- Remote Sensing Training, Sioux Falls SD, 8/7-9/01

Support Products Created in 2001

- Draft of overview and remote sensing and field validation methods are available on the FIREMON web site: http://fire.org/firemon/.
- Developed Access database to store ground validation data. Also available on FIREMON web site.
- Initiated web site development to archive burn severity mapping data.

Prioritization of Year 2000 Fires for Burn Severity Mapping

Fires are prioritized for mapping based on size, vegetation type, and significance of a fire (ecological, social, and/or political reasons). Prioritization can change based on local, regional, and/or national need. In most cases, low priority fires will not be completed unless they are part of satellite scene that contains a high or medium ranked fire. Ancillary fires are fires greater than 10 acres and less than 100 acres. Parks had to have at least one low priority fire to be ranked.

ALASKA REGION 2000 FIRES

NPS Unit		High	Medium	Low	Ancillary	Total
Denali	Sum of Acres	43,578				43,578
	Number of Fires	4				4

NORTHEAST REGION 2000 FIRES

NPS Unit		High	Medium	Low	Ancillary	Total
Shenandoah	Sum of Acres	24,222				24,222
	Number of Fires	1				1

MIDWEST REGION 2000 FIRES

NPS Unit		High	Medium	Low	Ancillary	Total
Jewel Cave	Sum of Acres	84,782				84,782
	Number of Fires	1				1
Theodore Roosevelt	Sum of Acres		278			278
	Number of Fires		1			1

MIDWEST REGION 2000 FIRES

Wind Cave	Sum of Acres	1,136				1,136
NPS Unit		**High**	**Medium**	**Low**	**Ancillary**	**Total**
	Number of Fires	1				1
Total Acres		85,918	278			86,196
Total Number of Fires		2	1			3

SOUTHEAST REGION 2000 FIRES

NPS Unit		**High**	**Medium**	**Low**	**Ancillary**	**Total**
Big South Fork	Sum of Acres	7,365				7,365
	Number of Fires	4				4
Everglades	Sum of Acres	9,403	644	541	48	10,636
	Number of Fires	9	2	3	1	15
Total Acres		16,768	644	541	48	18,001
Total Number of Fires		13	2	3	1	19

PACIFIC WEST REGION 2000 FIRES

NPS Unit		**High**	**Medium**	**Low**	**Ancillary**	**Total**
City of Rocks	Sum of Acres	10,586.6				10,586.6
	Number of Fires	1				1
Craters of the Moon	Sum of Acres		585	180		765
	Number of Fires		1	1		2
Death Valley	Sum of Acres	5,861				5,861
	Number of Fires	1				1
Great Basin	Sum of Acres	2,500			30	2,530
	Number of Fires	1			1	2
Hawaii Volcanoes	Sum of Acres	1,000				1,000
	Number of Fires	1				1
Total Acres		19,947.6	585	180	30	20,742.6
Total Number of Fires		4	1	1	1	7

INTERMOUNTAIN REGION 2000 FIRES

NPS Unit		**High**	**Medium**	**Low**	**Ancillary**	**Total**
Bandelier	Sum of Acres	47,650				47,650
	Number of Fires	1				1
Big Thicket	Sum of Acres			448		448
	Number of Fires			3		3
Bryce Canyon	Sum of Acres			500		500

INTERMOUNTAIN REGION 2000 FIRES

	Number of Fires			2		2
NPS Unit		**High**	**Medium**	**Low**	**Ancillary**	**Total**
Dinosaur	Sum of Acres	11,055				11,055
	Number of Fires	1				1
Glacier	Sum of Acres	2,386	356			2,742
	Number of Fires	1	1			2
Grand Canyon	Sum of Acres	13,000				13,000
	Number of Fires	1				1
Great Sand Dunes	Sum of Acres	2,403				2,403
	Number of Fires	1				1
Great Teton	Sum of Acres	16,055				16,055
	Number of Fires	5				5
Lake Meredith	Sum of Acres		1,480	240		1,720
	Number of Fires		3	2		5
Mesa Verde		1,890				1,890
		2				2
Pecos	Sum of Acres	130				130
	Number of Fires	1				1
Yellowstone	Sum of Acres	6,257				6,257
	Number of Fires	4				4
Total Acres		100,826	1,836	1,188		103,850
Total Number of Fires		18	4	7		28

OUTLOOK FOR 2002

Goals

- Complete extended assessment of all high priority fires for year 2000 and 2001.
- Provide initial assessments of 2002 fires as requested.
- Ground validates more than 25% of 2000 and 2001 high priority fires.
- Initiate burn severity atlases in three parks.
- Provide two training sessions on remote sensing and ground validation methods.
- Have burn severity web site operational by July of 2002.
- Have Version 1 of remote sensing and field validation methods on FIREMON web site by April 2002.

Funding

FIREPRO has allocated money this year to complete extended assessments of 2001 fires, perform initial assessments of 2002 fires (as requested), develop fire atlases in parks, and develop a web site to enable greater access to burn severity data. FIREPRO has also provided funding to support burn severity field validation/ remote sensing training, and funds to support costs associated with field validation.

Prioritization of Year 2001 Fires for Burn Severity Mapping

Fires are prioritized for mapping based on size, vegetation type, and significance of a fire (ecological, social, and/or political reasons). Prioritization can change based on local, regional, and/or national need. In most cases, low priority fires will not be completed unless they are part of satellite scene that contains a high or medium ranked fire. Ancillary fires are fires greater than 10 acres and less than 100 acres. Parks had to have at least one low priority fire to be ranked.

INTERMOUNTAIN REGION 2001 FIRES

NPS Unit		High	Medium	Low	Ancillary	Total
Amistad	Sum of Acres			100	80	180
	Number of Fires			1	1	2
Bandelier	Sum of Acres	6,100				6,100
	Number of Fires	1				1
Big Thicket	Sum of Acres	1,060	575		107	1,742
	Number of Fires	1	1		2	4
Bryce Canyon	Sum of Acres	1,191		170	25	1,386
	Number of Fires	1		1	1	3
Dinosaur	Sum of Acres	2,192	1,180	395	295.5	4,062.5
	Number of Fires	1	3	2	10	16
Glacier	Sum of Acres	71,000				71,000
	Number of Fires	1				1
Grand Canyon	Sum of Acres	3,900	902	250		5,052
	Number of Fires	2	1	1		4
Grand Teton	Sum of Acres	8,507	800	231	266	9,804
	Number of Fires	2	2	2	10	16
Lake Meredith	Sum of Acres		1,622	407	20	2,049
	Number of Fires		3	2	2	7
Yellowstone	Sum of Acres	6,600	1,150	240	10	8,000
	Number of Fires	2	2	2	1	7
Zion	Sum of Acres		595			595
	Number of Fires		1			1

INTERMOUNTAIN REGION 2001

NPS Unit		High	Medium	Low	Ancillary	Total
Total Acres		100,550	6,824	1,793	804	109,971
Total Number of Fires		11	13	11	27	62

ALASKA REGION 2001 FIRES

NPS Unit		High	Medium	Low	Ancillary	Total
Denali	Sum of Acres	4,704				4,704
	Number of Fires	1				1
Total Acres		4,704				4,704
Total Number of Fires		1				1

MIDWEST REGION 2001 FIRES

NPS Unit		High	Medium	Low	Ancillary	Total
Badlands	Sum of Acres	3,572	303.8			3,875.8
	Number of Fires	1	1			2
Buffalo River	Sum of Acres	1,470	937		90	2,497.4
	Number of Fires	1	1		2	4
Devils Tower	Sum of Acres		320			320
	Number of Fires		1			1
Indiana Dunes	Sum of Acres			388	254	642
	Number of Fires			2	6	8
Ozark	Sum of Acres		601.9	250		851.9
	Number of Fires		1	2		3
Tallgrass Prairies	Sum of Acres		9,173		64	9,237.4
	Number of Fires		2		1	3
Wilson's Creek	Sum of Acres			200.9		200.9
	Number of Fires			1		1
Wind Cave	Sum of Acres	1,848			15	1,863
	Number of Fires	1			1	2
Total Acres		6,890	1,1336	839	424	19,488
Total Number of Fires		3	6	5	10	24

SOUTHEAST REGION 2001 FIRES

NPS Unit		High	Medium	Low	Ancillary	Total
Big Cypress	Sum of Acres	62,665	1,511	729.8	357.9	65,263.7
	Number of Fires	8	3	4	9	24
Everglades	Sum of Acres	39,777	6,011	1,124	291	47,203
	Number of Fires	11	10	6	10	37
Great Smoky Mt	Sum of Acres	8,500	1,331.6	671.4	55	10,558
	Number of Fires	2	2	3	2	9
Gulf Islands	Sum of Acres			108		108
	Number of Fires			1		1
Little River	Sum of Acres			274	44	318
	Number of Fires			1	1	2
Obed	Sum of Acres			200		200
	Number of Fires			1		1
Total Acres		110,942	8,853.6	3,107.2	747.9	123,650.7
Total Number of Fires		21	15	16	22	74

NORTHEAST REGION 2001 FIRES

NPS Unit		High	Medium	Low	Ancillary	Total
New River	Sum of Acres		547		59.9	606.9
	Number of Fires		1		2	3
Shenandoah	Sum of Acres			130.5		130.5
	Number of Fires			1		1
Total Acres			547	131	60	737
Total Number of Fires			1	1	2	4

PACIFIC WEST REGION 2001 FIRES

NPS Unit		High	Medium	Low	Ancillary	Total
Crater Lake	Sum of Acres				143	143
	Number of Fires				2	2
John Day	Sum of Acres	1,300				1,300
	Number of Fires	1				1
Joshua Tree	Sum of Acres			373		373
	Number of Fires			3		3
Lake Meade	Sum of Acres		618	100	30	748
	Number of Fires		1	1	2	4
Mojave	Sum of Acres			120	10	130
	Number of Fires			1	1	2

PACIFIC WEST REGION 2001 FIRES

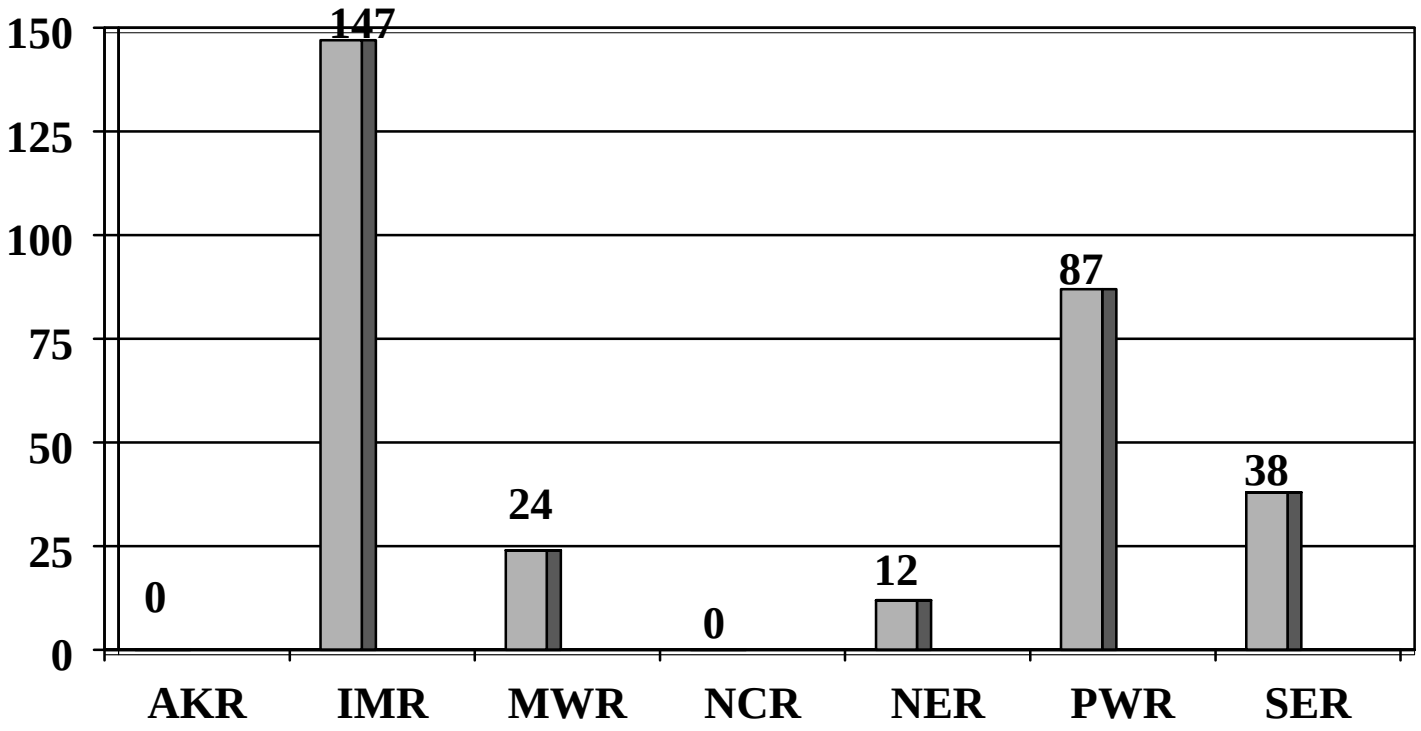
NPS Unit		High	Medium	Low	Ancillary	Total
North Cascades	Sum of Acres	56,445			30	56,475
	Number of Fires	2			1	3
Point Reyes	Sum of Acres		339		10.3	349.3
	Number of Fires		1		1	2
Redwood	Sum of Acres		330	258	211.5	799.5
	Number of Fires		1	1	3	5
Sequoia Kings	Sum of Acres	4,152	508		120	4,780
	Number of Fires	1	1		2	4
Whiskeytown	Sum of Acres	1,800	650		17	2,467
	Number of Fires	1	1		1	3
Yosemite	Sum of Acres	8,016			71	8,087
	No. of Fires	1			3	4
Total Acres		71,713	2,445	851	642.8	7,5652
Total Fires		6	5	6	16	33

OTHER FIRES TO MAP IN 2002

NPS Unit	Fire Name	Fire Year	Size (Acres)
Noatak	Uvgoon2	1999	88,345
Everglades	All fires	1999	29,107
Saguaro	Box Canyon	1999	6,477

2001 SERVICE WIDE FIRE STATISTICS

2001 MUTAL AID RESPONSES BY REGION
Number of Responses

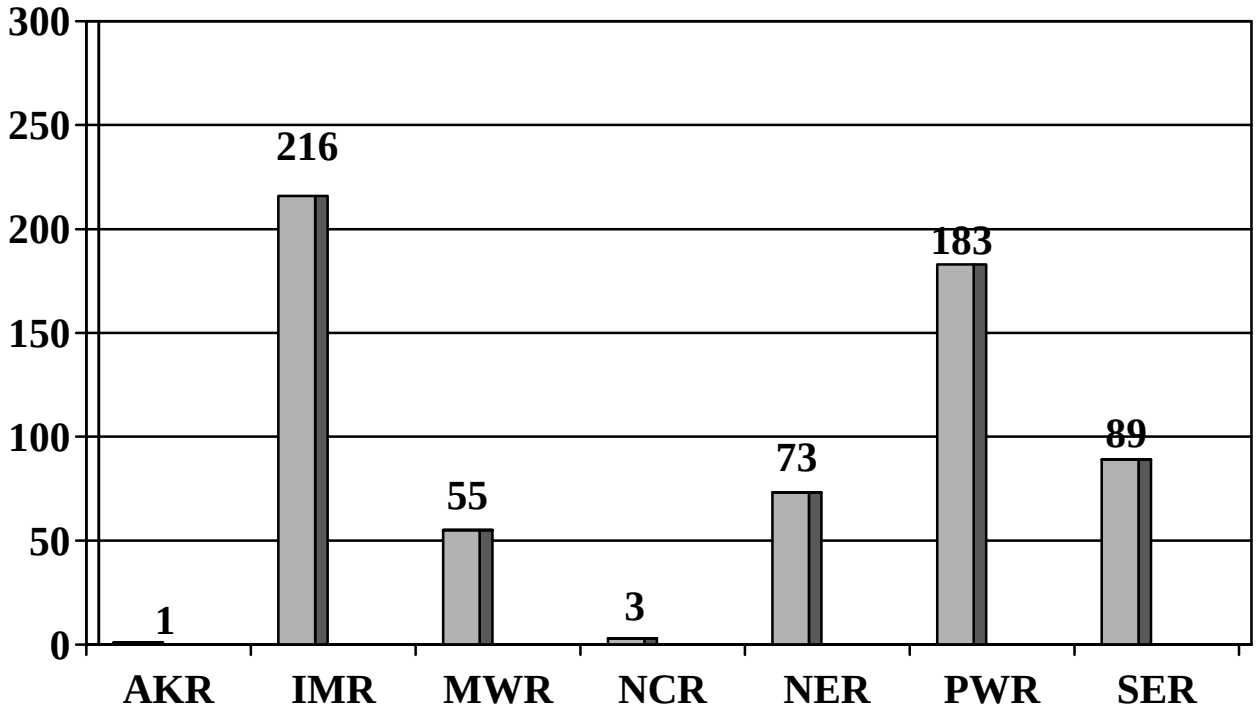


KEY:

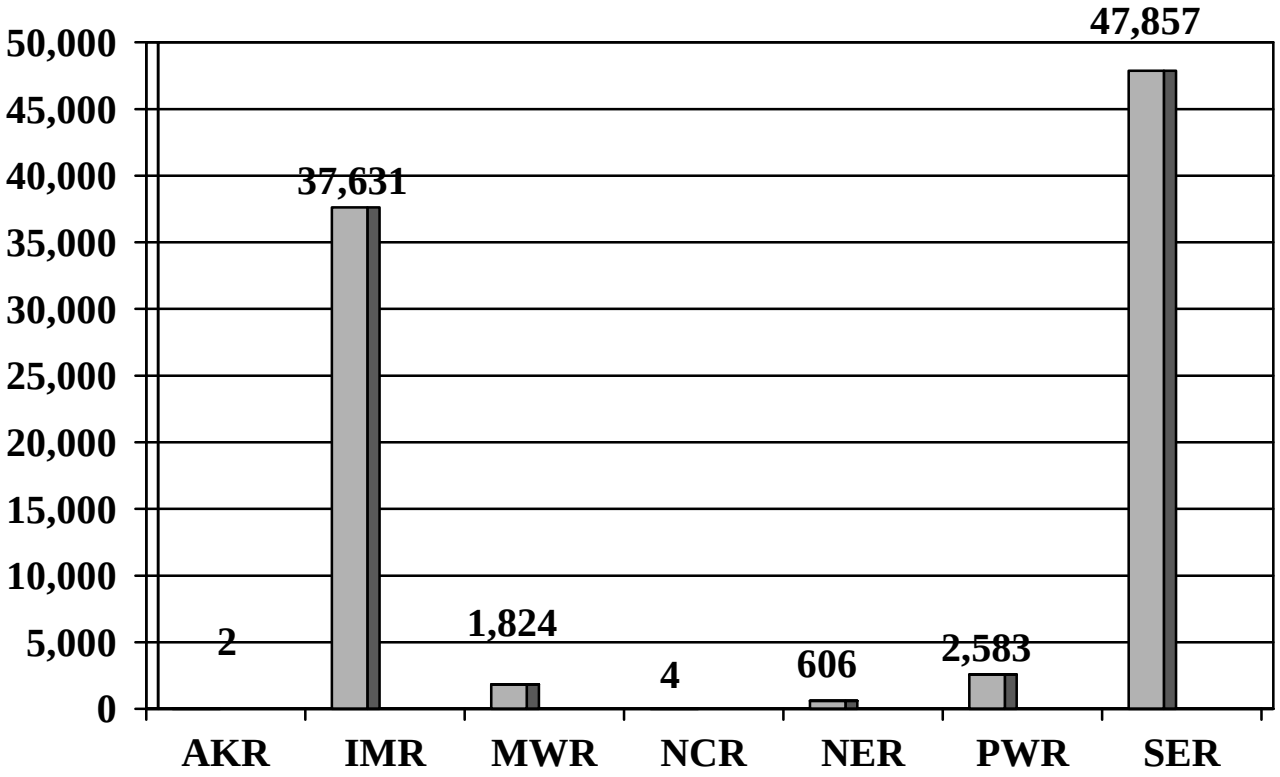
AKR = Alaska Region
IMR = Intermountain Region
MWR = Midwest Region
NCR = National Capital Region
NER = Northeast Region
PWR = Pacific West Region
SER = Southeast Region

2001 WILFIRES BY REGION

Number of Fires

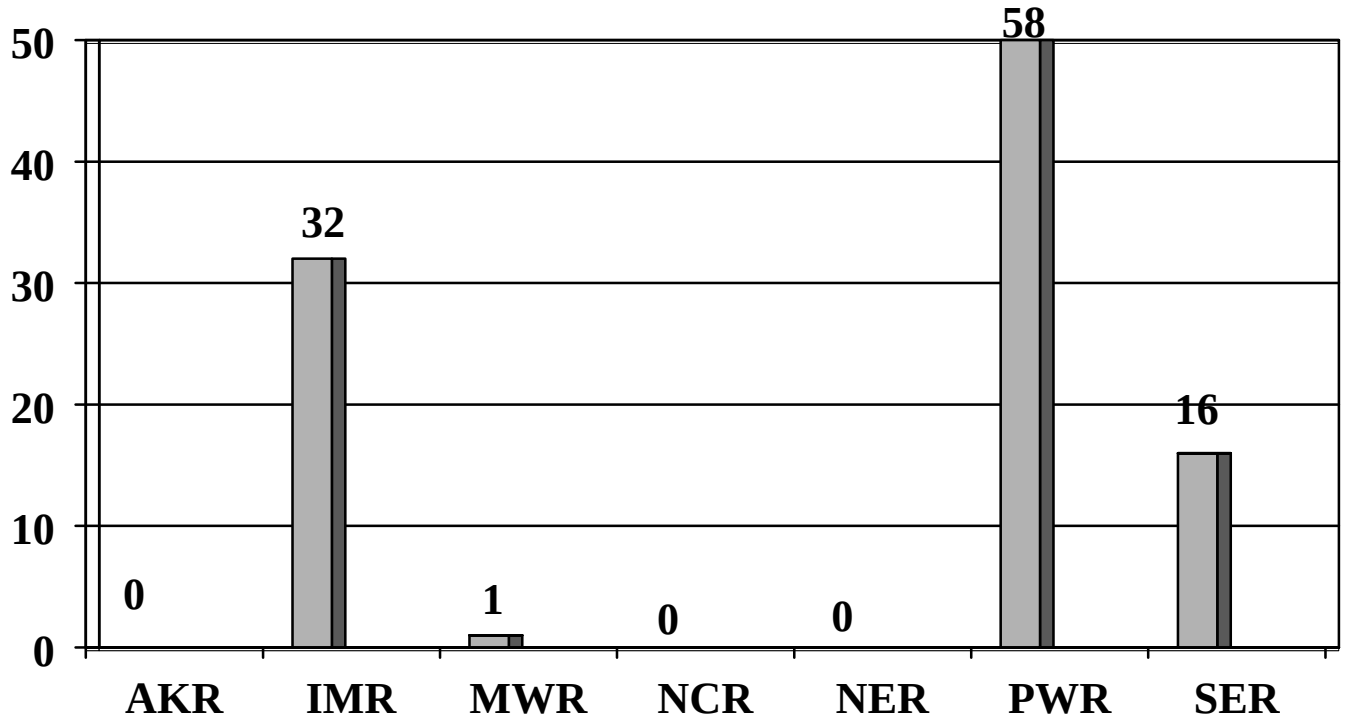


Number of Acres

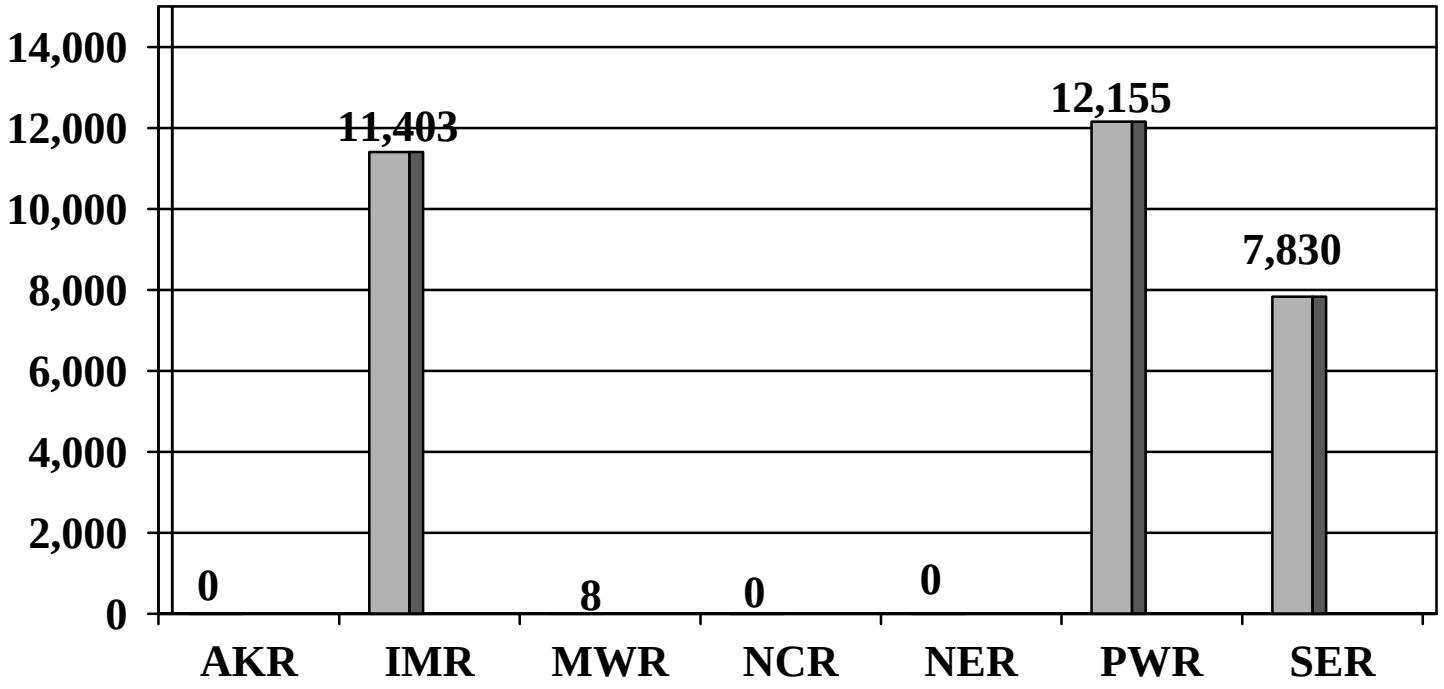


2001 WILDLAND FIRE USE BY REGION

Number of Fires

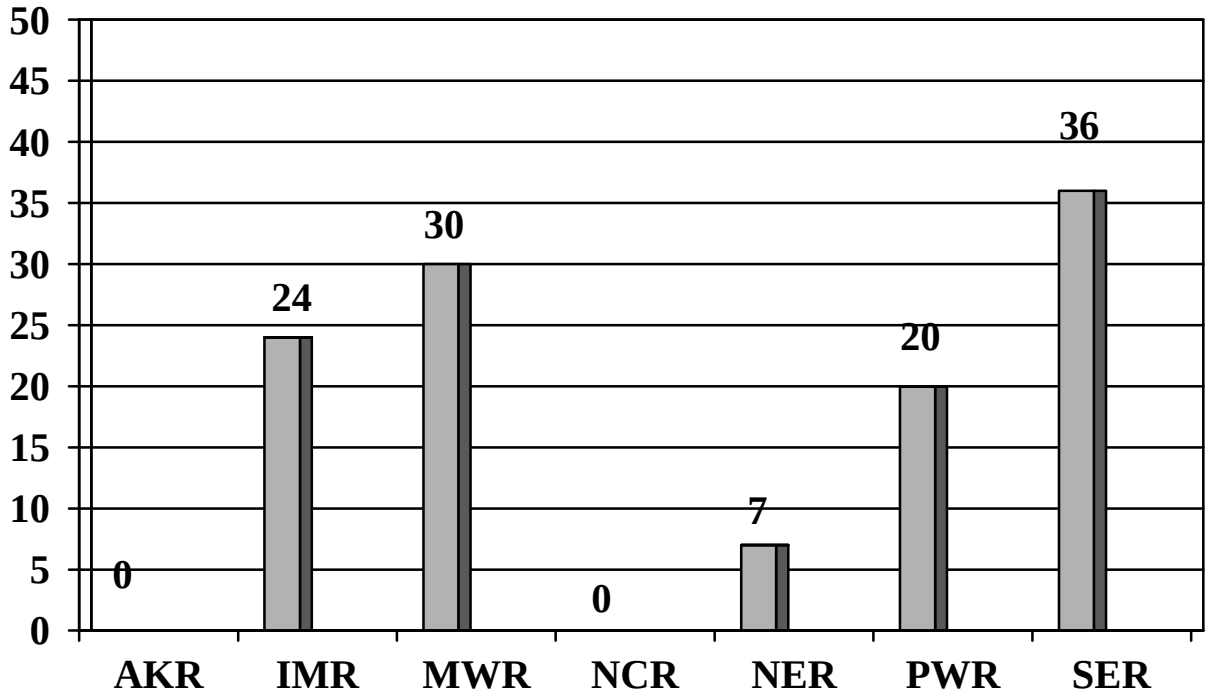


Number of Acres

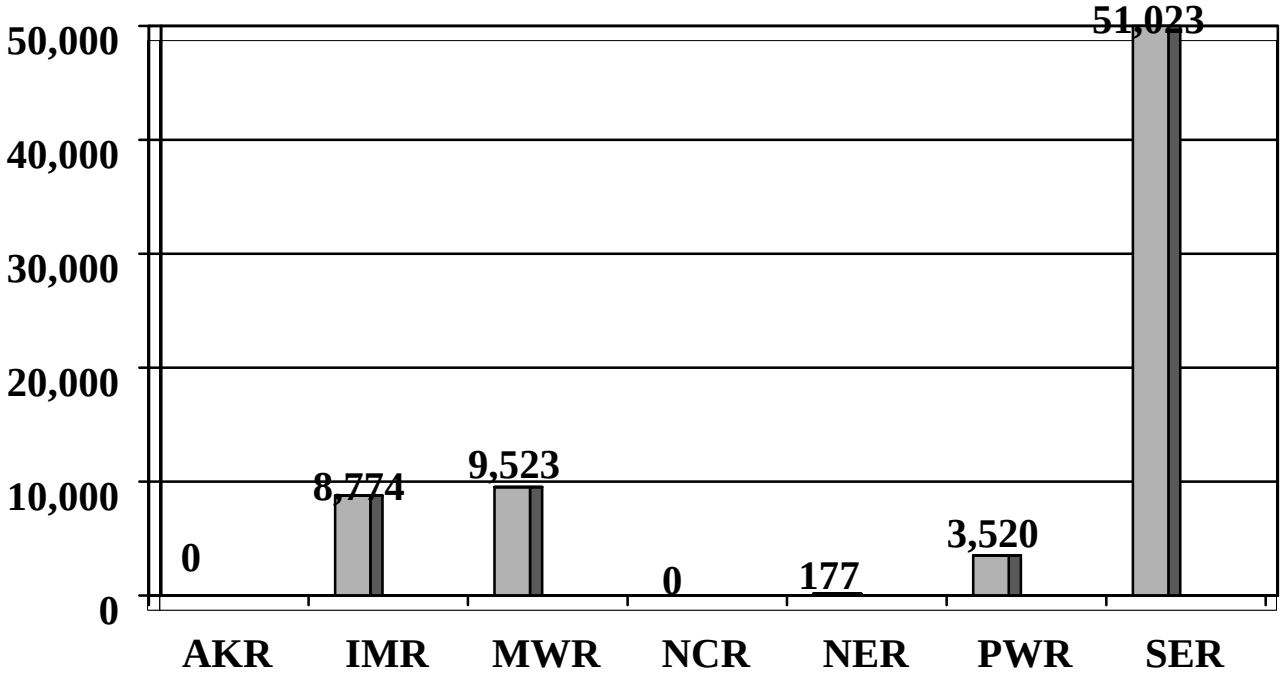


2001 PRESCRIBED FIRES BY REGION

Number of Fires

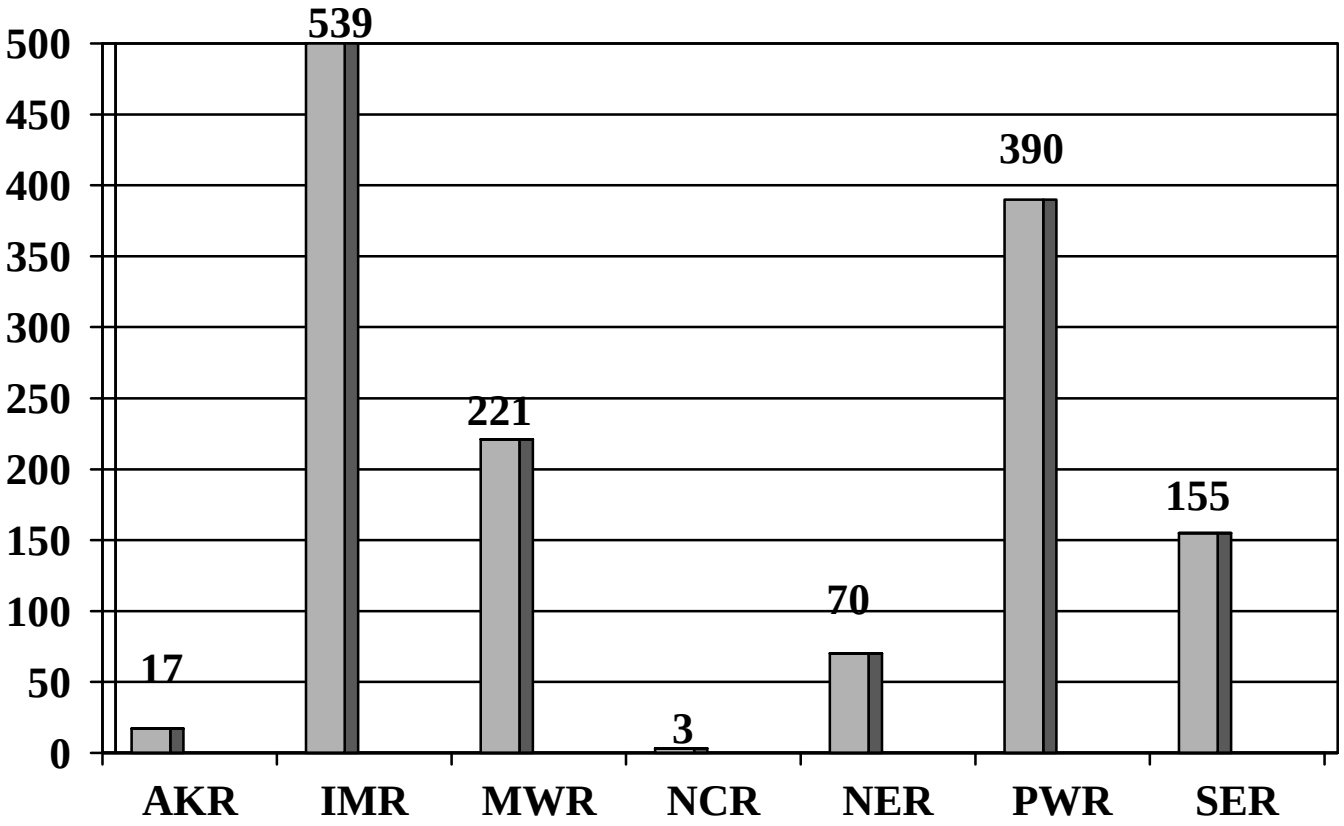


Number of Acres



2001 SUPPORT ACTIONS BY REGION

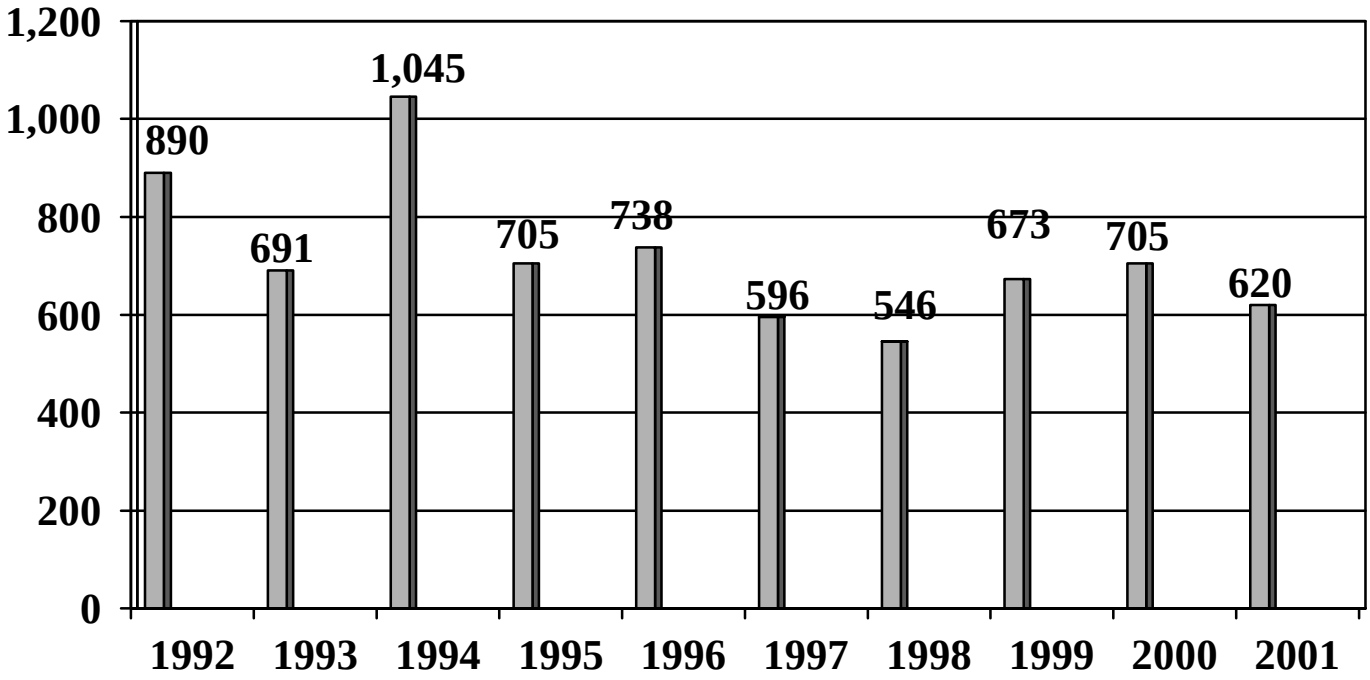
Number of Support Action



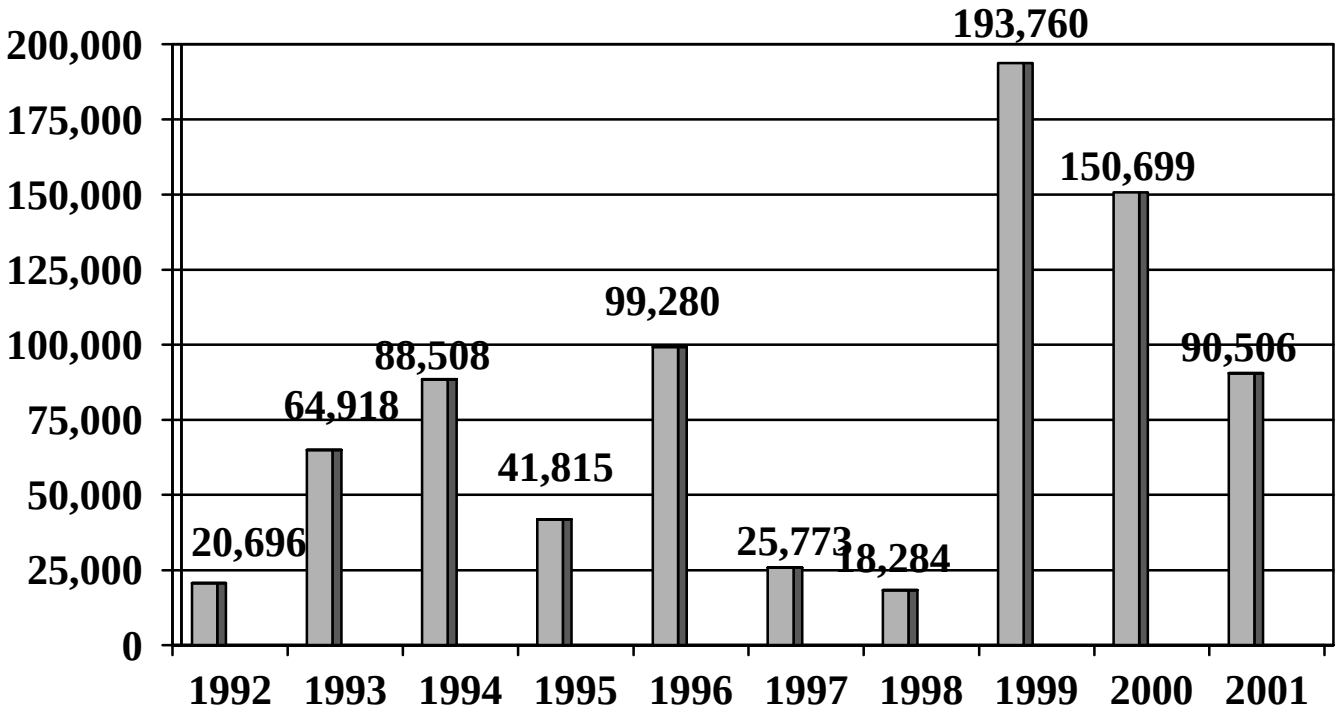
1992-2001
FIRE STATISTICS
SERVICEWIDE

NPS WILDFIRES, 1992-2001

Number of Fires

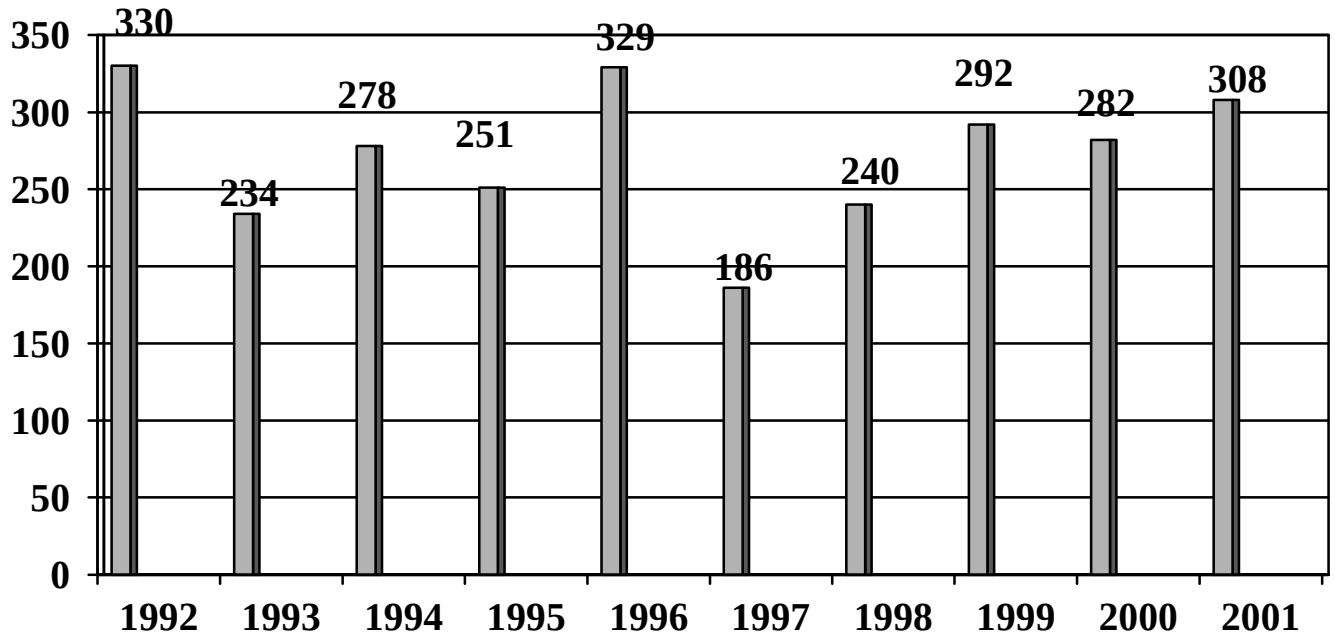


Number of Acres

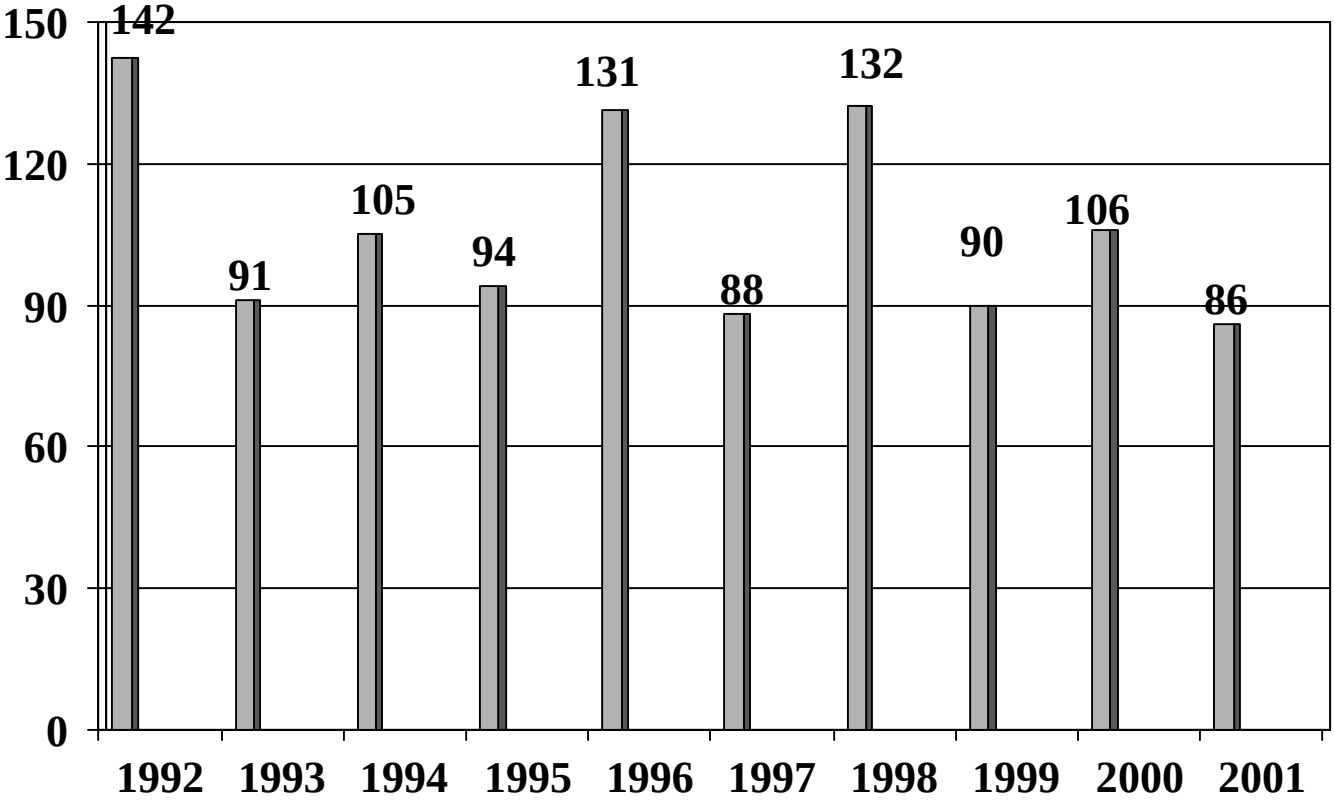


NPS MUTUAL AID RESPONSES, 1992-2001

Number of Responses

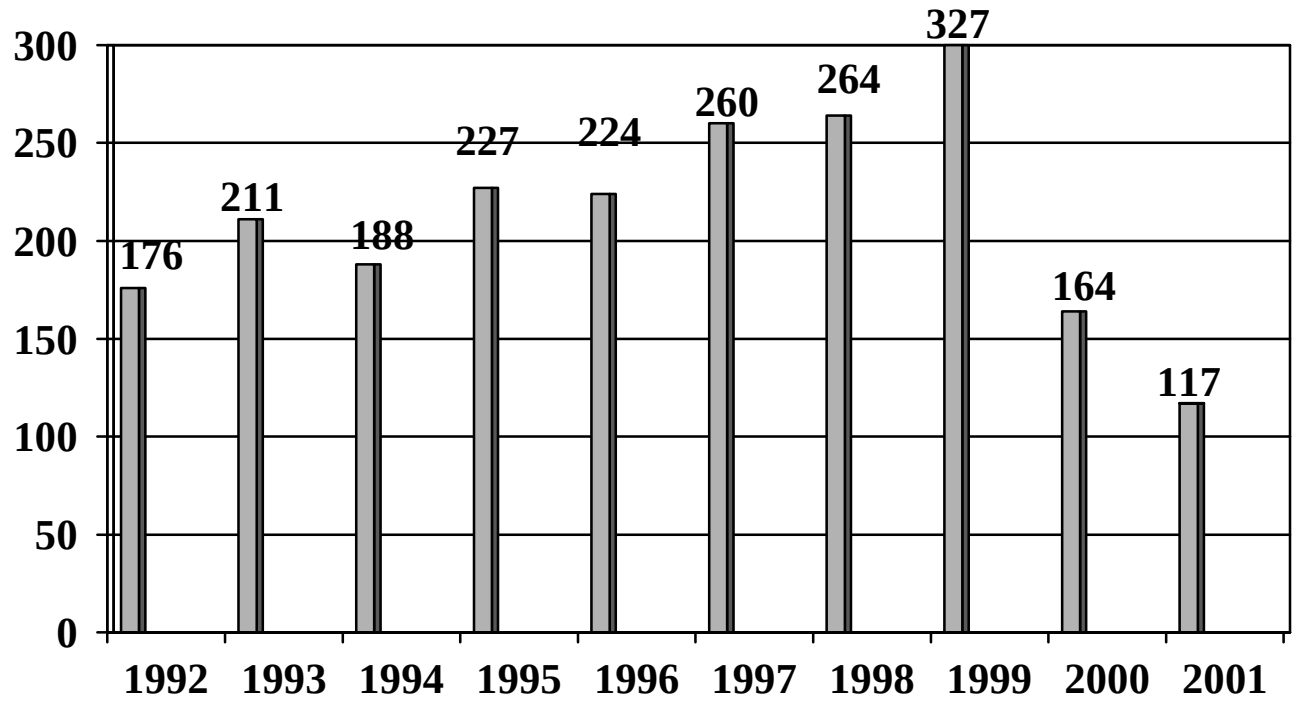


NPS False Alarms, 1992-2001

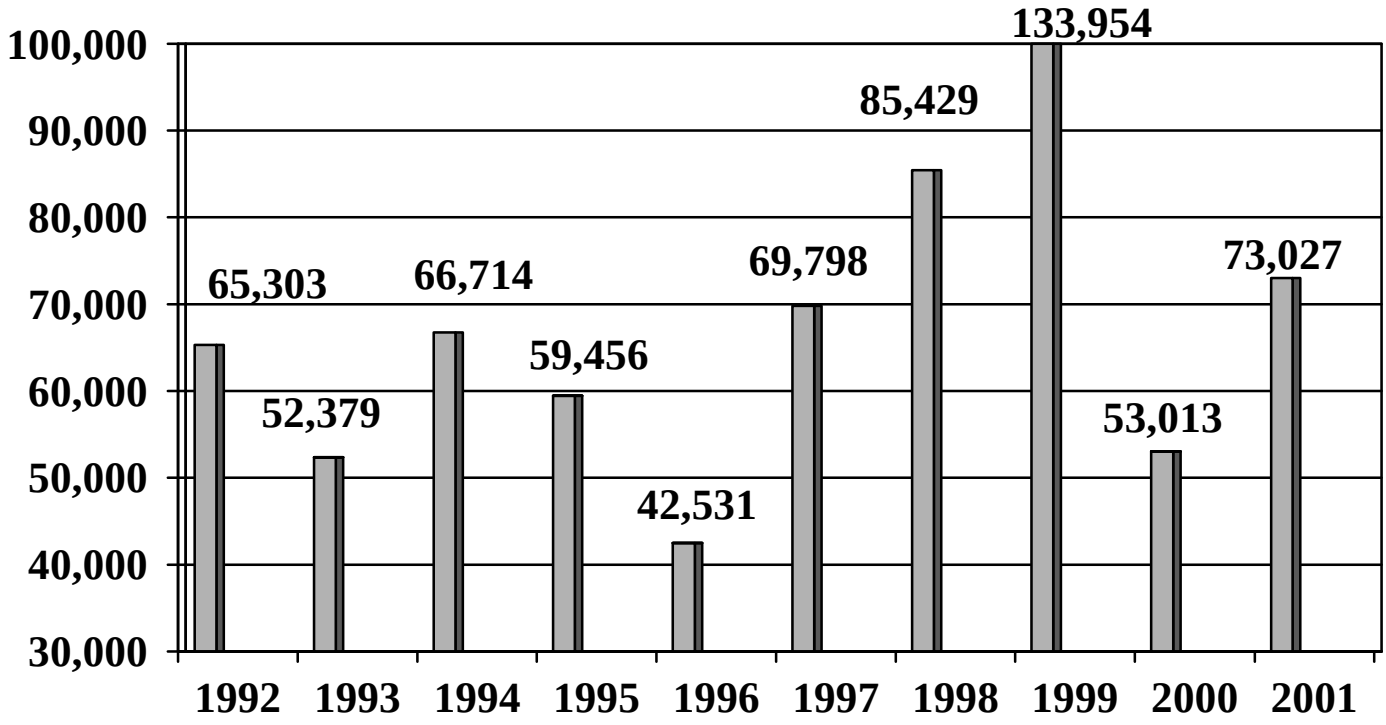


NPS PRESCRIBED FIRE, 1992-2001

Number of Fires

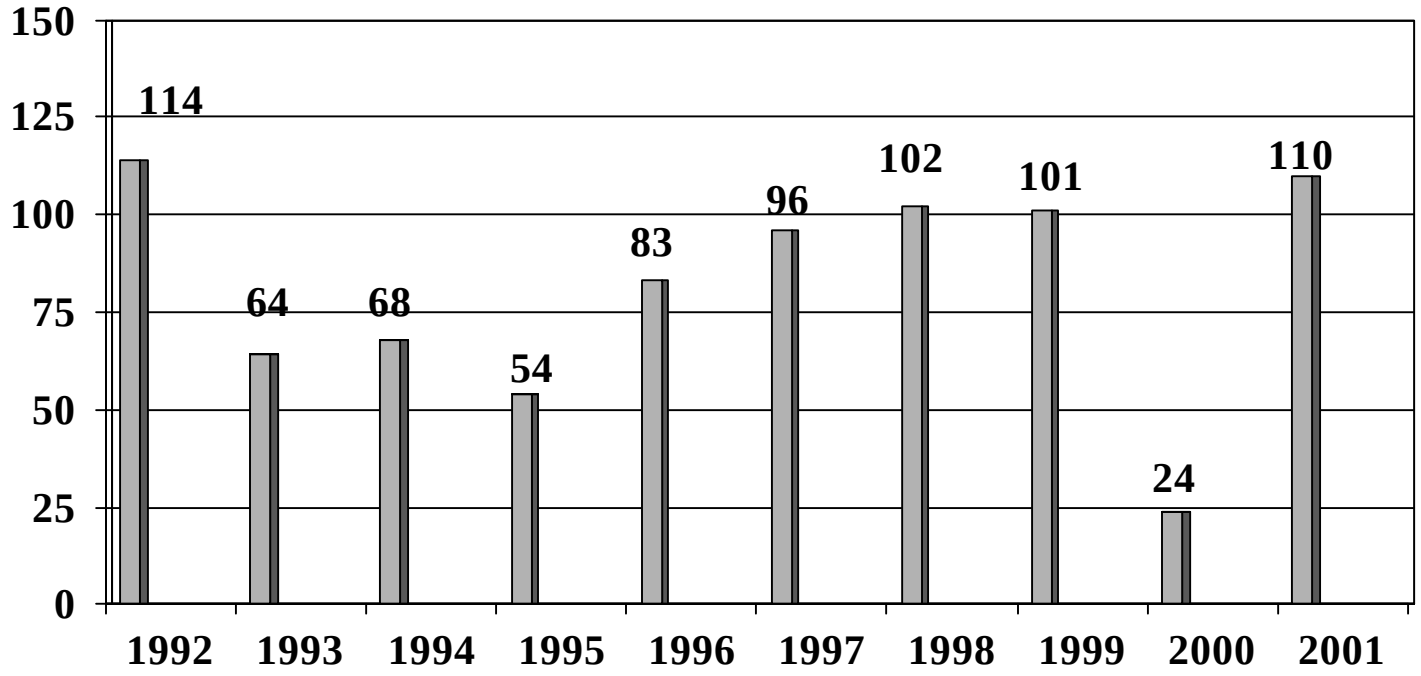


Number of Acres

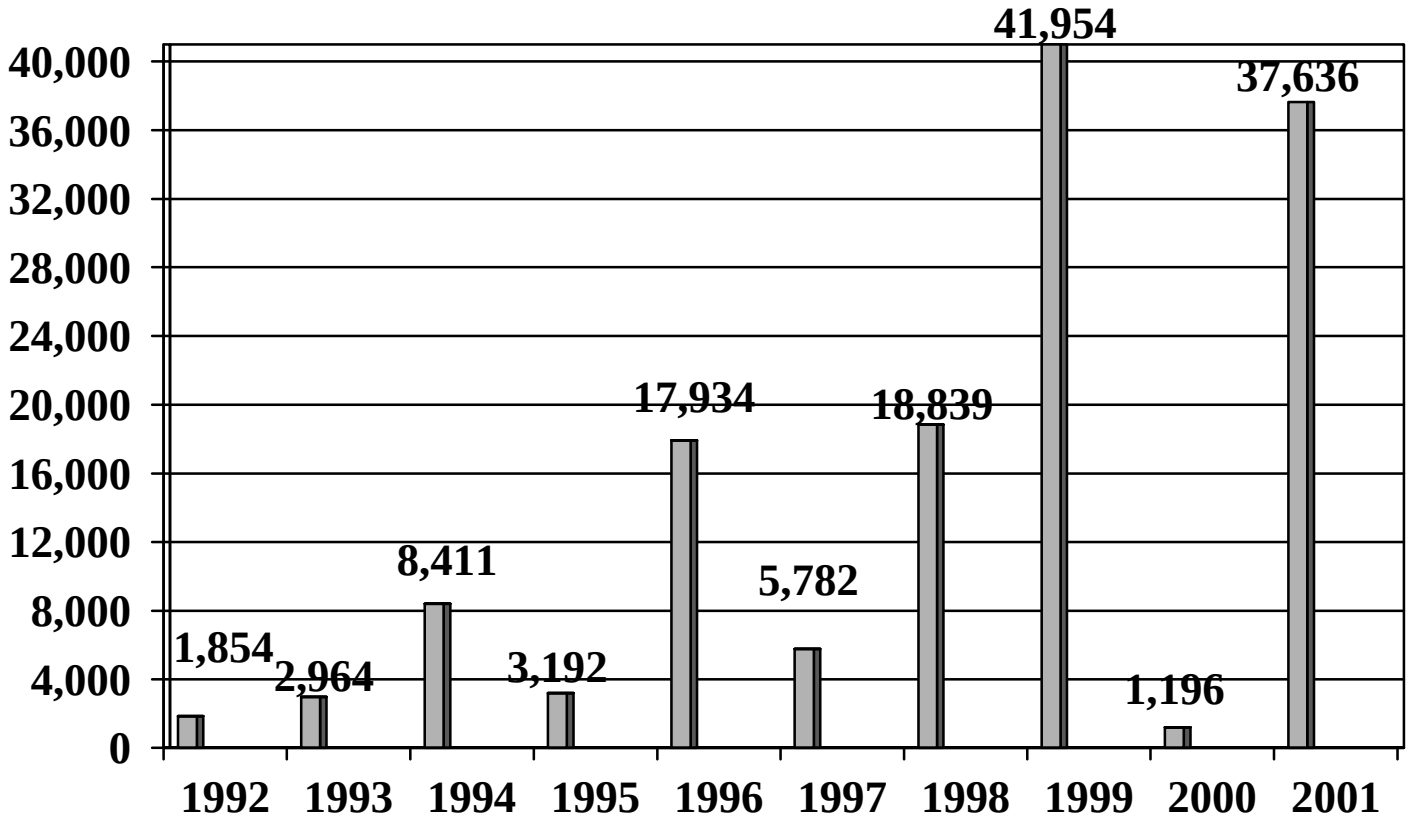


NPS WILDLAND FIRE USE, 1992-2001

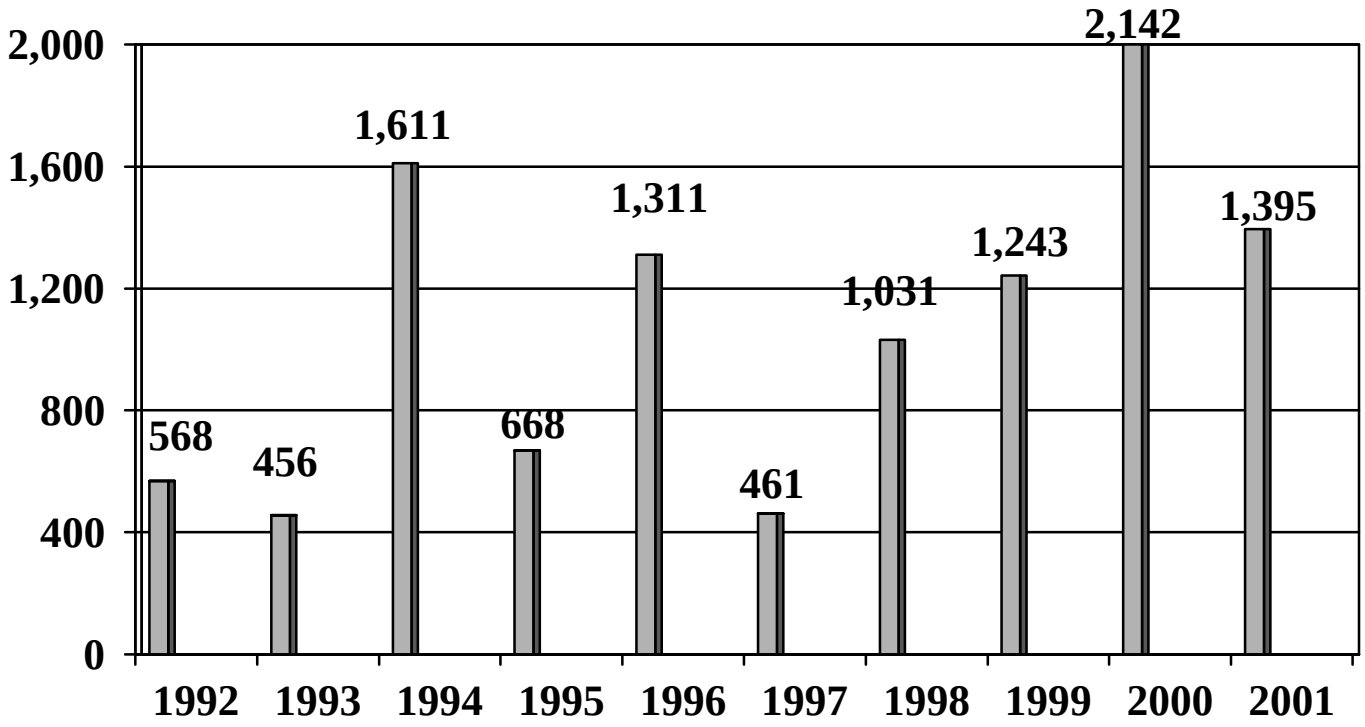
Number of Fires



Number of Acres



NPS SUPPORT ACTIONS, 1992-2001
Number of Support Actions



Number of Support Actions

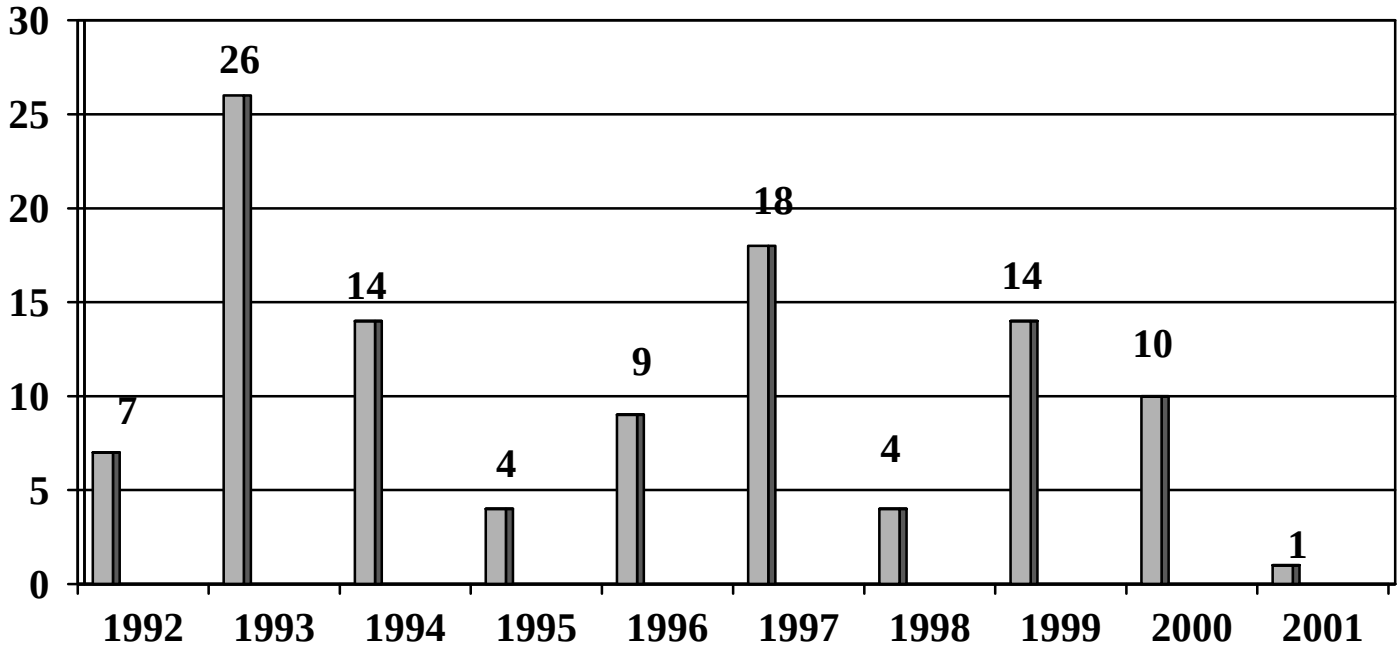
Support actions are primarily wildfire suppression assists to non-local areas. They Do not include local mutual aid responses. Many agency personnel, including those Whose regular job assignments are not fire-related, have been trained and dispatched to fire assignments.

The above graph displays the number of support action dispatches, consequently the Actual number of individuals dispatched is substantially greater. These figures do Not include people, who were involved in mutual aid or local suppression activities, Or the people involved in fire related support positions at their home units. In Addition to personnel, NPS helicopters, engines, and other equipment are commonly Used during mobilizations.

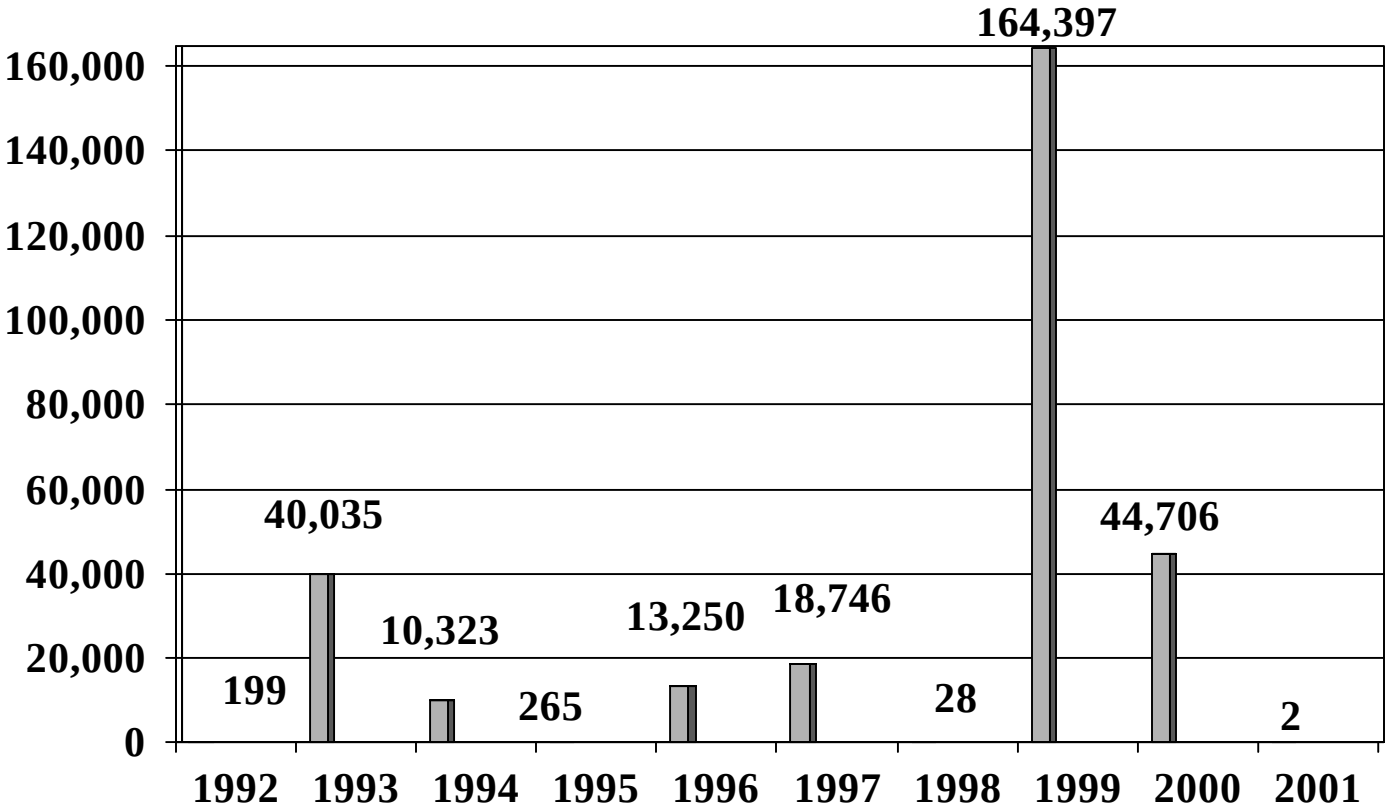
1992-2001
FIRE STATISTICS
BY REGION

ALASKA REGION WILDFIRES, 1992-2001

Number of Fires

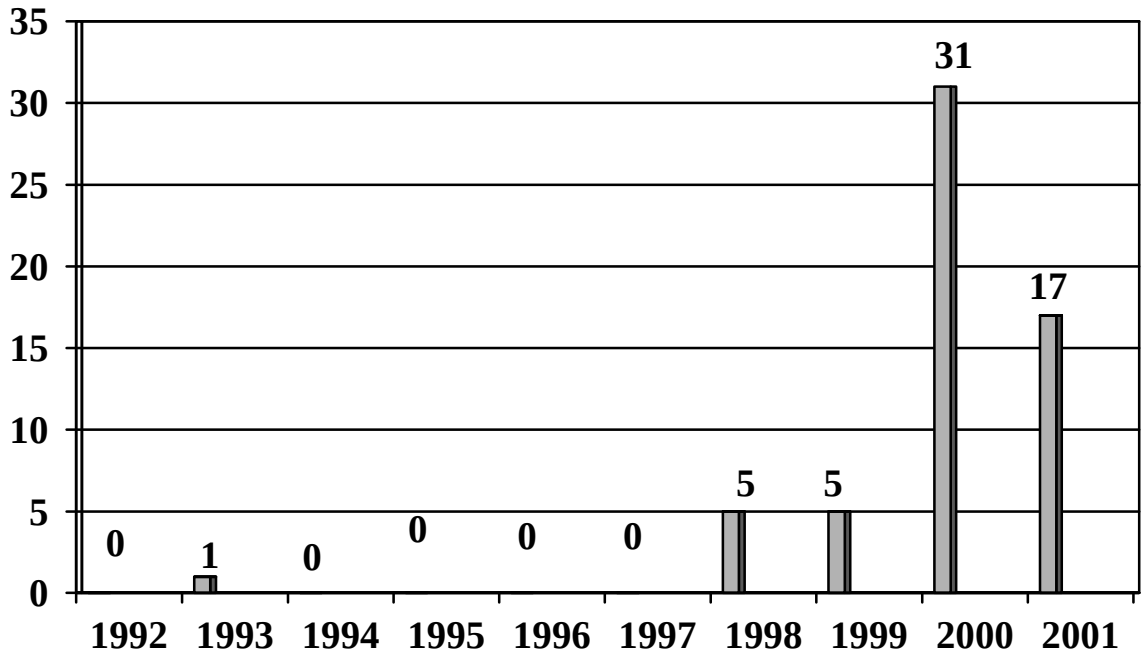


Number of Acres

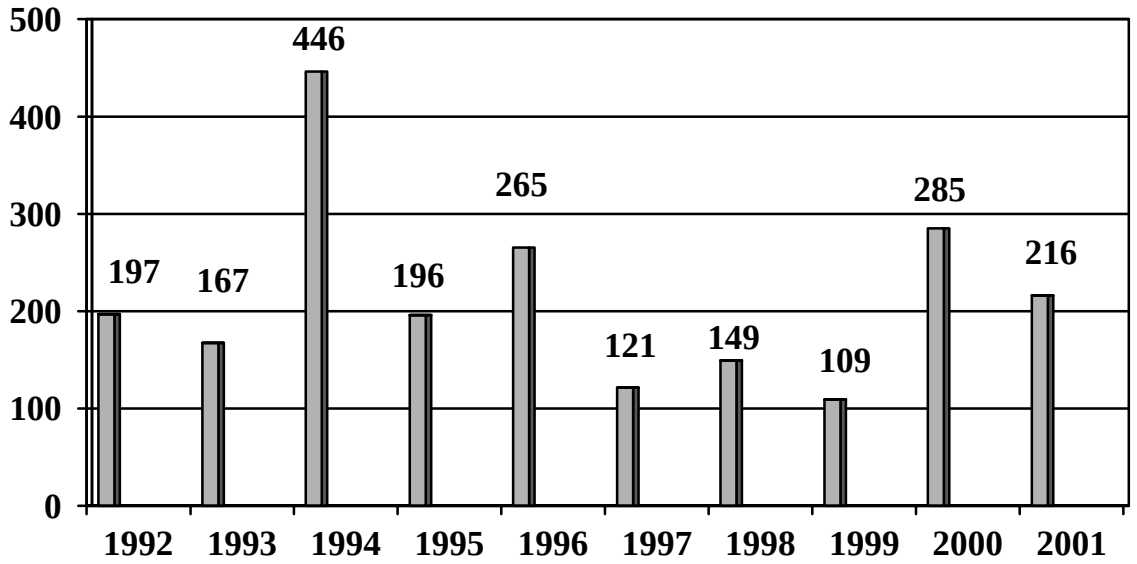


ALASKA REGION SUPPORT ACTIONS

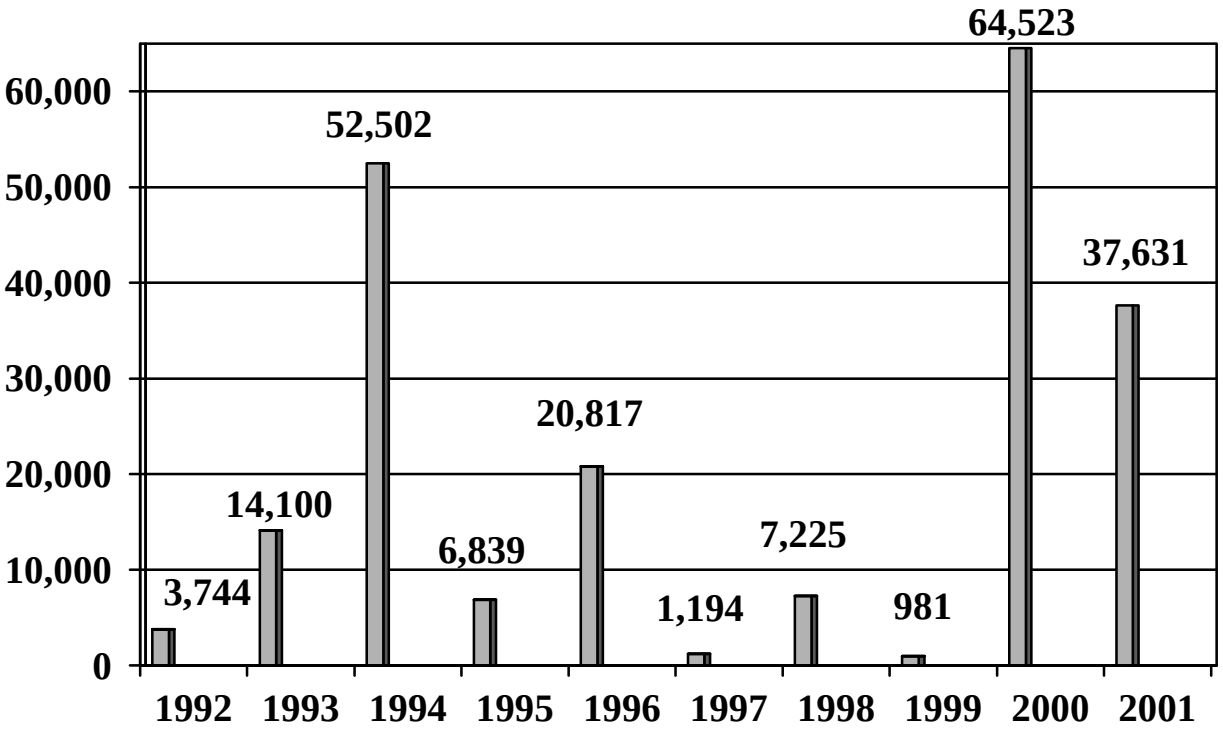
Number of Actions



INTERMOUNTAIN REGION WILDLAND FIRES
1992-2001
Number of Fires

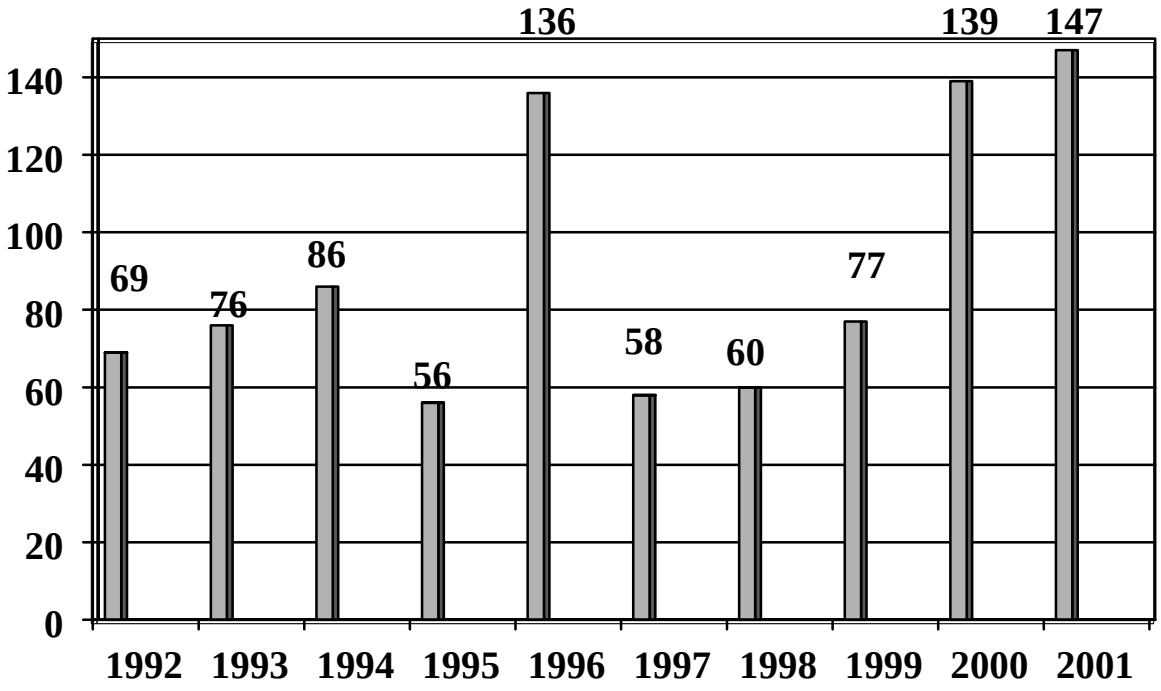


Number of Acres

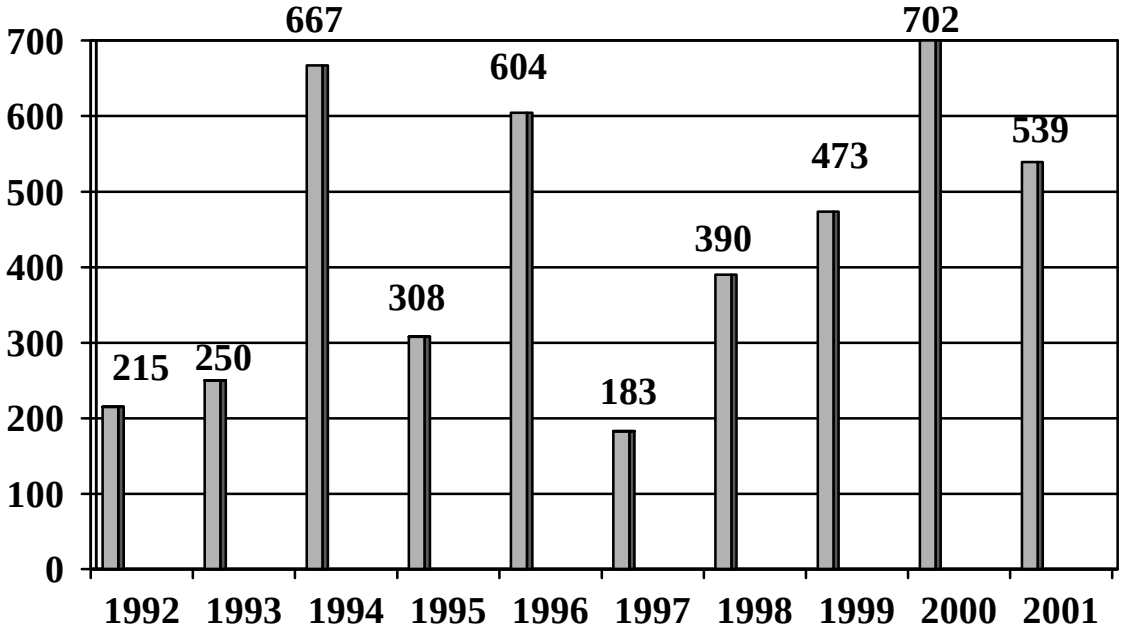


INTERMOUNTAIN REGION
MUTUAL AID RESPONSES, 1992-2001

Number of Responses

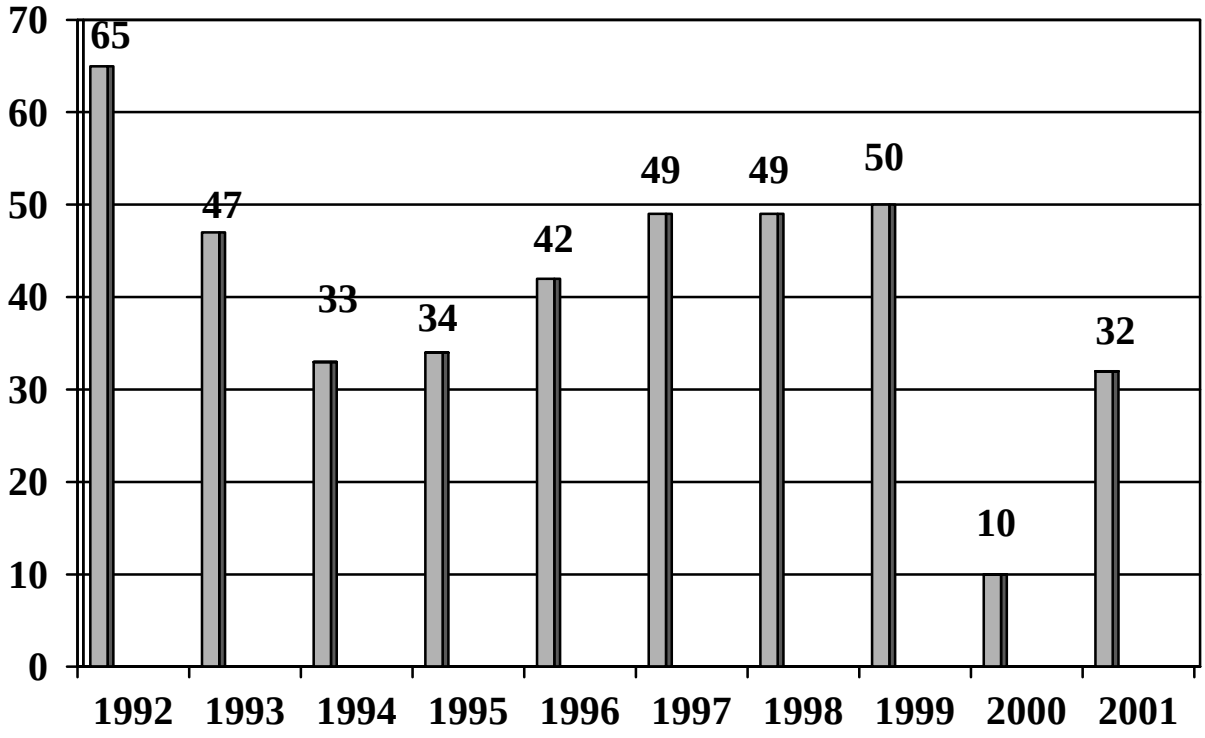


Number of Support Actions

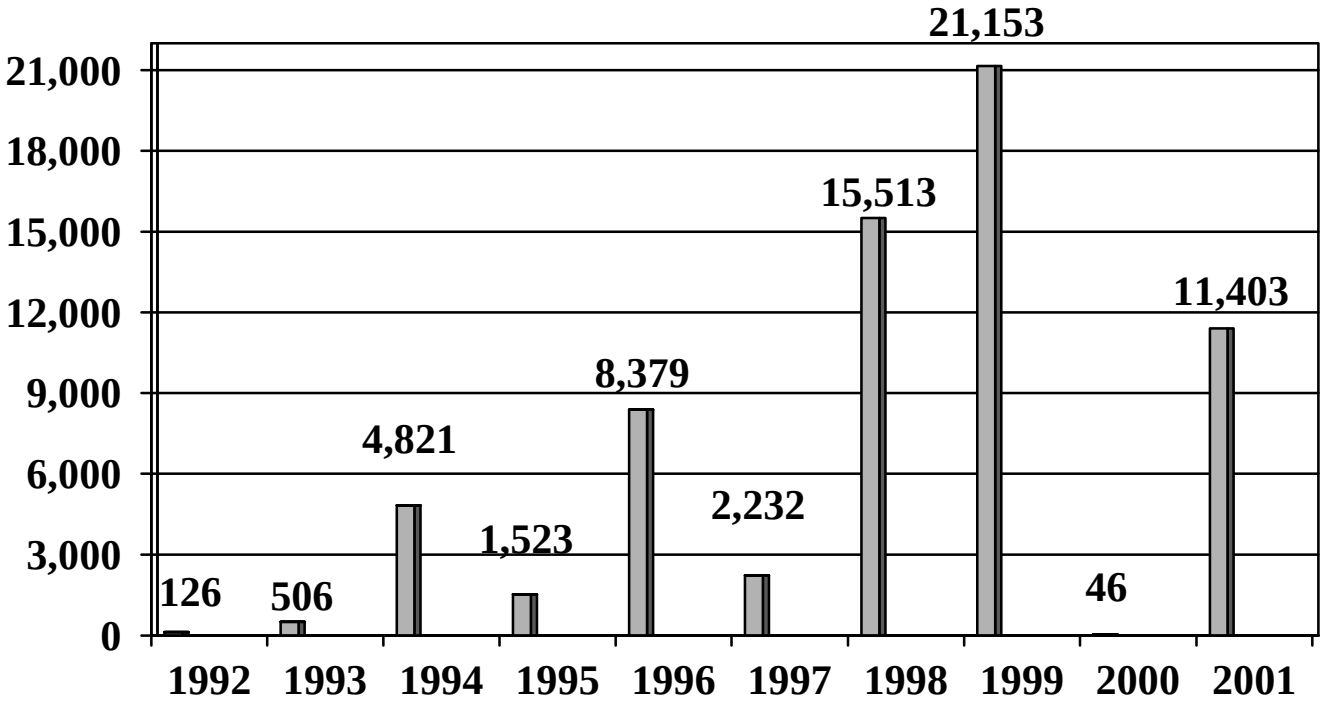


INTERMOUNTAIN REGION
WILDLAND FIRE USE, 1992-2001

Number of Fires

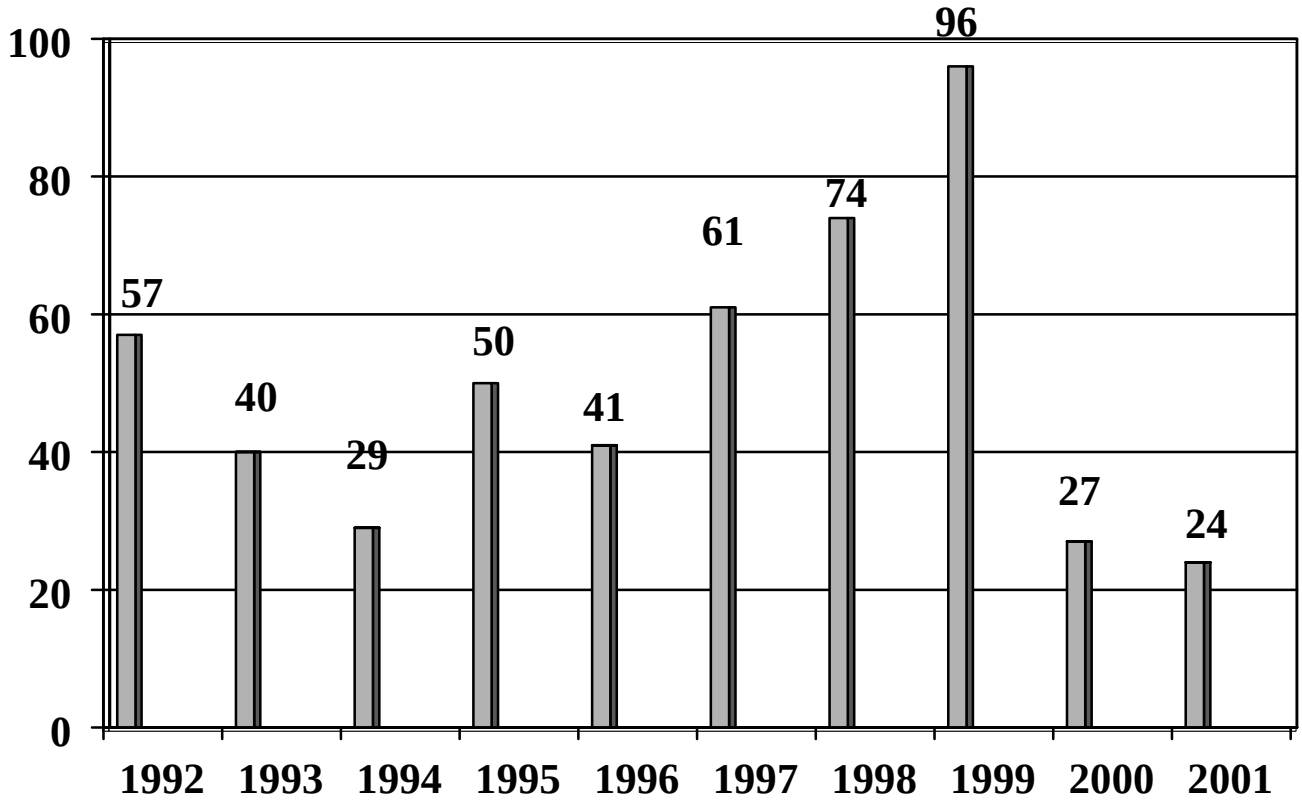


Number of Acres

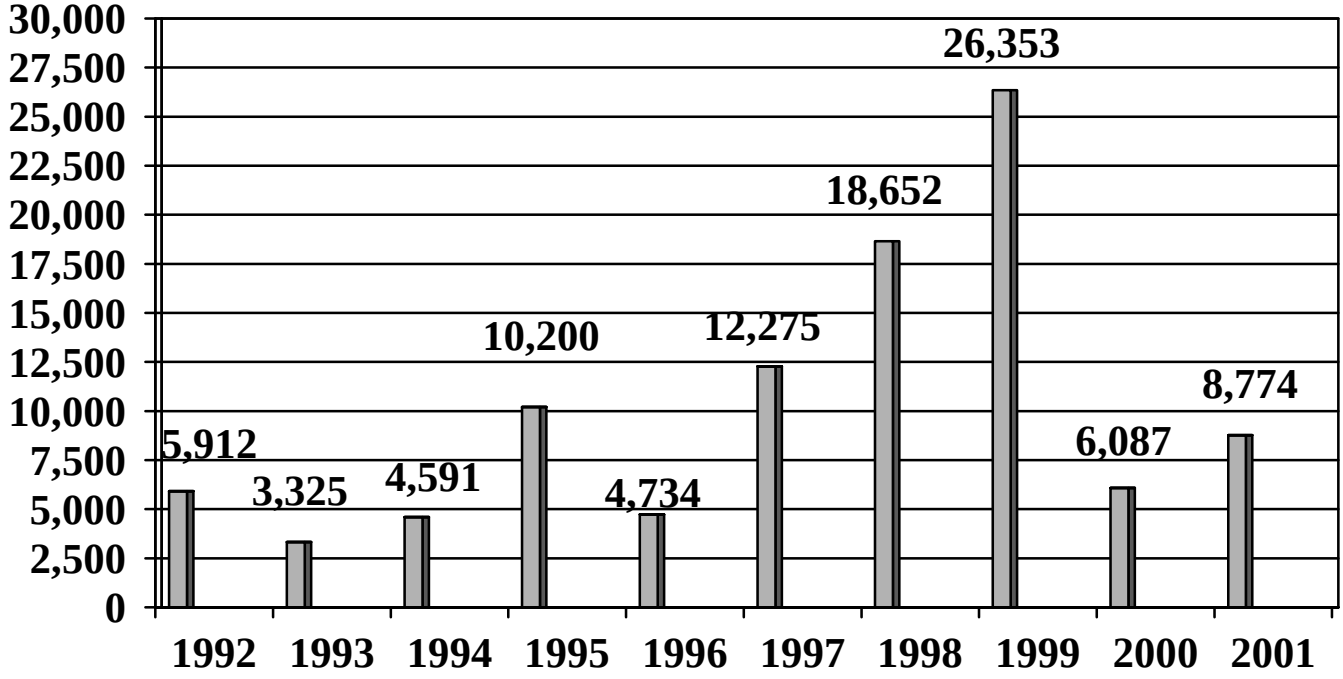


INTERMOUNTAIN REGION
PRESCRIBED FIRES, 1992-2001

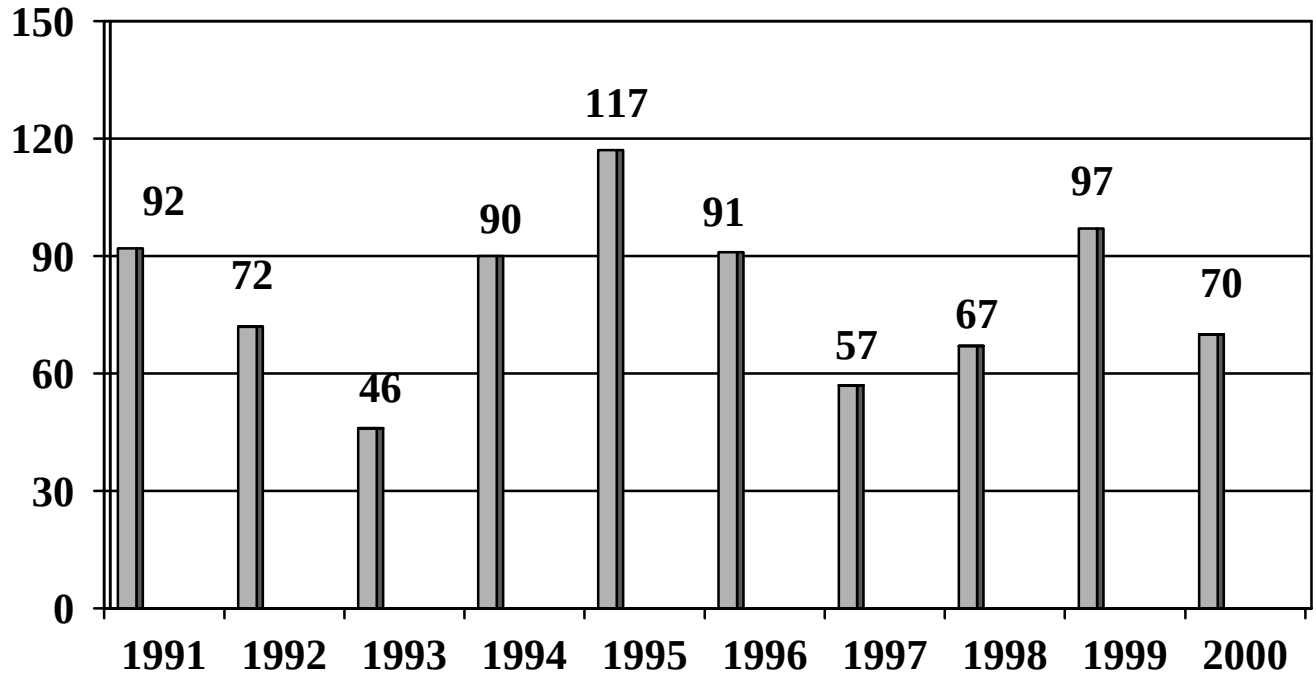
Number of Fires



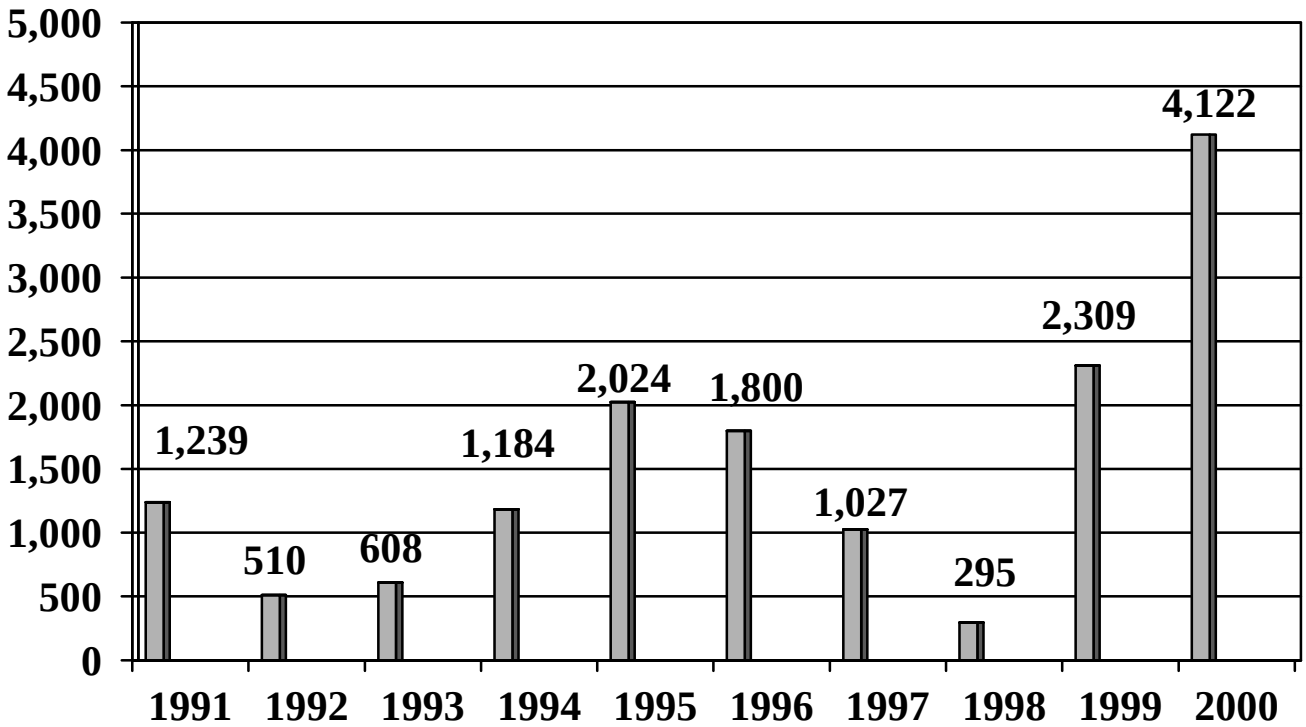
Number of Acres



MIDWEST REGION
WILDLAND FIRES, 1992-2001
Number of Fires

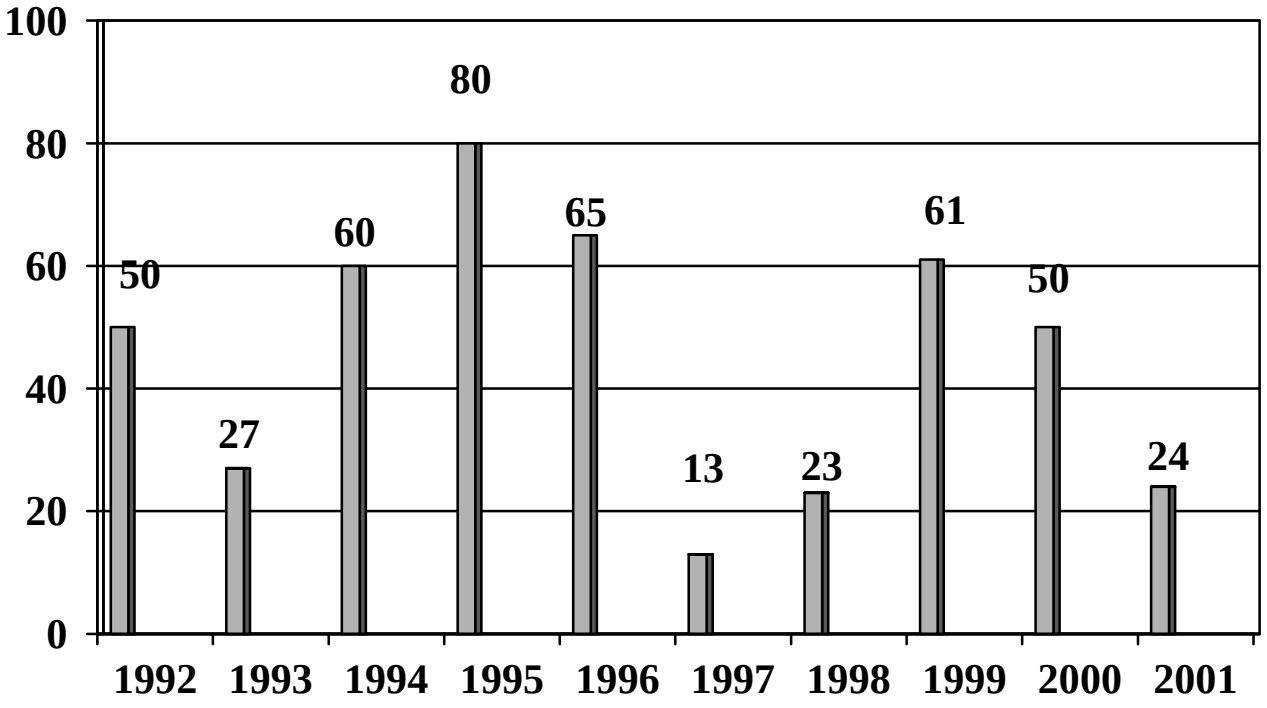


Number of Acres

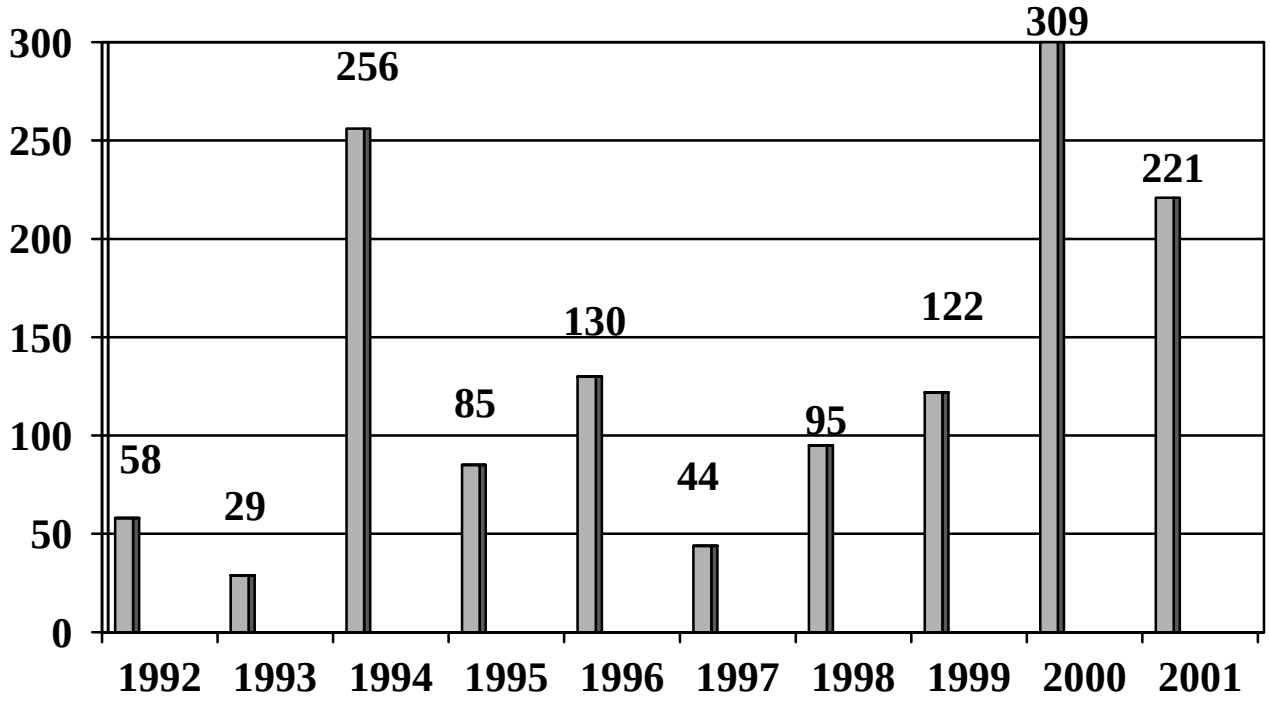


MIDWEST REGION
MUTUAL AID RESPONSES, 1992-2001

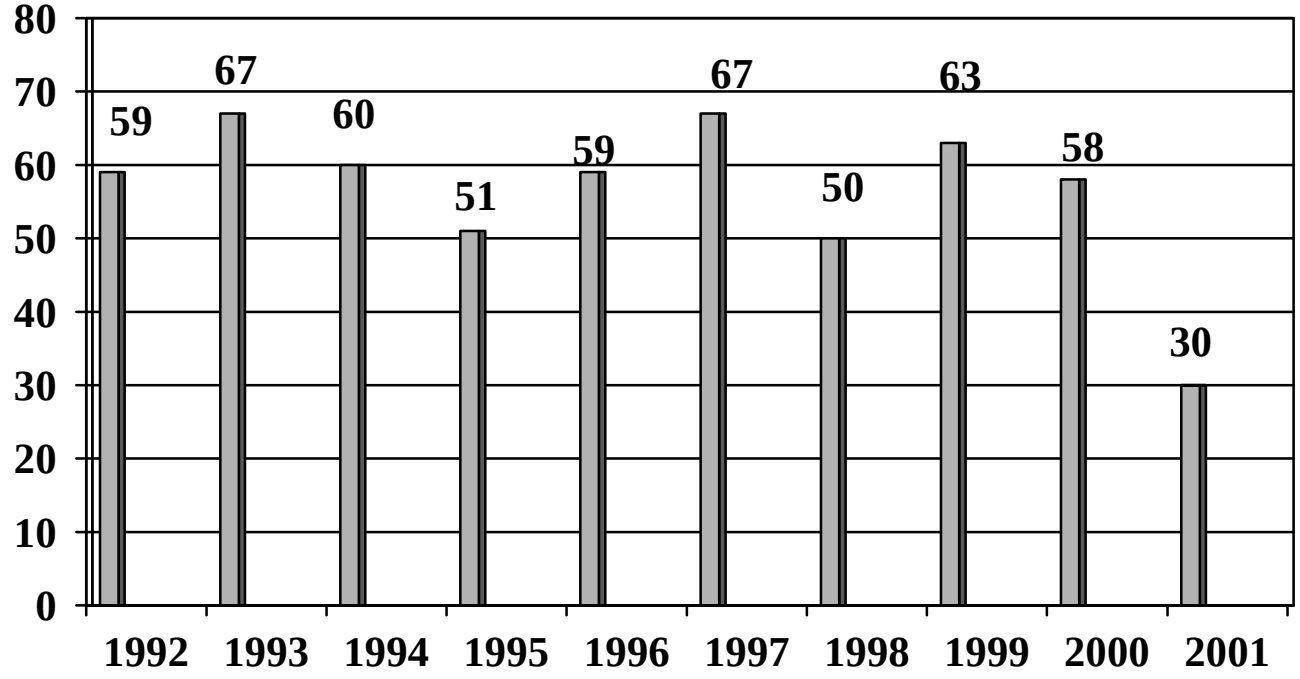
Number of Responses



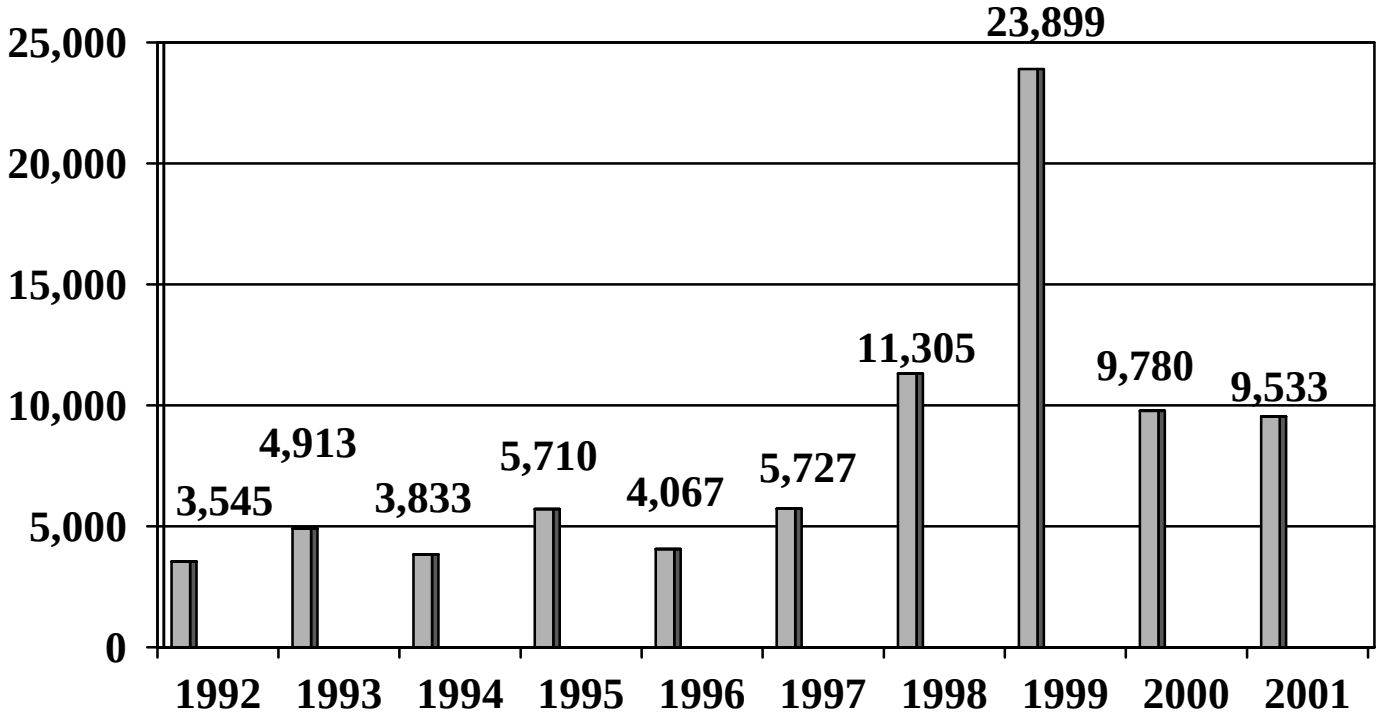
Number of Support Actions



MIDWEST REGION
PRESCRIBED FIRES, 1992-2001
Number of Fires

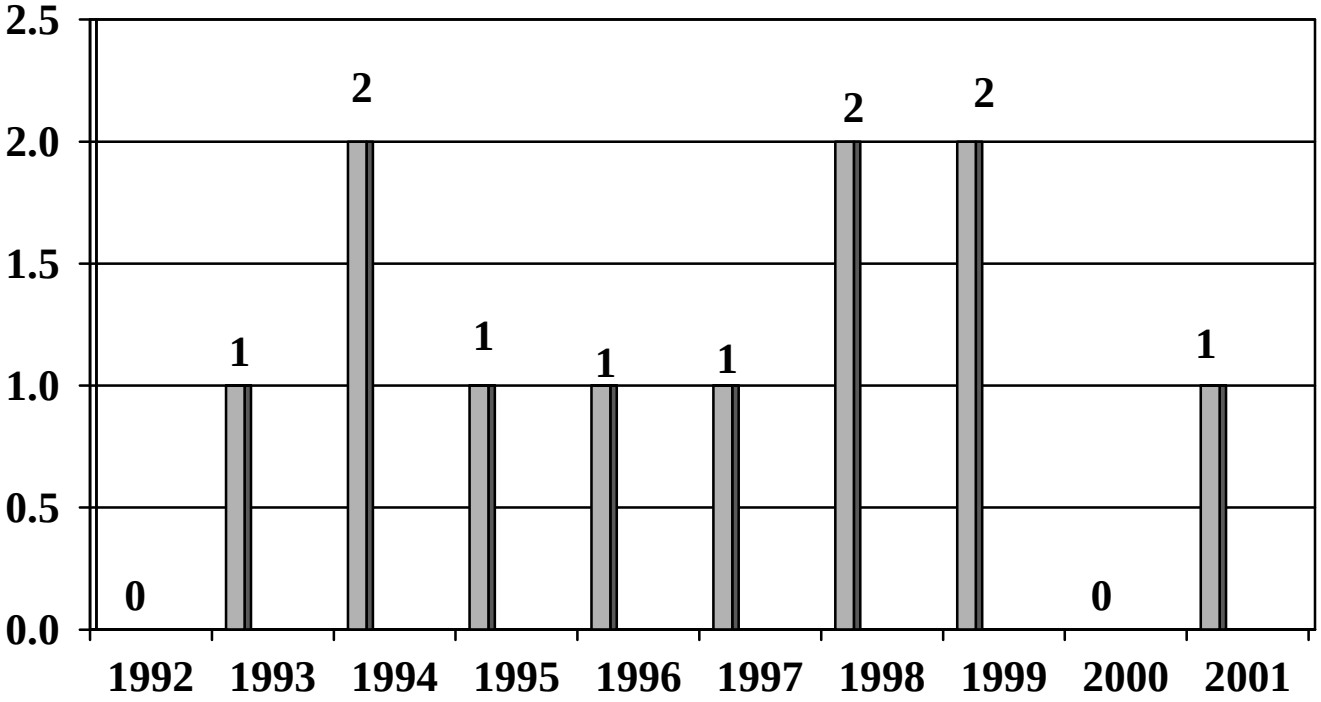


Number of Acres

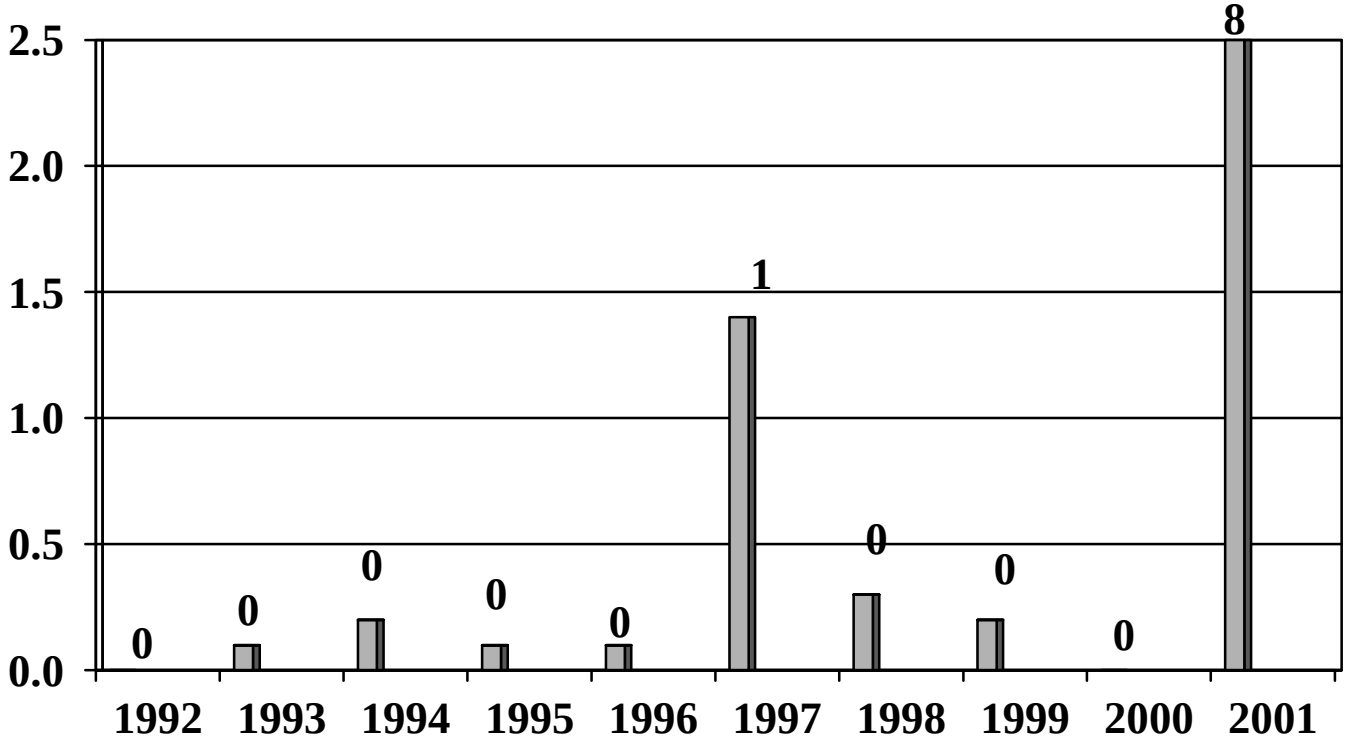


MIDWEST REGION
WILDLAND FIRE USE, 1992-2001

Number of Fires

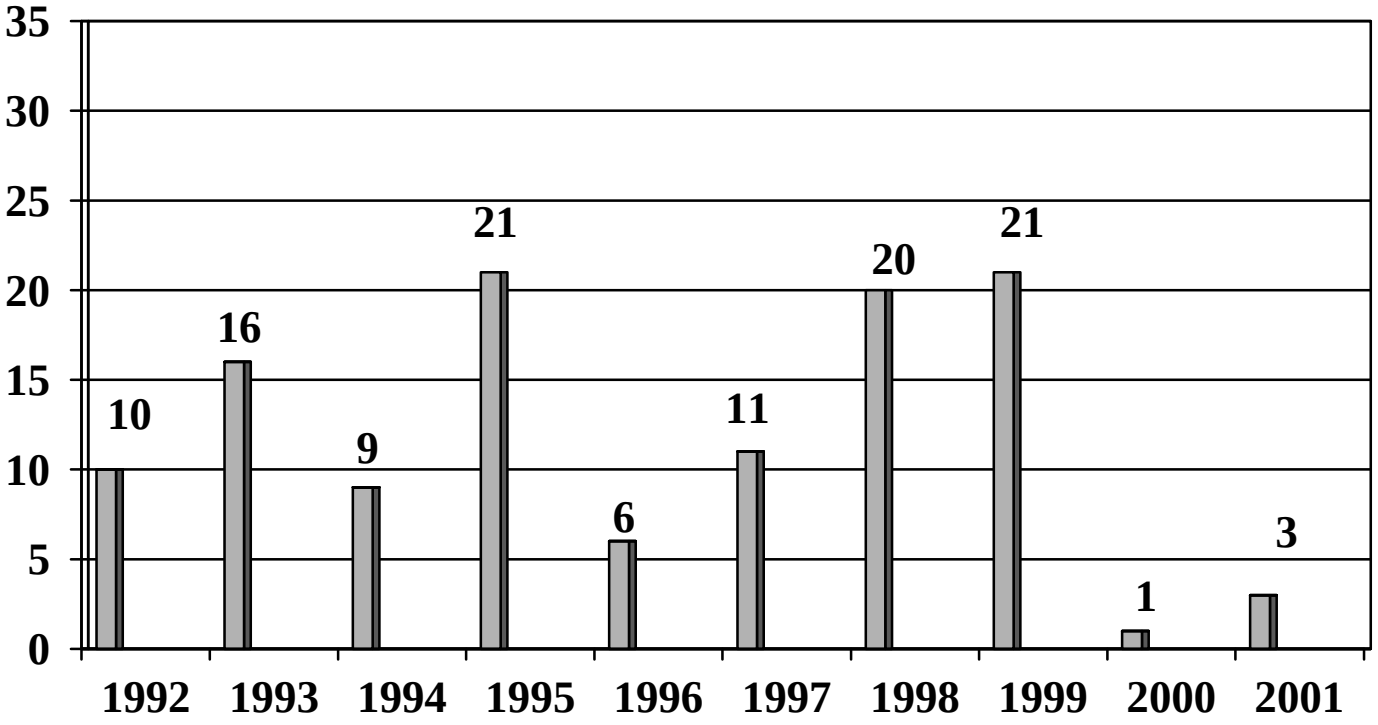


Number of Acres

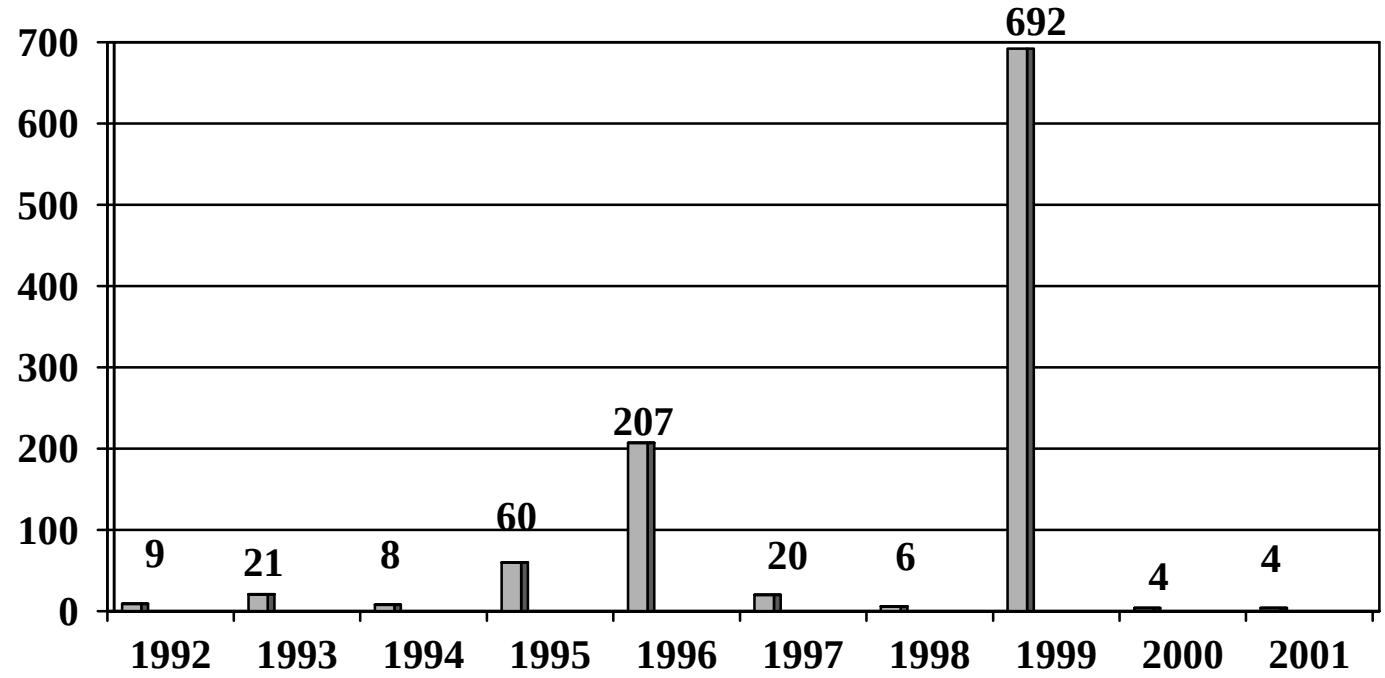


NATIONAL CAPITAL REGION
WILDLAND FIRES, 1992-2001

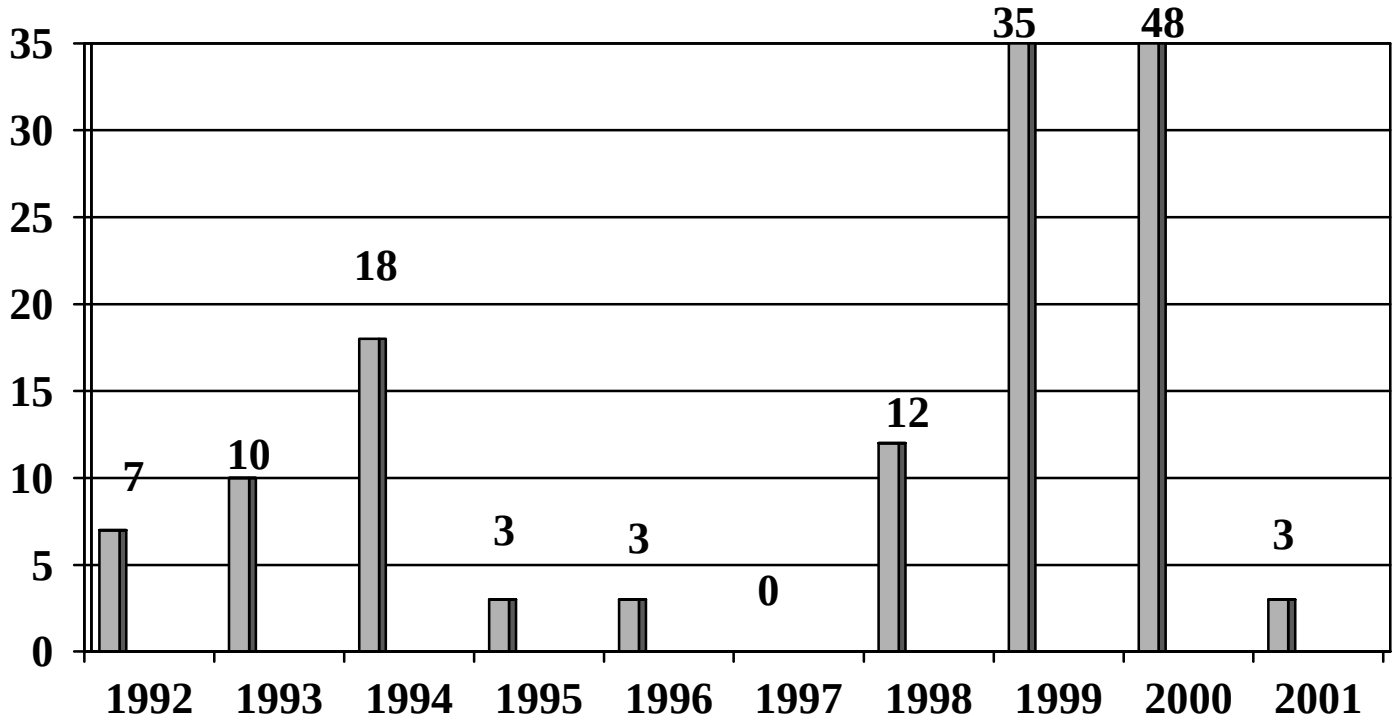
Number of Fires



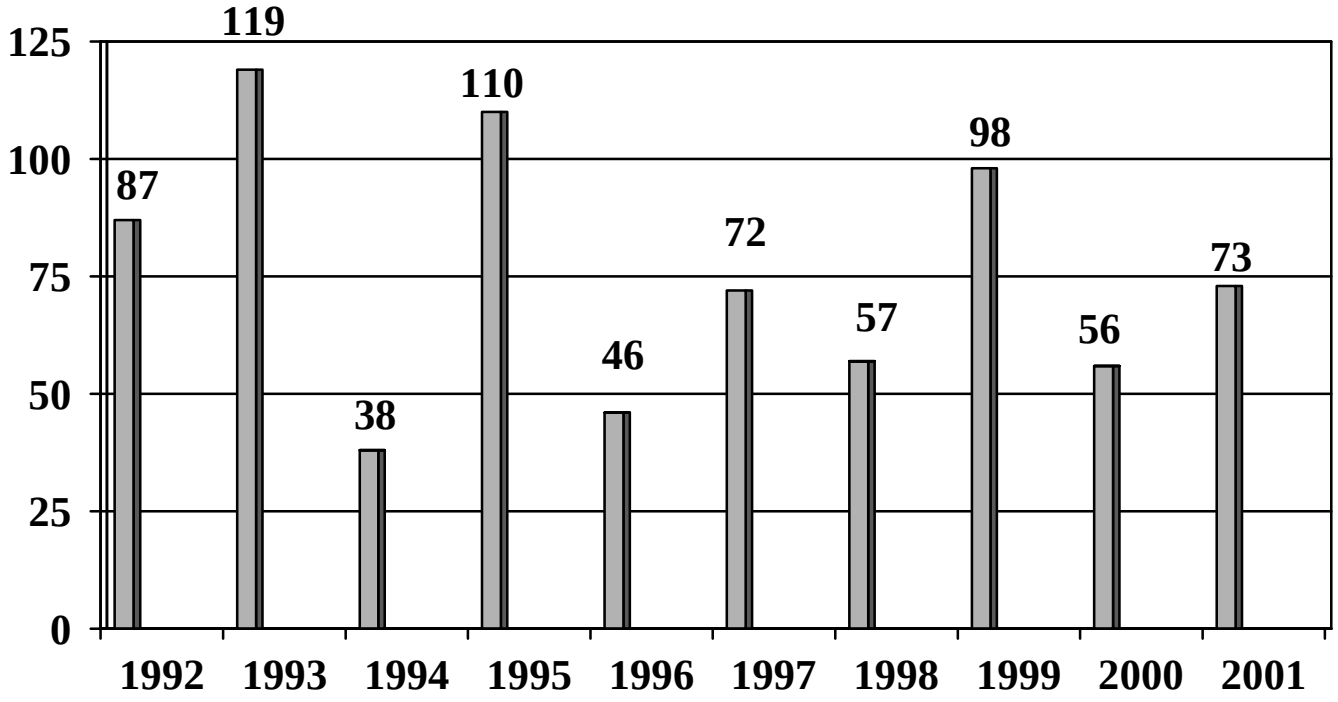
Number of Acres



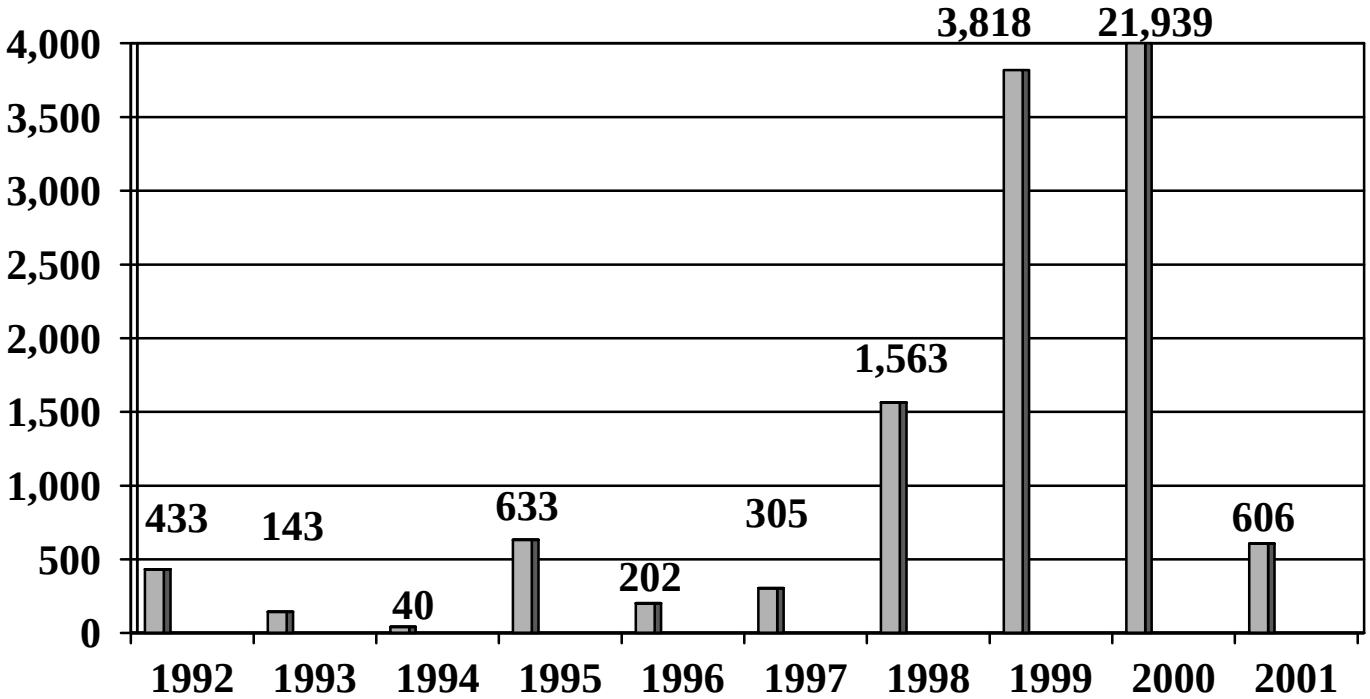
NATIONAL CAPITAL REGION
SUPPORT ACTIONS
Number of Responses



NORTHEAST REGION
WILDLAND FIRES, 1992-2001
Number of Fires

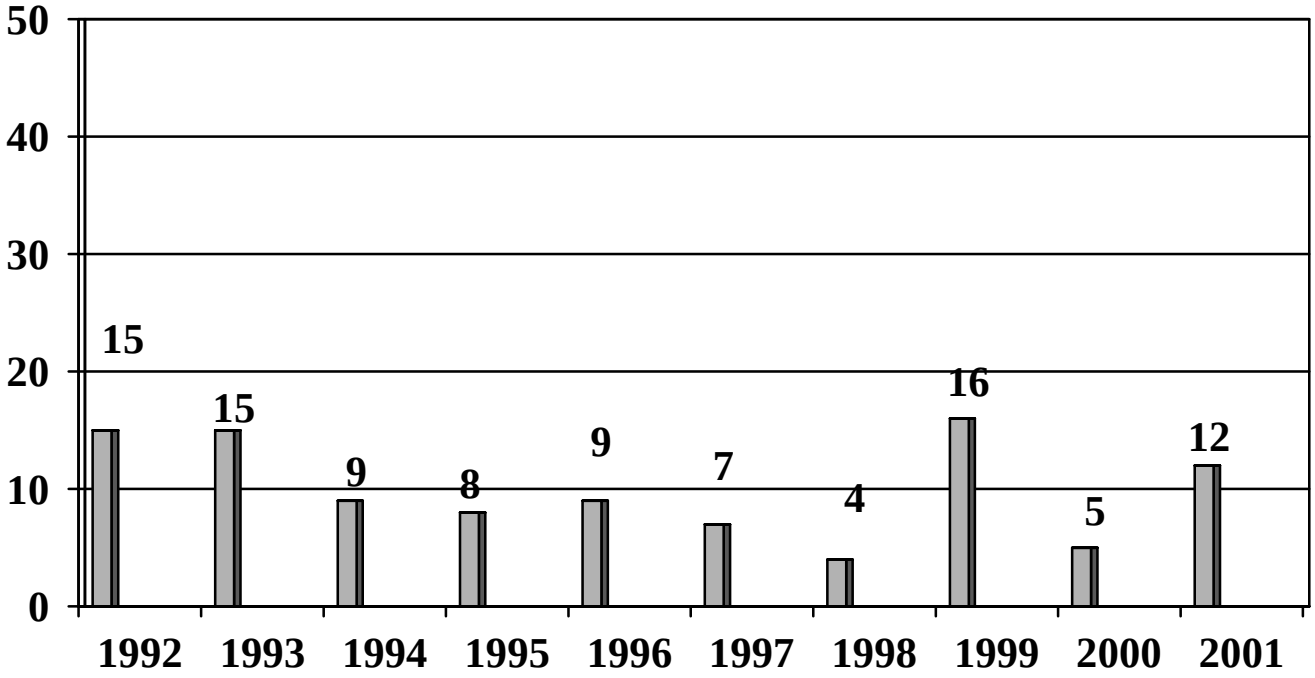


Number of Acres

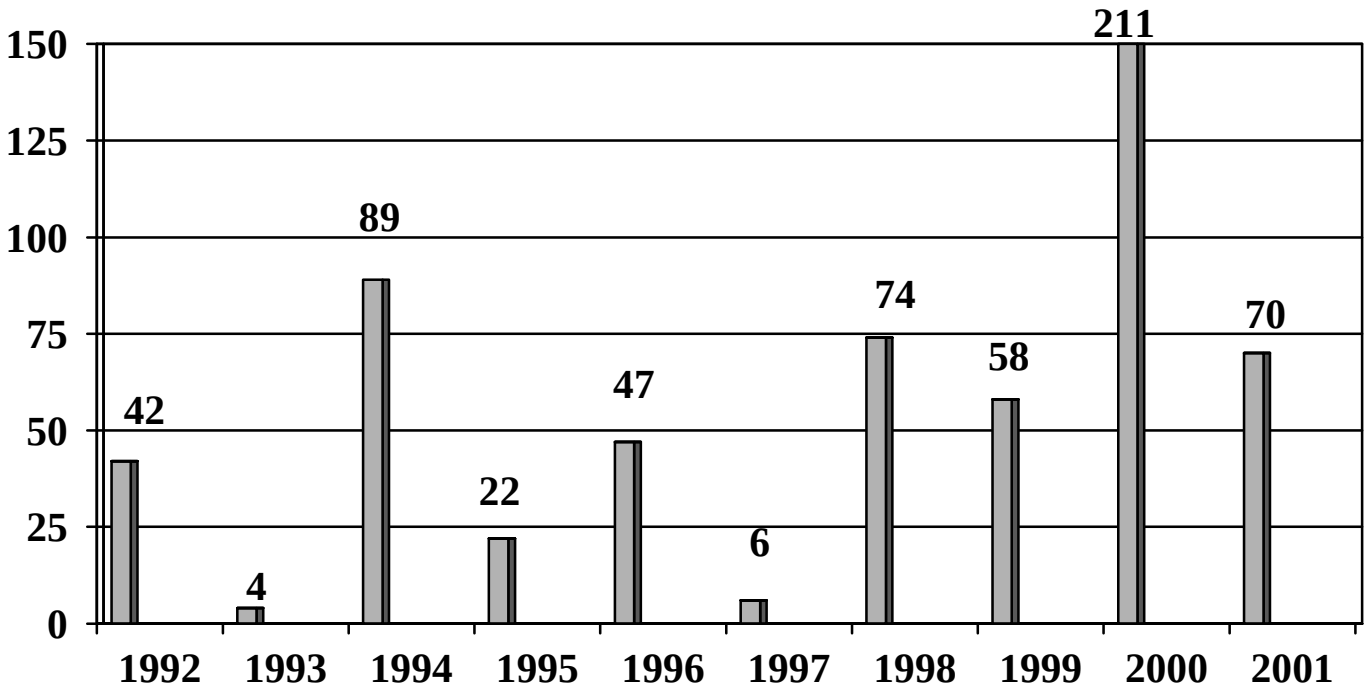


NORTHEAST REGION
MUTUAL AID RESPONSES, 1992-2001

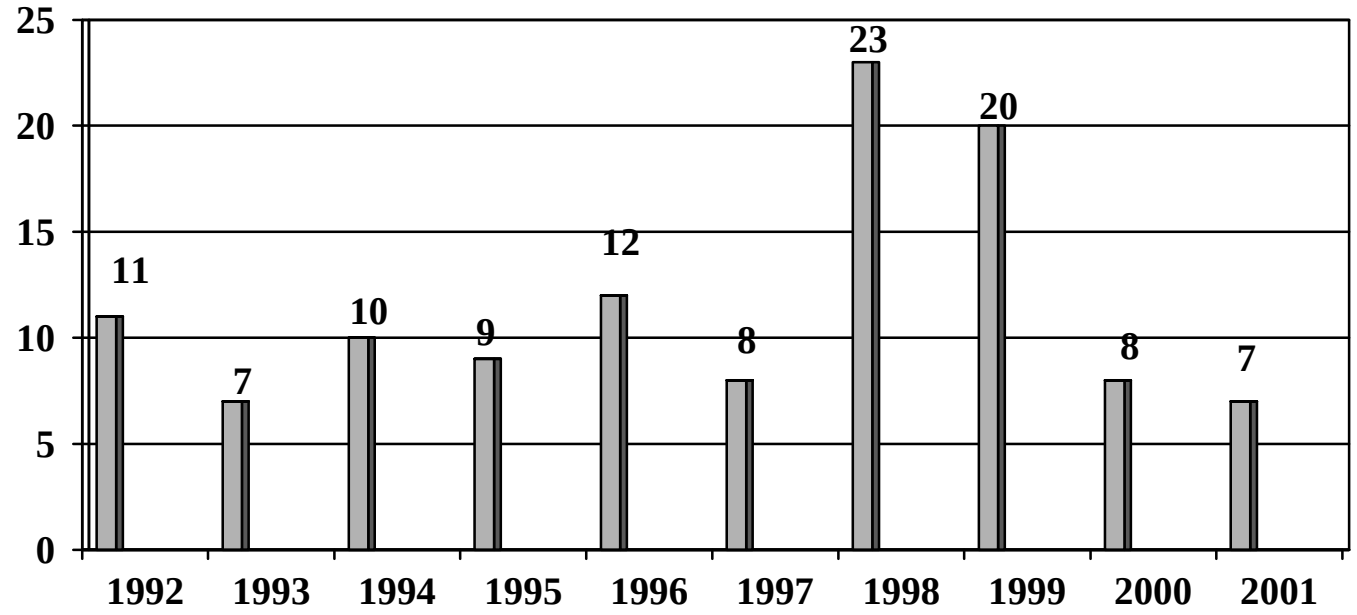
Number of Responses



Number of Support Actions



NORTHEAST REGION
PRESRIBED FIRES, 1992-2001
Number of Fires



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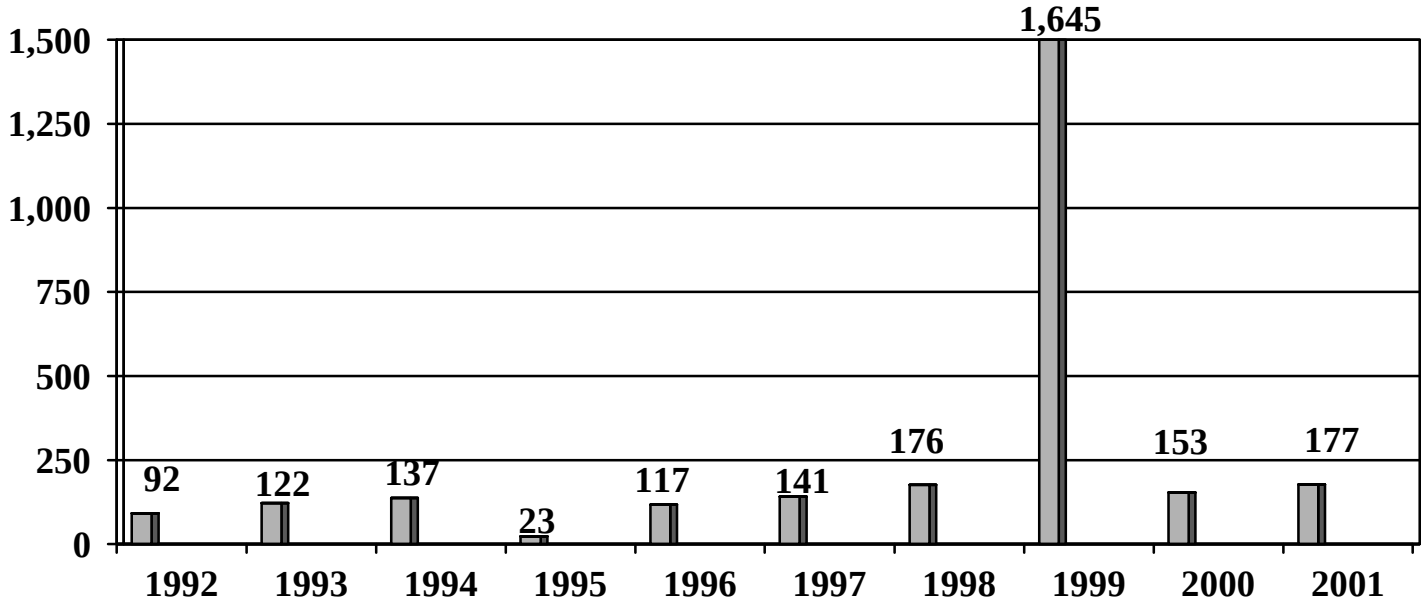
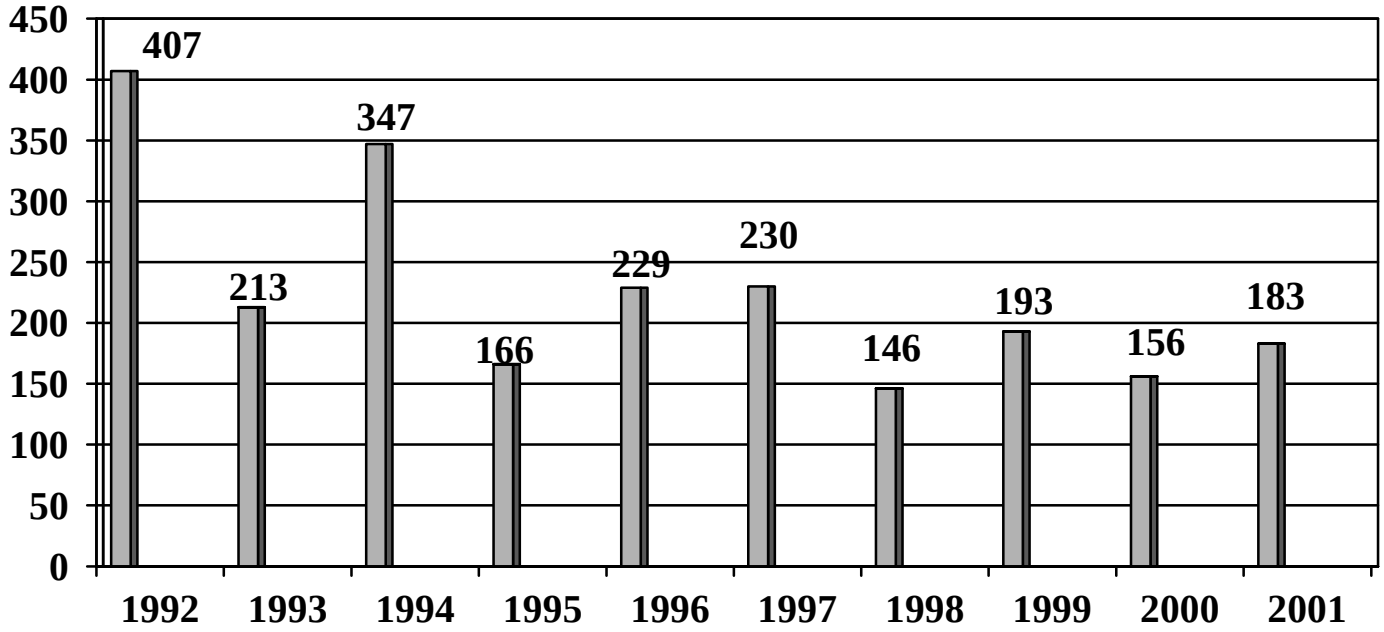


PACIFIC WEST REGION
WILDLAND FIRES, 1992-2001
Number of Fires



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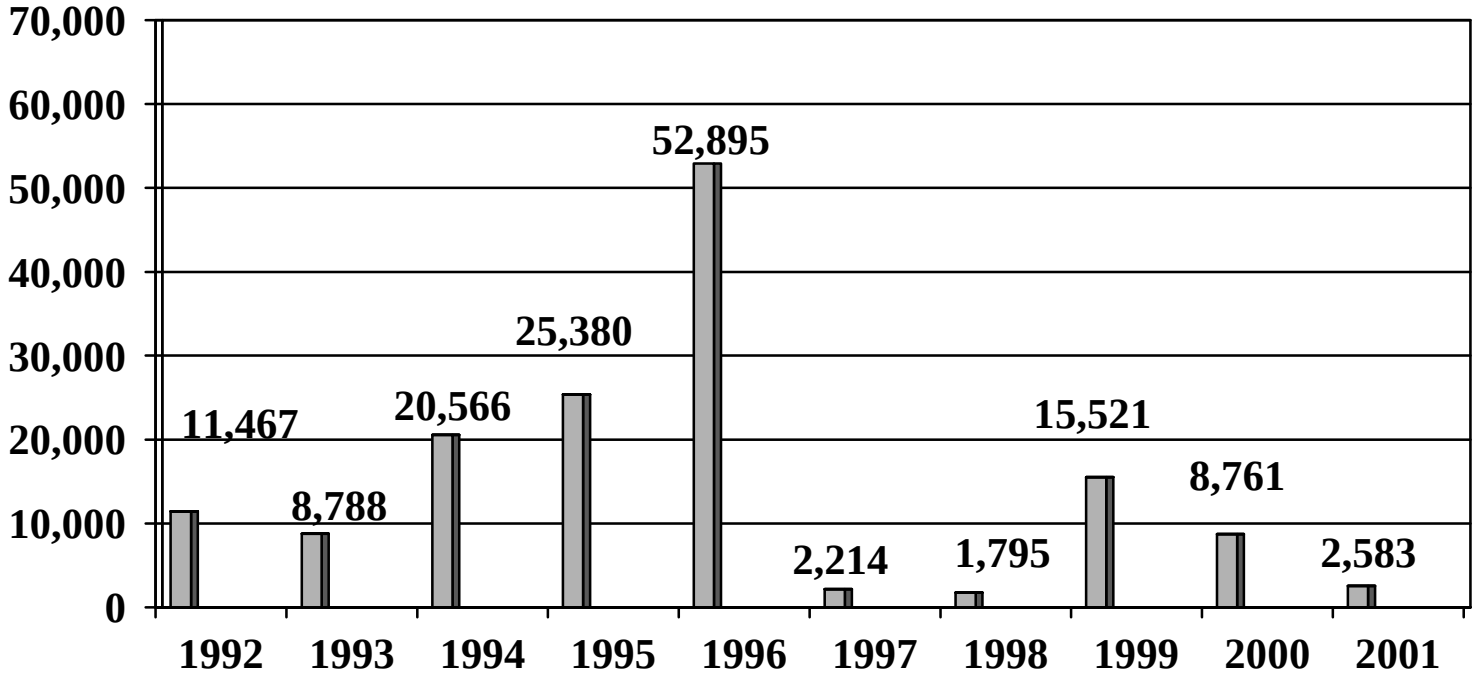
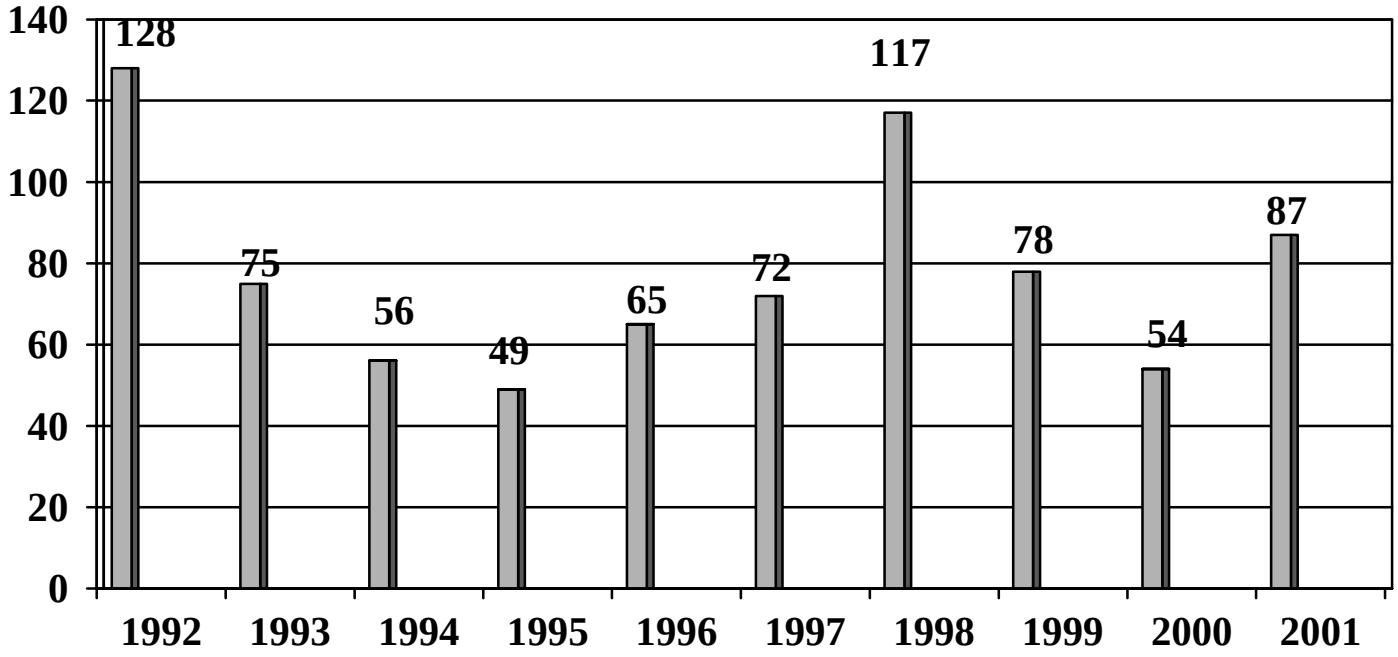


PACIFIC WEST REGION
MUTUAL AID RESPONSES
Number of Responses



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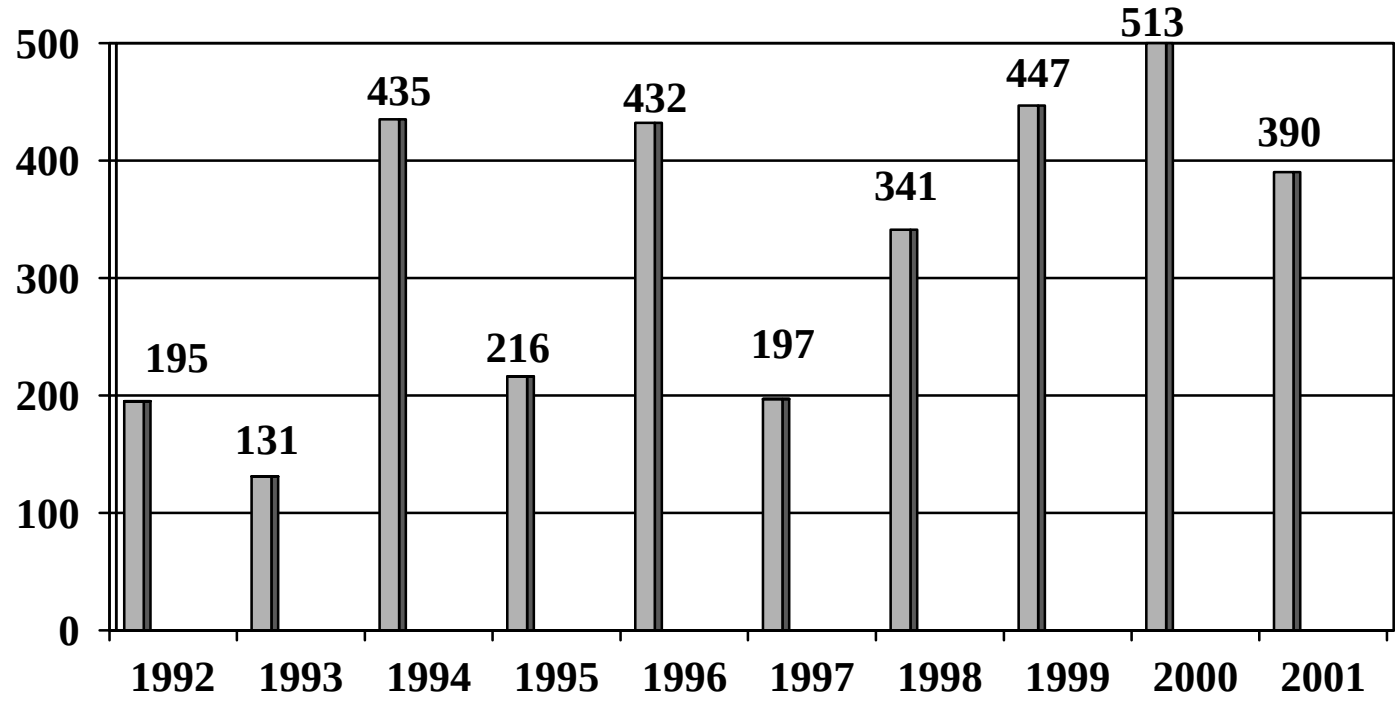

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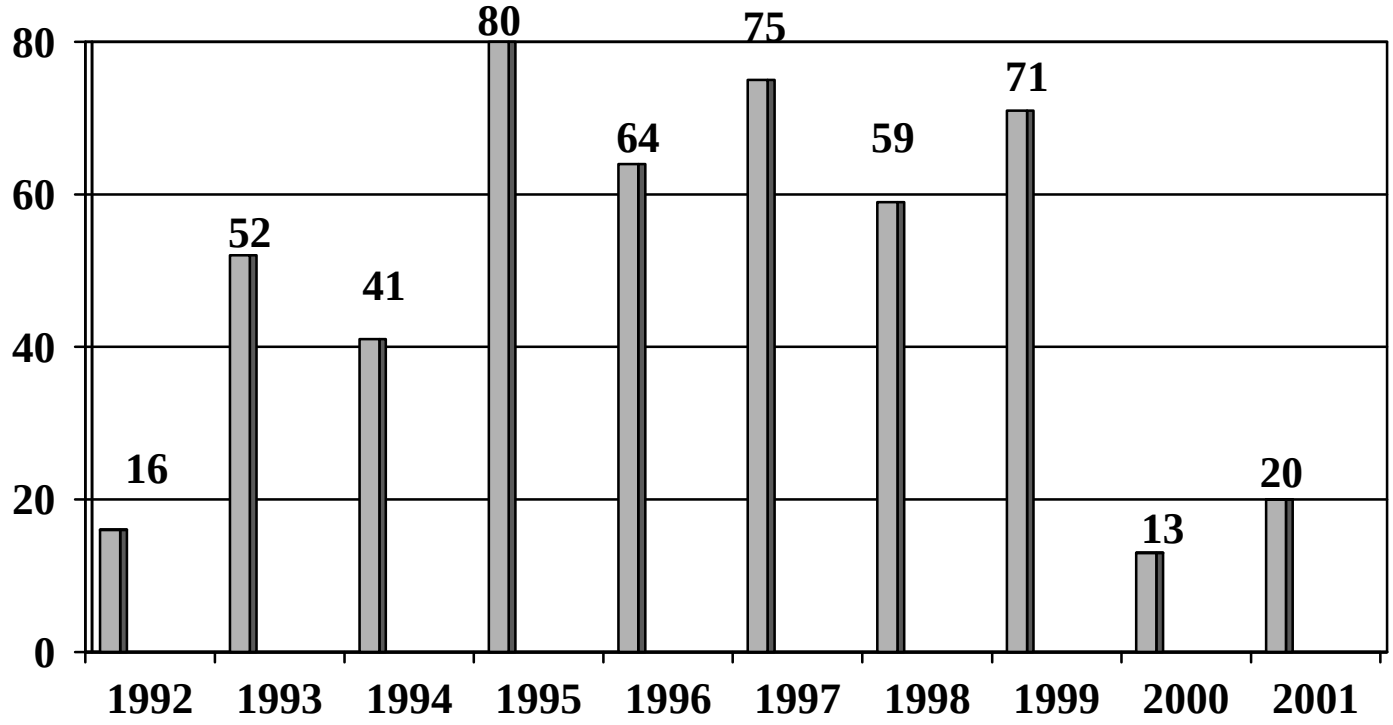
PRESCRIBED FIRES, 1992-2001

Number of Fires



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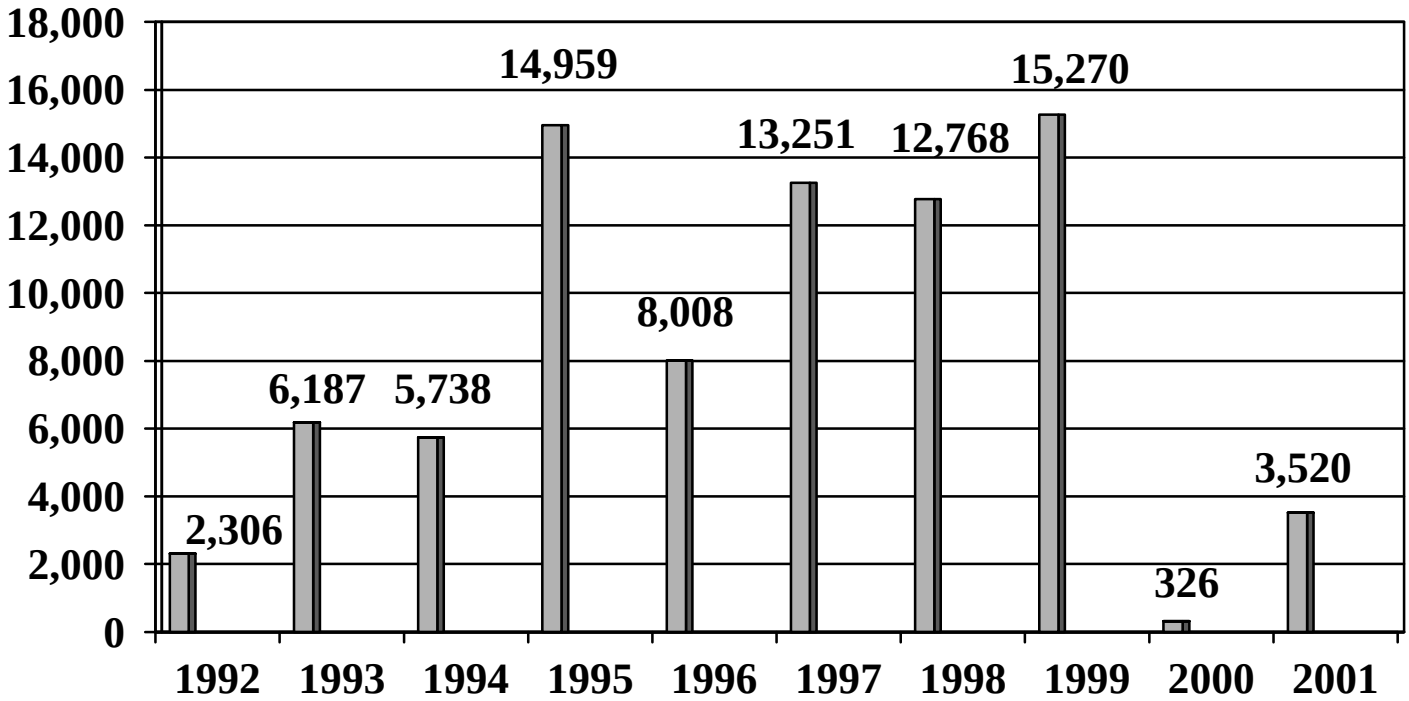
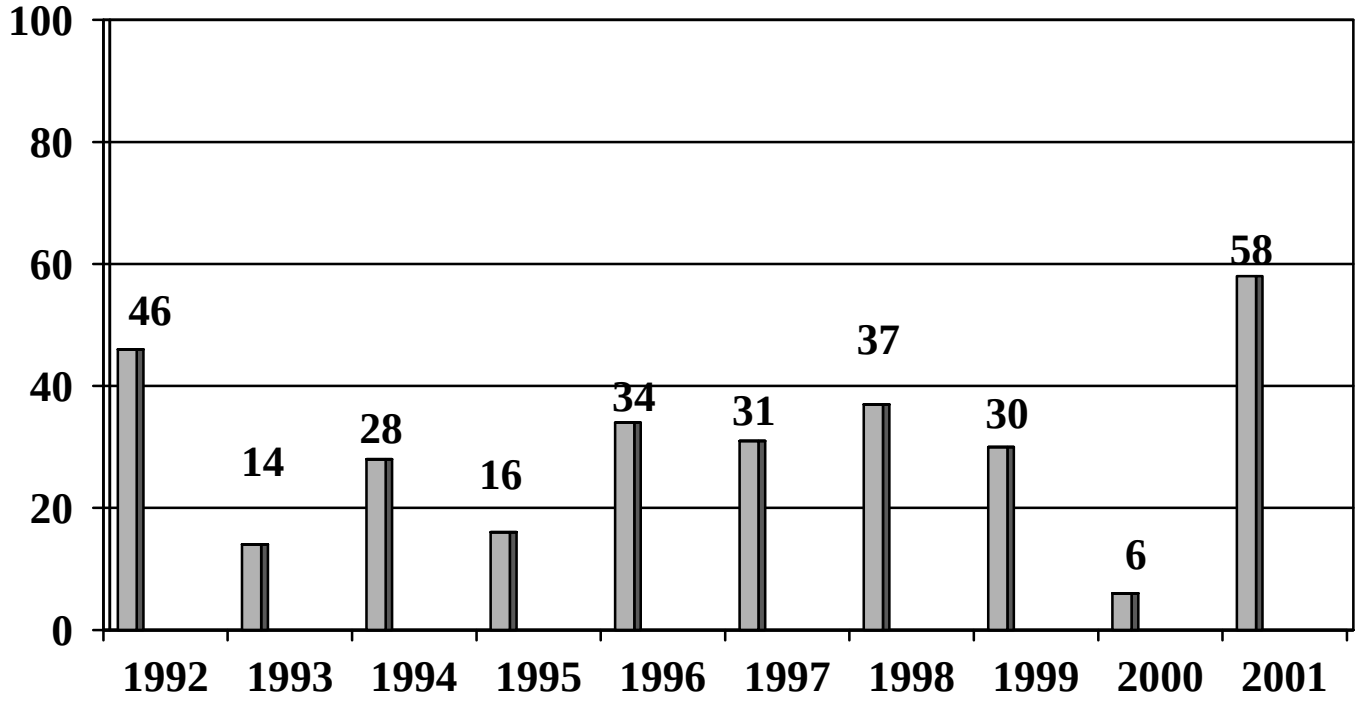


PACIFIC WEST REGION
WILDLAND FIRE USE, 1992-2001

Number of Fires



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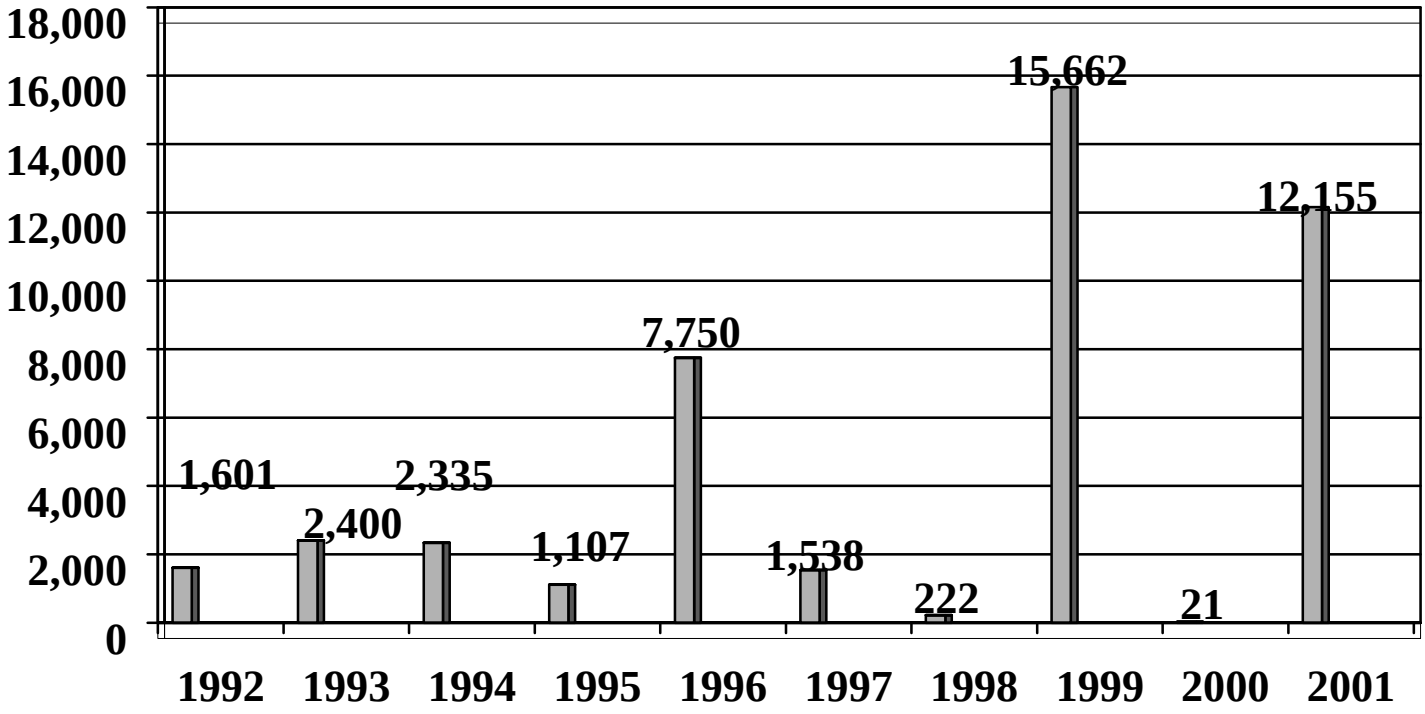
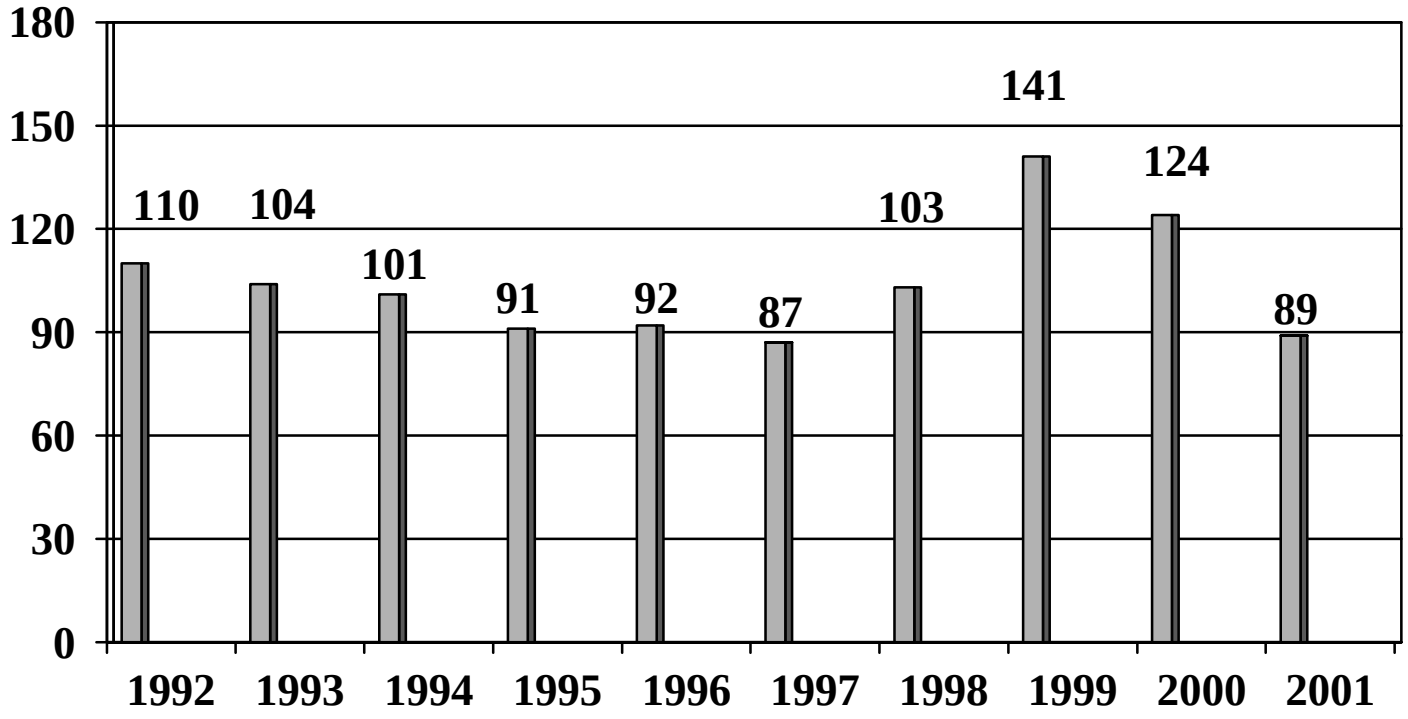


SOUTHEAST REGION
WILDLAND FIRES, 1992-2001

Number of Fires



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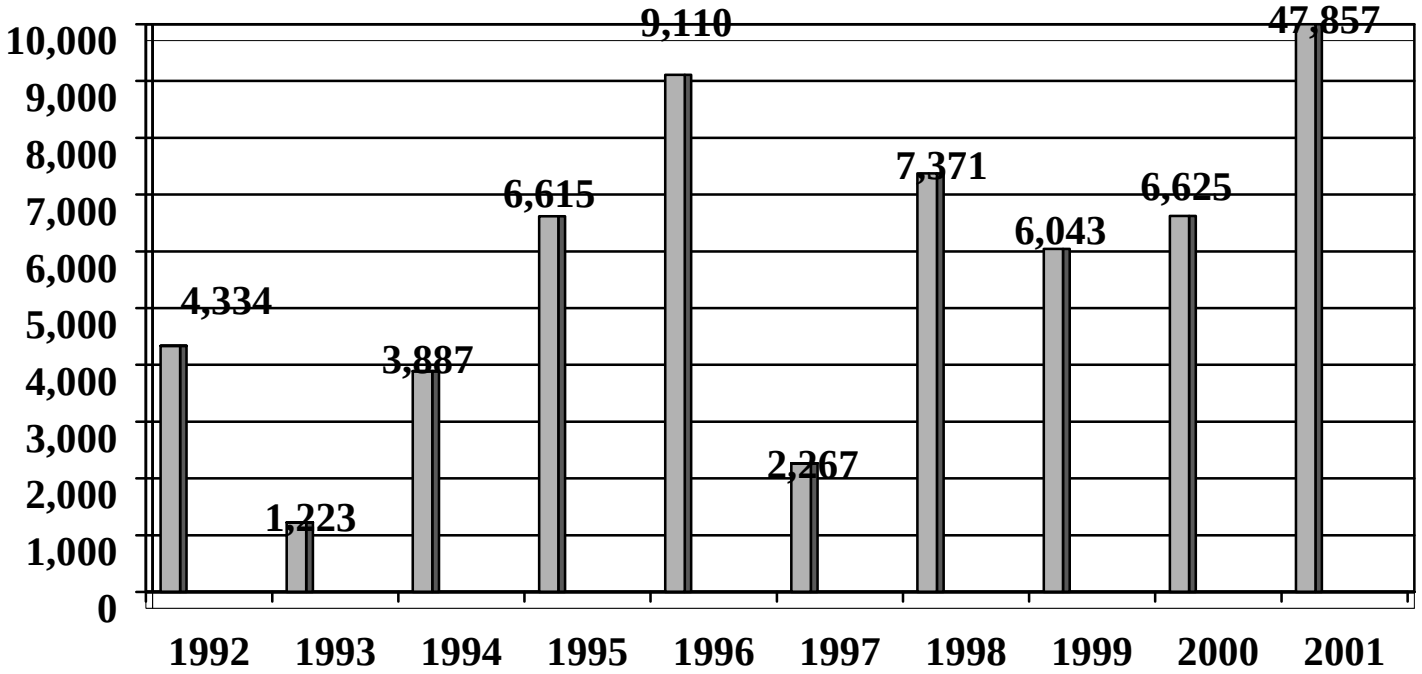
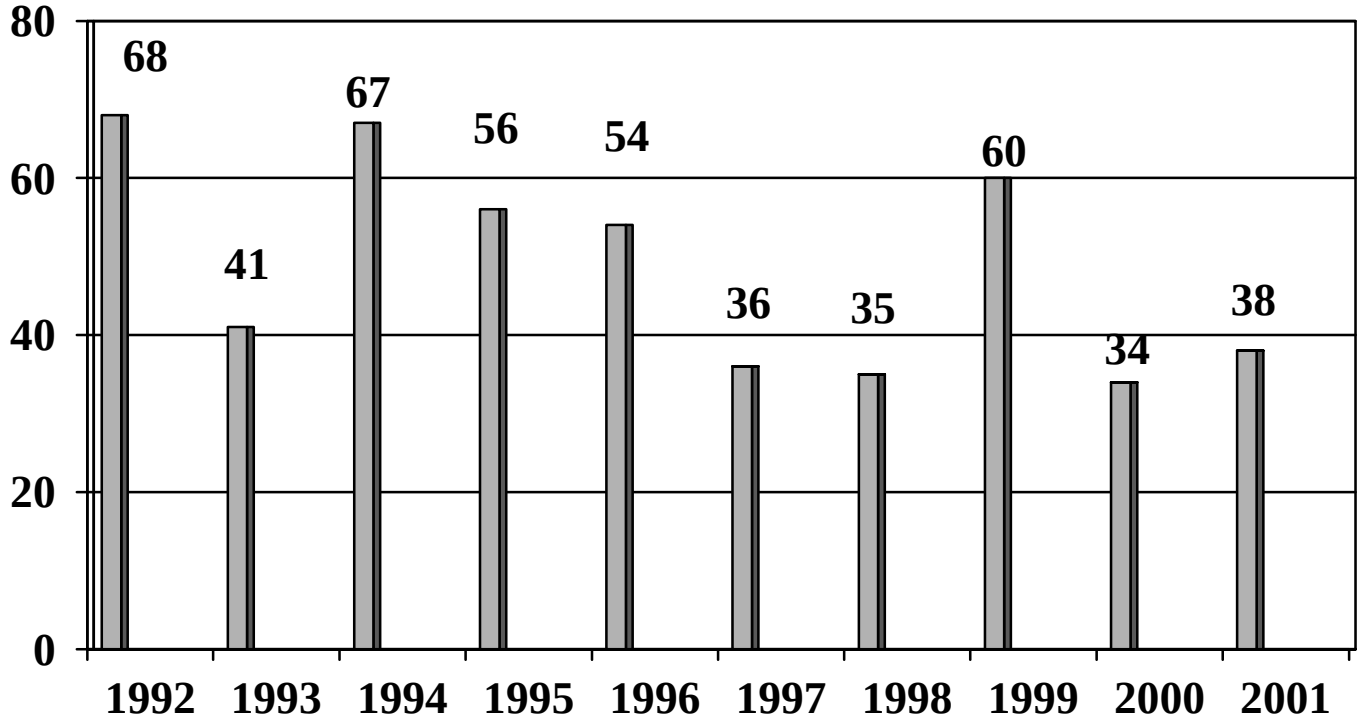
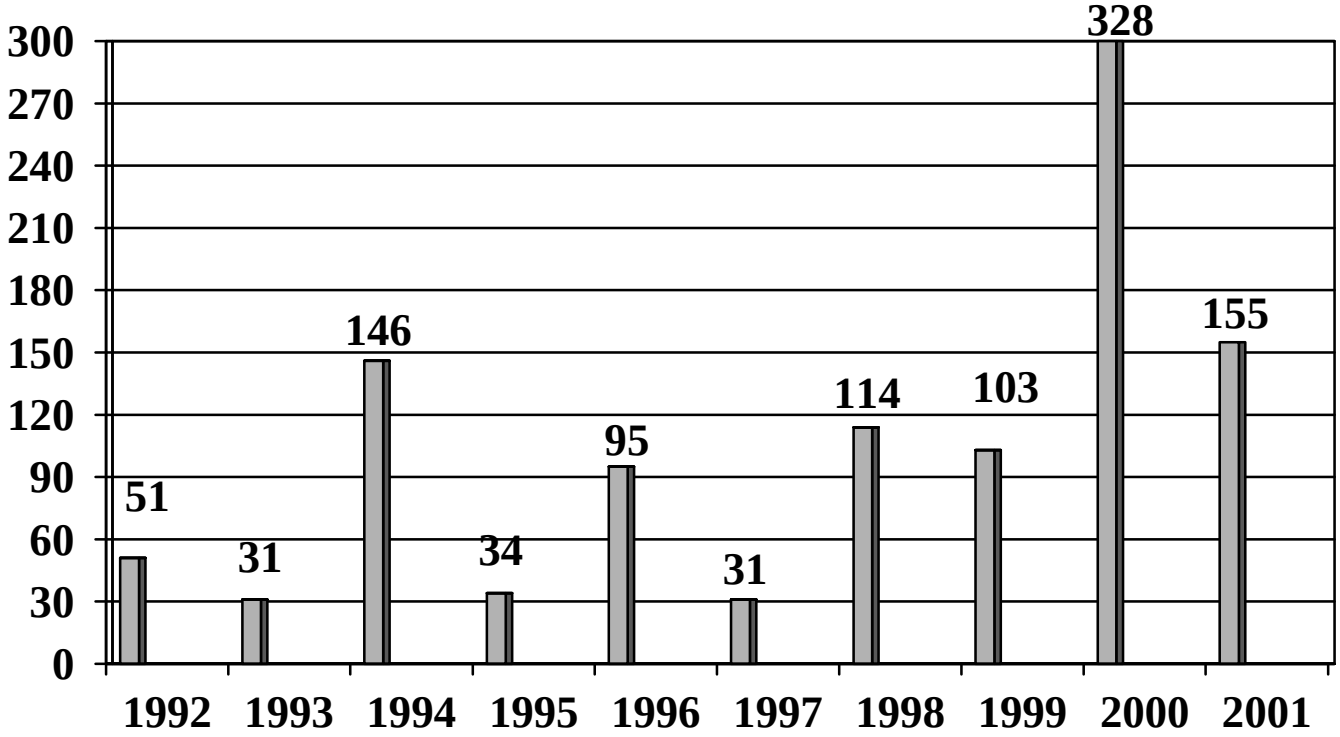


SOUTHEAST REGION
MUTUAL AID RESPONSES, 1992-2001
Number of Responses



Number of Support Actions



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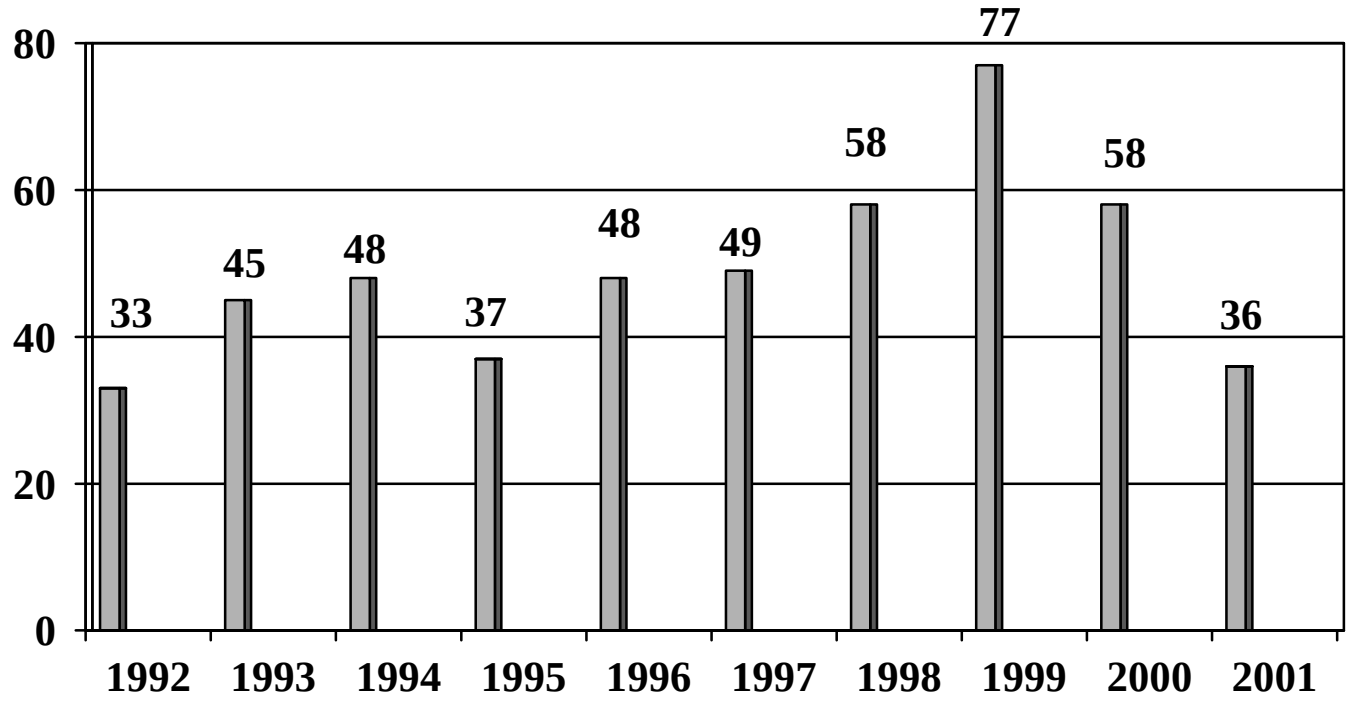
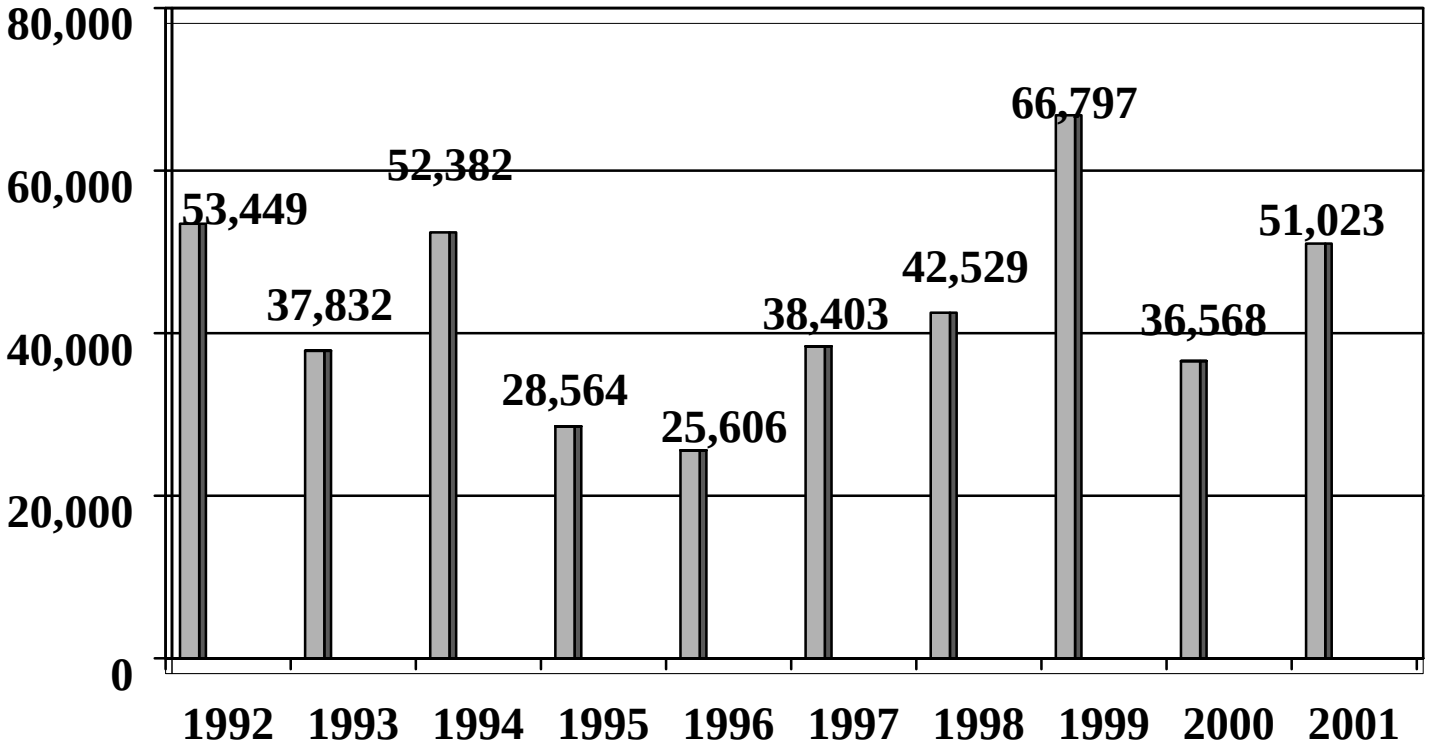
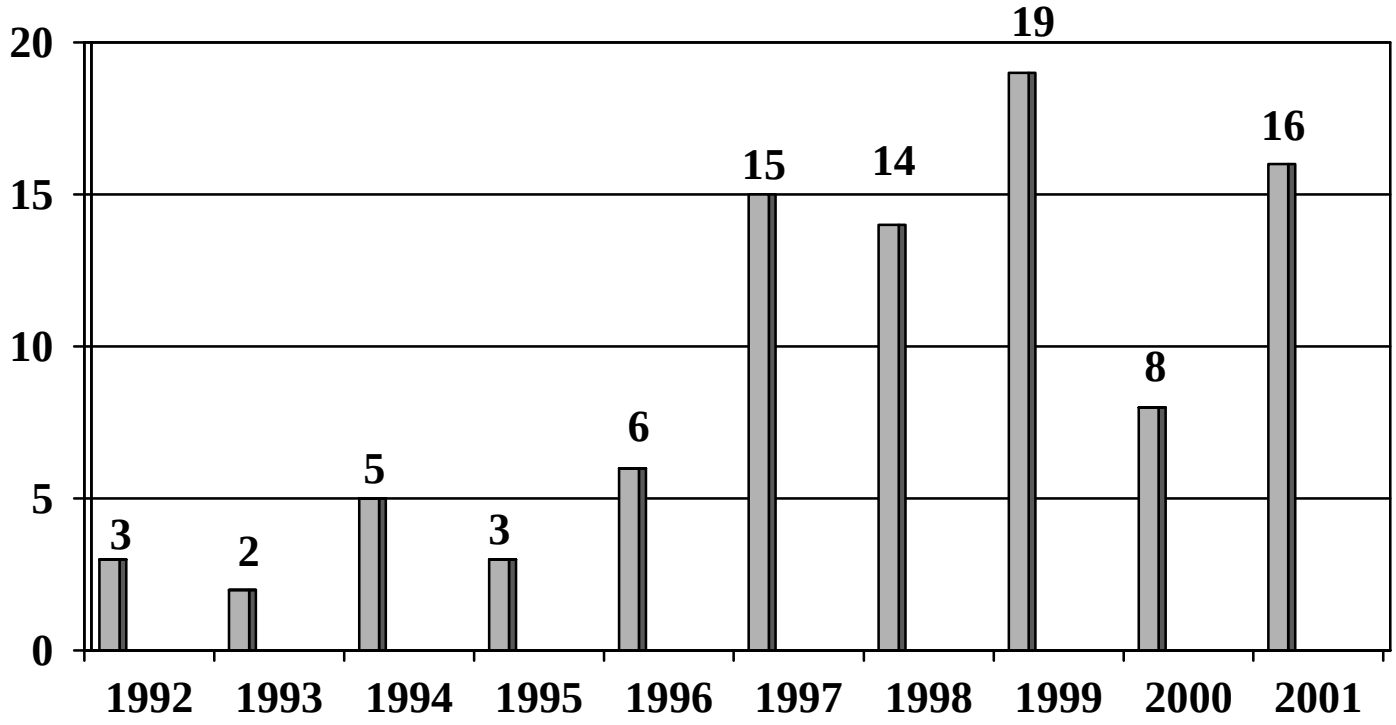
PRESCRIBED FIRES, 1992-2001
Number of Fires



Number of Acres



SOUTHEAST REGION
WILDLAND FIRE USE, 1992-2001
Number of Fires



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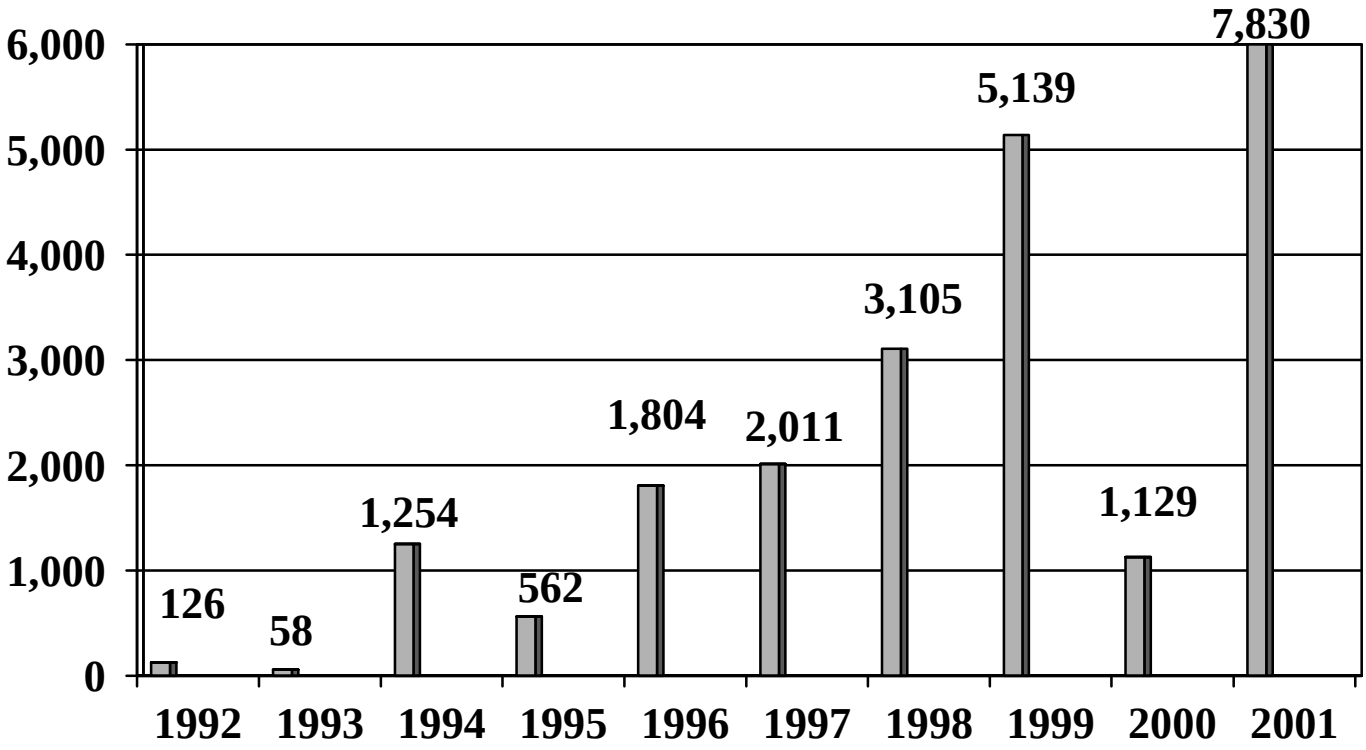


FIRE ECOLOGY

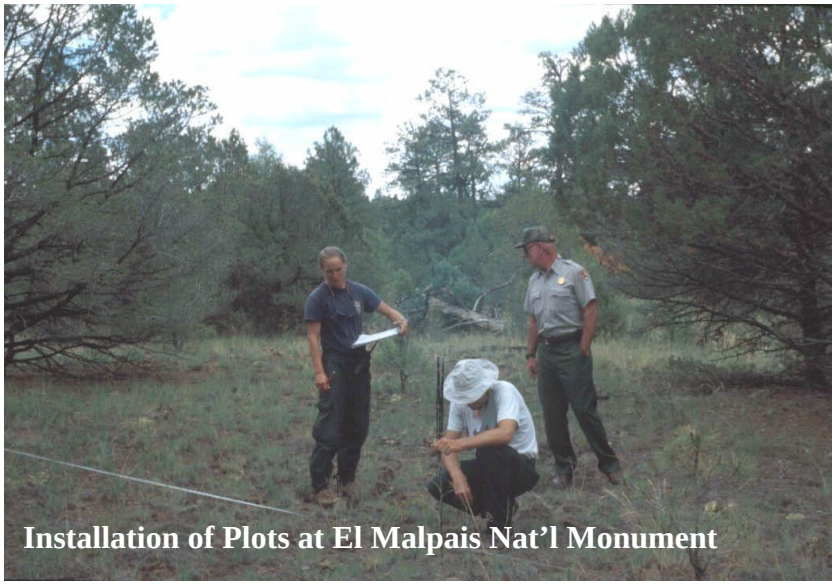
ATTACHMENTS

Photo point installation in the Bear Island Fire at Big Cypress National Preserve.

Intermountain Region

Intermountain Region's 2000 Annual Report reflected that the region had promoted five lead monitors to fire ecologist positions as well as hired new ecologists for several parks. It is more accurate to say we hired three new fire ecologists for Big Bend National Park, Rocky Mountain National Park, and Yellowstone National Park in 2001. One vacant position at Grand Canyon National Park was converted to a fire ecologist position and filled. At the time of this report, two lead monitors successfully competed for newly established fire ecologist positions at Zion National Park and Saguaro National Park. We are continuing to work on two more new fire ecologist positions at this time.

Through this busy fire season for Intermountain Region, fire effects crews were able to accomplish a lot of their scheduled work. The burn moratorium altered many work schedules, but the dominating factor in altered work schedules was the release of new burn plan requirements well into the prescribed fire season. Hiring was hindered by job shuffling among agencies and within the National Park Service and by the late arrival of certification lists of qualified applicants.



Installation of Plots at El Malpais Nat'l Monument

Carl Key and Nate Benson expanded the burn severity mapping protocols to test on fuel models that differ from Glacier National Park.

Fire effects personnel from Bandelier, Glacier, Grand Canyon, Grand Tetons, Yellowstone, and Zion participated in verifying mapping with plot work for fires within Glacier, Yellowstone, Mesa Verde, Bandelier and Grand Canyon.

CBI Class I, 2001

Several Intermountain Fire Effects Crews utilize non-FMH monitoring techniques or are involved in ongoing park management monitoring programs. Park fire effects programs assist or have primary stream turbidity sampling, rare plant surveys, mechanical or manual treatment plots, invasive plant monitoring, and overstory spatial measurements for Farsite GIS layers. The region is looking at monitoring methods for desert ecosystems that may provide statistically valid numbers within a shorter time frame.

The region has an interagency fire effects crew with employees provided by both the National Park Service and the USDA Forest Service. This crew samples for fire effects on State, Forest Service, and National Park Service administered lands. There are two interagency monitoring plans in draft stage at this time.

Fire effects crews provided cadre for various fire classes as well as presenting a specialized version of RX-80/RX-92 for the U.S. Fish and Wildlife Service in Maryland, Delaware, and West Virginia. Intermountain fire effects personnel provided Fire Effects Monitors (FEMOs) for wildland fire occurrences around the country as well as working on task books while completing suppression assignments.

Other accomplishments for the Intermountain Region Fire Effects program include updating and refining monitoring type descriptions, monitoring plans, contributions to fire history research/studies, establishing plots in new monitoring types, collecting and preserving field use plant specimens as well as adding to park plant collections, and participating in fire management planning and compliance.

Eric Miller at Yellowstone National Park has graciously agreed to coordinate the second edition of the Intermountain Region Fire Effects Newsletter. Any contributions for this newsletter should be forwarded to Eric by the end of April, 2002. You can read this newsletter at: www.nps.gov/yell/technical/fire/news.htm.

Parks and other units included in this report are Glacier National Park, Nez Perce National Historic Park, Big Hole Battlefield, Grand Canyon National Park, Grand Teton National Park, Bighorn Canyon National Recreation Area, Bridger-Teton National Forest, Wyoming Game and Fish Department, Bandelier National Monument, El Malpais National Monument, Lake Meredith National Recreation Area, Rocky Mountain National Park, Great Sand Dunes National Monument, Florissant Fossil Beds National Monument, Zion National Park, Bryce Canyon National Park, Golden Spike National Historic Site, Mesa Verde National Park, Great Basin National Park, Arches National Park, Lake Mead National Recreation Area, Yellowstone National Park, Chiricauhua National Monument, Walnut Canyon National Monument, and Big Thicket National Preserve.

The Intermountain Region fire effects staff have received requests for training or presentations about the National Park Service monitoring program from the U.S. Fish and Wildlife Service, the Bureau of Land Management, the USDA Forest Service and the Lady Bird Johnson Wildflower Center. We have tried to accommodate some of these requests, but do not have the staffing or dollars to present enough training or provide enough talks about this program at this time. We will continue to work within the confines of budget and time to assist those who request these services.

PLOT NETWORK INFORMATION

TABLE 1. Plot installation by plot type.

Number of Plots Installed Previous Years				Number of Plots Installed 2001				Total Number Plots Installed			
G	B	F	Total	G	B	F	Total	G	B	F	Total
5	121	477 (9 C)	602	6	32	146 (1 C)	184	11	157	822 (10 C)	975

Number of Plots Installed Previous Years			Number of Plots Installed 2001			Total Number Plots Installed		
Other		Total	Other		Total	Other		Total
Excl 6		Excl 6	Mac 4 CBI 284		Mac 4 CBI 284	Excl 6 Mac 4 CBI 284		Excl 6 Mac 4 CBI 284

Excl = Willow browse **Mac = Plant cover and density macroplot**

C = Control Plots **CBI = Composite Burn Index**

[1/] BAND had 90 plots, lost PSNE1TO815 in Cerro Grande because line was cut through the plot.
[2/] LAMR had 37 plots, lost two (one was cut and the other was destroyed by the installation of a pipeline).
[3/] YELL installed 5 WFURB forest plots plus one control; one mechanical treatment plot. Other data included in totals.

TABLE 2. Plot remeasurements by plot type for 2001 and 2002.

Total Plots to Remeasure 2002				Total Plots Remeasurement 2001			
G	B	F	Total	G	B	F	Total
12	87 (22 P)	264 (56 P)	363 (78 P)	0	68 (6 P)	261 (27 P)	329 (33 P)

C = Control Plots

P = Immediate Postburn Remeasurements

TABLE 4. Projected plot installation.

Plots to be Installed 2002				Projected Total			
G	B	F	Total	G	B	F	Total
0	89	139	228 (5 C)	11	241	705 (5 C)	957 (15 C)

Midwest Region Fire Ecology Annual Report for FY2001

Fire ecology was greatly enhanced in this region with the hiring of three ecoregional fire ecologists. These positions correspond to the I&M (Inventory and Monitoring) networks (Great Lakes, Heartland and Northern Great Plains), and are duty-stationed at Voyageurs, Ozarks and Wind Cave. They were created to provide support for the parks within these areas. Their duties include supervision of the fire effects crews, fire effects data analysis, NEPA compliance, acting as a liaison to resource management, providing science-based input into fire management, and assisting with fire management planning.

The fire effects monitoring continues to be a large emphasis in the fire ecology program. There are four fire effects crews operating within the Midwest Region, at Voyageurs, Ozarks, Wind Cave, and Indiana Dunes. Their primary strategy is the monitoring of permanent vegetation plots to ensure that prescribed fire objectives are being met, and that unwanted effects are not occurring. Across all programs, there were a total of 33 plots installed and read in areas to be treated with prescribed fire, and 167 plots that were read postburn. The programs continue to grow. The Ozark crew began installing plots at Buffalo this year. The Northern Great Plains crew began incorporating nested-frequency protocols to better sample the herbaceous layer, and has begun using non-standard techniques to monitor tree mortality at Devils Tower, and smooth brome in Badlands.

A continuing problem for fire effects is the lack of coverage in the Tallgrass Prairie region. The regional fire ecologist has been working on coordinating with the Long Term Ecological Monitoring (LTEM) group at Wilson's Creek to coordinate their vegetation monitoring programs. This past year an agreement was reached on coordination of our two programs, contingent on the hiring of FIREPRO positions, specifically a fire ecologist and two fire effects crew members. The national office has not been very receptive to the hiring of new permanent positions for FY 2002. The coordination of these programs is on hold until these positions are hired.

An encouraging trend in the region is an increased coordination between fire and resource management. There have been several workshops around the region where fire ecologists and other fire management staff have been able to interface with resource managers and other park staff to tackle park management issues. These include a desired future condition/vegetation workshop at Voyageurs, a Heartland I&M workshop at Cuyahoga Valley, and an interdisciplinary workshop at Homestead. The Fire program has also been active in the Vegetation mapping program, providing assistance at Effigy Mounds and Indiana Dunes.

In summary, this past year showed evidence of fire management receiving more science-based information to better manage resources. With the new ecoregional ecologist positions, and continued growth of the fire effects programs, more ecological information will be provided to fire and resource management staffs to help the parks provide better stewardship of their resources.

Midwest Region Fire Effects Annual Summary

Park	Plot Visit Type	Proposed	Actual	Difference
INDU	Installs	14	2	-12
	Rereads	55	40	-15
OZAR	Installs	15	9	-6
	Rereads	33	33	0
VOYA	Installs	5	0	-5
	Rereads	14	10	-4
WICA	Installs	52	22	-30
	Rereads	125	84	-41

The above table compares the proposed plot visits to the visits that were actually accomplished. The proposed plot visits were taken from FY2001 SACS entries. Plot visits are divided into installations and rereads. Rereads include immediate post-burn rereads, as these were included in the SACS entries in all parks. The regional fire ecologist asked all parks to include these in the SACS entries, and hence thinks it is appropriate to include them in the accomplishments. The immediate postburn rereads increased the proposed rereads in SACS, and were the rereads that did not occur.

All parks fell short of their goals. The only exception is OZAR completed all of their rereads. While there were undoubtedly numerous causes to this, the primary cause is included below:

INDU- The regional ecologist gave poor advice and encouraged optimistic proposals.
OZAR- Expansion to BUFF consumed more time than anticipated.
VOYA – Unfilled FMO position provided a lack of direction for plot installs.
WICA – Burn ban set back RX fire program, reducing immediate postburn rereads. Changes in 5-year burn plan reduced the number of installs.

The data presented above also differs from the tables presented in the individual park annual reports. It is hard to decipher exactly where the differences lie, as the two reports break down the figures differently. The reasons for the differences are explained below:

INDU - Did not use the FY2001 SACS inputs, but an internal document?
OZAR - Immediate post-burn rereads were not included in the accomplishments.
VOYA – FY2002 SACS entries were used instead of FY2001.
WICA – Did not use FY2001 SACS inputs, but an internal document?

Northeast Region

SHENANDOAH NATIONAL PARK
FIRE EFFECTS MONITORING PROGRAM - 2001 ANNUAL REPORT

INTRODUCTION

This year the fire effects monitoring crew for Shenandoah National Park and the mountains to sea program consisted of the lead fire effects monitor and a Student Conservation Association Volunteer. In the first year of monitoring they were able to serve two parks. The first was Saratoga National Historical Park and the second was their "home base" of Shenandoah National Park.

At Saratoga National Historical Park, with the help of Chris Martin, Linda White and a VIP, they were able to draft an FMH-4 and install six brush transects. While Saratoga has used prescribed fire for many years to maintain open grassy fields, this is the first year that FMH monitoring has been incorporated to monitor the meeting of set objectives. A preliminary analysis of the data from Saratoga shows that more plots are needed and possibly the creation of additional monitoring types. Saratoga will benefit substantially from the data gathered this year as well as in future years.

At Shenandoah National Park, they installed four forest plots to monitor the pioneer species Gray Birch. These plots are located in a densely vegetated swampland area of the park. An early analysis of the data shows that more plots are needed and the area may need to be broken down into two separate monitoring types. The further refining of objectives and coordination with the parks botanist and Virginia Natural Heritage Program will be vital to the success of this project.

The fire effects monitoring program at Shenandoah is off to a good start. While the program only had enough money to hire an SCA for a few weeks, in addition to the lead monitor, they were able to install and pilot sample ten plots. The first plot took the longest, however in each subsequent plot they became more efficient. Detailing with other crews and talking with other fire effects folks has also helped getting the program rolling. This year the parks fire ecologist position will be filled. This position will be a great help to further analyze the data collected thus far, as well as to start coordinating fire effects monitoring with other parks.

PLOT NETWORK INFORMATION

Explanation of tables:

Table 1. This was SHEN's first year of sampling. With the help of an SCA and other volunteers they were able to install six brush transects and four forest plots.

Table 2. There were no plots to remeasure in 2001. In 2002 it is expected to complete post-burn re-measurements of six brush transects at Saratoga and help the parks vegetation crew do post-burn reads of five grass transects.

Table 3. In 2002 eleven plots will be re-measured.

Table 4. An ambitious projected plot installation for 2002. CBI plots may also be sampled.

Table 5. The estimated plot load for 2001 was written before the lead fire effects monitor arrived. An SCA volunteer and the lead monitor were unable to complete 83 plots. Therefore, they are 73 plots short of the predicted amount.

Table 6. No plots have burned.

Table 7. No plots have burned.

Table 8. Six brush transects were installed at Saratoga and four forest plots were installed at Shenandoah.

TABLE 1. Plot installation by plot type.

Number of Plots Installed Previous Years				**Number of Plots Installed 2001**				**Total Number Plots Installed**			
G	B	F	Total	G	B	F	Total	G	B	F	Total
0	0	0	0	0	6	4	10	0	6	4	10

TABLE 2. Plot remeasurements by plot type for 2001 and 2002.

Total Plots to Remeasure 2002				Total Plots Remeasurement 2001			
G	B	F	Total	G	B	F	Total
(5P)	(6P)	0	(11P)	0	0	0	0

TABLE 3. Five-year projected numberof plot remeasurements by year

Number of Plots					
2002	2003	2003	2004	2005	2006
11	?	?	?	?	?

TABLE 4. Projected plot installation.

Plots to be Installed 2002				Projected Total			
G	B	F	Total	G	B	F	Total
10	10	25	45	0	0	0	0

TABLE 5. Workload difference between your budget request and actual work accomplished.

Workload Difference in 2002			
G	B	F	Total
-15	-3	-55	-73

TABLE 6. Number of plots that have burned or otherwise treated.

Total Plots Burned 2001				Total Plots Burned to Date			
G	B	F	Total	G	B	F	Total
0	0	0	0	0	0	0	0
Total Plots Thinned 2001				**Total Plots Thinned to Date**			
G	B	F	Total	G	B	F	Total
0	0	0	0	0	0	0	0

TABLE 7. Post-treatment plot summary.

	G	B	F	Total
Immediate Postburn	x	x	x	x
Immediate Non-fire	X	x	x	x
1 Year Postburn	X	x	x	x
2 Year Postburn	X	x	x	x
5 Year Postburn	X	x	x	x
10 Year Postburn	X	x	x	x

TABLE 8. Number of plots installed by monitoring type in 2001.

Monitoring Type Code	Monitoring Type Name	Number of Plots Installed in 2001	Total Number of Plots Installed
BMIGR1D01	Mixed Grassland	6	6
FBEPO1D08	Gray Birch	4	4

DATA ANALYSIS

Minimum Plot Calculations

Minimum plot calculations were run for the two monitoring types in which plots were installed during the summer of 2001. Only a few plots were installed in each monitoring type, therefore further plot installation will be needed to achieve a more accurate estimate of the minimum plot load.

BMIGR1D01
SARATOGA MIXED GRASSLAND

Six brush transects were installed at Saratoga National Historical Park in the grassland monitoring type. The park has been burning to maintain open grassy fields for many years, however, this is the first year that they have incorporated FMH protocols to monitor the achievement of objectives. The primary objective that Saratoga identified was to decrease the density of woody shrubs with the secondary objective of decreasing non-native vegetation while encouraging native vegetation.

Since only six plots were installed, the minimum number of plots was not achieved for the primary monitoring variable. Installing more plots would likely significantly lower the current minimum plot calculation. The monitoring type may also be split into two because of different vegetation composition and fuel models.

FBEPO1D08
Shenandoah Gray Birch

Four forest plots were installed at Shenandoah National Park. The primary objective is to increase the density of gray birch seedlings and the secondary objective is to decrease the density of pole sized trees. This area may be split into two monitoring types because of different fuel models and high variation in gray birch seedlings between plots. The high variability has resulted in high minimum plot calculations for the primary monitoring objective.

This being the only gray birch population in Virginia, the area is highly sensitive. Other treatments such as mechanical thinning, the use of control plots and fences to mediate deer browse will likely be considered. Collaboration with the parks botanist, Virginia Natural Heritage program and fire ecologists will be vital to be able to make sound management decisions.

TABLE 9. Results of minimum plot calculations by monitoring type and monitoring type variable.

	Primary Monitoring Type Variable		**Secondary Monitoring Type Variable**	
	80%/25	90%/25	80%/25	90%/25
BMIGR1D01	28	53	7	13
FBEPO1D08	92	191	9	19

***** = Minimum Plot Numbers Achieved

† = Number Obtained Using Minimum Detectable Change Initial Interpretation of the Data

Since this was the first year of sampling, no plots have burned. The Fire Management Plan (FMP) is currently being re-written at Saratoga National Historical Park. If the plan is completed this winter, plots may be burned in the spring.

Actions to be Taken Based on this Data Analysis

In both of these monitoring types, additional plots will be need to be installed and the definition of each monitoring type will need to be evaluated. In FBEPO01D08, objectives need to be re-defined.

Additional Analyses Needed

FBEPO01D08
Birch species are typically pioneer species and respond positively to disturbance. However, it is unknown how gray birch will respond to fire. Since this is the only gray birch population in Virginia, and possibly a glacial relict, it is important to proceed with caution. Thinning of trees and scorching of plots should be considered before burning the population.

PROGRAM INFORMATION

Staff Participants
Melissa Karanosky – Lead Fire Effects Monitor
Deanna Fusco – SCA Volunteer

Length of Season

TABLE 10. Number of pay periods in field season devoted to fire effects.

Calendar year 2001

Monitor	Starting Date	Ending Date	# of Pay Periods
Melissa Karanosky	02/11/01	12/01/01	21
Deanna Fusco (SCA Volunteer)	06/04/01	08/17/01	11

Percentage of Time Spent on Activities

Activity	Percentage of Time
FMH Plots	40%
FMH Data	15%
FMH Office	18%
Training/ Detail	9%
Travel	2%
Fire	12%
Other	4%

Changes in Protocol

FBEPO01D08
In this monitoring type, all seedlings were counted in the 5 X 10 meter suggested area. Gray Birch seedlings, which basal sprout from a living or dead tree, were counted, measured and mapped in the entire plot. Since Gray Birch is a VA RTE species, it was felt that all of the seedlings in the plot should be accounted for.
Overstory trees, pole sized tree and shrubs were pilot sampled.

BMIGR1D01
Shrubs were pilot sampled.

Data

All 2001 data was entered into the FMH program and checked for errors. The electronic data was then printed out and checked against the original data sheets. Corrections were then changed in the FMH program and a final printout of the data was made.

EQUIPMENT INFORMATION

Field equipment is stored in the shed outside the fire management building at headquarters. Equipment is stored in the fire monitor locker and labeled FMH MTTS (mountains to the sea). Expensive equipment such as cameras, radios and microscope are kept in the lead fire monitor's office. Original field data sheets along with corrected printouts are filed in the lead fire monitor's office. An off-site copy of the data is stored in a filing cabinet in the Inventory and Monitoring building. Back-up zip disks are also periodically made of data and stored in this location. Slides are developed, labeled and stored in a plastic slide holder and binder that is located in the lead monitor's office.

MONITORING TYPE INFORMATION

BMIGR1D01
FMH 4 (see Appendix B)

FBEPO01DO8
FMH 4 (still being revised)

STATUS OF FIVE-YEAR BURN PLAN

The five-year burn plan which is incorporated in Shenanandoah National Park's Fire Management Plan (FMP) is currently being re-written. The hiring and training of a new fire management officer has resulted in a temporary delay in the completion of the plan. The plan will be submitted for review in May of 2002.

APPENDICES

Appendix A – Table of burn unit and plot number
Appendix B – FMH 4 Saratoga National Historical Park
Appendix C – Detail and Trainings 2001
Appendix D – GPS Map of plot locations for FBEPO1D08 (Shenandoah)
Appendix E – GPS Map of plot locations for BMIGR1D01 (Saratoga)

APPENDIX A

TABLE 11. Transects/plots classified by burn unit and monitoring type.

Shenandoah	Gray Birch Burn Unit
Monitoring Type	Plot #
FBEPO1D08*	1,2,3,4
*Plots may be broken down into two monitoring types.	

Saratoga	Grassland Unit
Monitoring Type	Plot #
BMIGR1D01**	1,2,3,4,5,6**
**Plots may be broken down into more than one monitoring type and separate burn units.	

APPENDIX B

FMH-4
BMIGR1D01

FMH-4 Monitoring Type Protocols FMH Data - SARA Page: 0001
FMH version 3.10, Printed on 11/29/01, 10:19:25 am

Current directory: C:\WORK\FMH\SARA

----------Description----------

Monitoring Type Code: BMIGR1D01 Date Described: 07/16/01

Monitoring Type Name: Saratoga Fields

Preparer: Karanosky

FGDC Association:

FMH-4 Version Title/Description: <Untitled FMH-4 version>

Visits Assigned: 00 PRE

Burn Prescription

Date of Burn (mo-mo)..... Aspect (deg.).....
Wind Direction (deg.)..... Spread Direction (B/H/F)..

Fuel (tns/ac).....	0.0-0.0	Herb Moisture (%)....	0-0
Live Woody (tns/ac)……..	0.0-0.0	Midflame Wind (mph)….....	0.0-0.0
Herbs (tns/ac)..……..…..	0.0-0.0	Rate of Spread (ch/hr)…….....	0.0-0.0
Air Temp. (F)....…….....	0-0	Heat per Area (btu/ftý)……......	0.0-0.0
Rel. Humidity (%).…….....	0-0	Fireline Intns (btu/ftý)……....	0.0-0.0
1-hr TLFM (%)...…….....	0-0	Slope (%).....…….....	0-0
10-hr TLFM (%).....……	0	Flame Length (ft)....……...	0.0-0.0
100-hr TLFM (%).....…....	0	Flame Zone Depth (ft).……..	0.0-0.0
1000-hr TLFM (%)....…....	0	Scorch Height (m)....…….	0.0-0.0
Woody Moisture (%)....….	0-0	Char Height (m)..... ……...	0.0-0.0

Additional Prescription Information: (No information provided)

Management Objectives: Reduce all woody stems by 70-90% by the fourth year. post-burn; reduce non-native species by 20-40% by the fourth year post-burn; increase native herbaceous species by 20-40% by the fourth year post-burn..

Monitoring Objectives: We want to be 80% confident of detecting a 70% decrease in the mean density of woody stems by the fourth year post-burn. We also want to be 80% confident of detecting a reduction in the mean non-native species by 20% four years after the application of prescribed fire. In addition we want to be 80% confident of increasing the mean density of native herbaceous species by 20% by the fourth year post-burn. We are willing to accept a 20% chance of saying a change took place when in fact it did not.

Objective Variables: Mean woody stem density; mean density of non-native species, mean density of herbaceous native species.

Physical Description: (No information provided).

Biological Description: (No information provided)

Rejection Criteria: Areas within 30 meters of roads, burn unit boundaries, human made trails, clearings, mowed areas or historic structures.

Notes (This Entire Monitoring Type): Plots #1,2,4,5,6 are fuel model 1 while plot #3 is probably fuel model 3.

----------General Protocols----------

Comments (Deviations, Problems, Omissions), this Version Only: All three shrub widths from pilot sampling entered.

Preburn Control Plots.....No	Herb. Height.…….....,,,.....Yes
Herbaceous Density.....Yes	Abbreviated Tags.....…,,,,...Yes
0P/Origin Buried.....….....No	Herbaceous Fuel Load...,,,,,...No
Voucher Specimens.....Yes	Brush Fuel Load.....,,,.,…,....No

Count Dead Branches of Living Plants as Dead.....…….,,....No

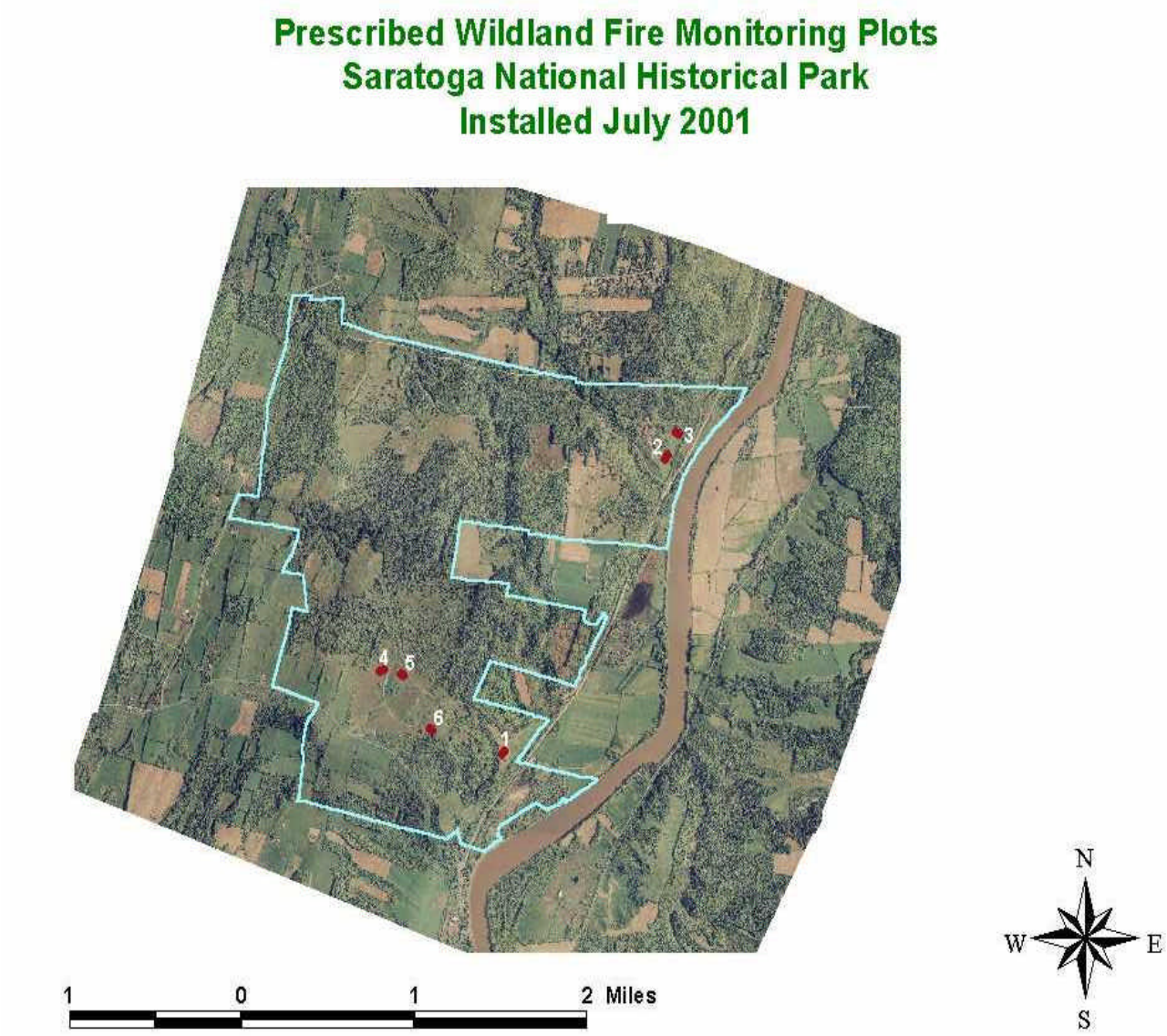
Width "Observed" Transect….1.0m
Herb Transects Sampled.…..0P-30P
Length One Shrub Transect…...30m Width One Shrub Transect...2.0m
Total Shrub Area....…….....60.0m2
Stakes Installed At...…….....0P, 30P
Number of herb frames.……....0 Size of one herb frame.....0.00m2
Total Herb Area.....……....0.00

Burn and Duff Moisture.....…….....No	Flame Zone Depth.....…...No
Postburn 100 Points Burn Severity...No	Herbaceous Fuel Load.....No
Herb. (FMH-15/17/21).…….....No	

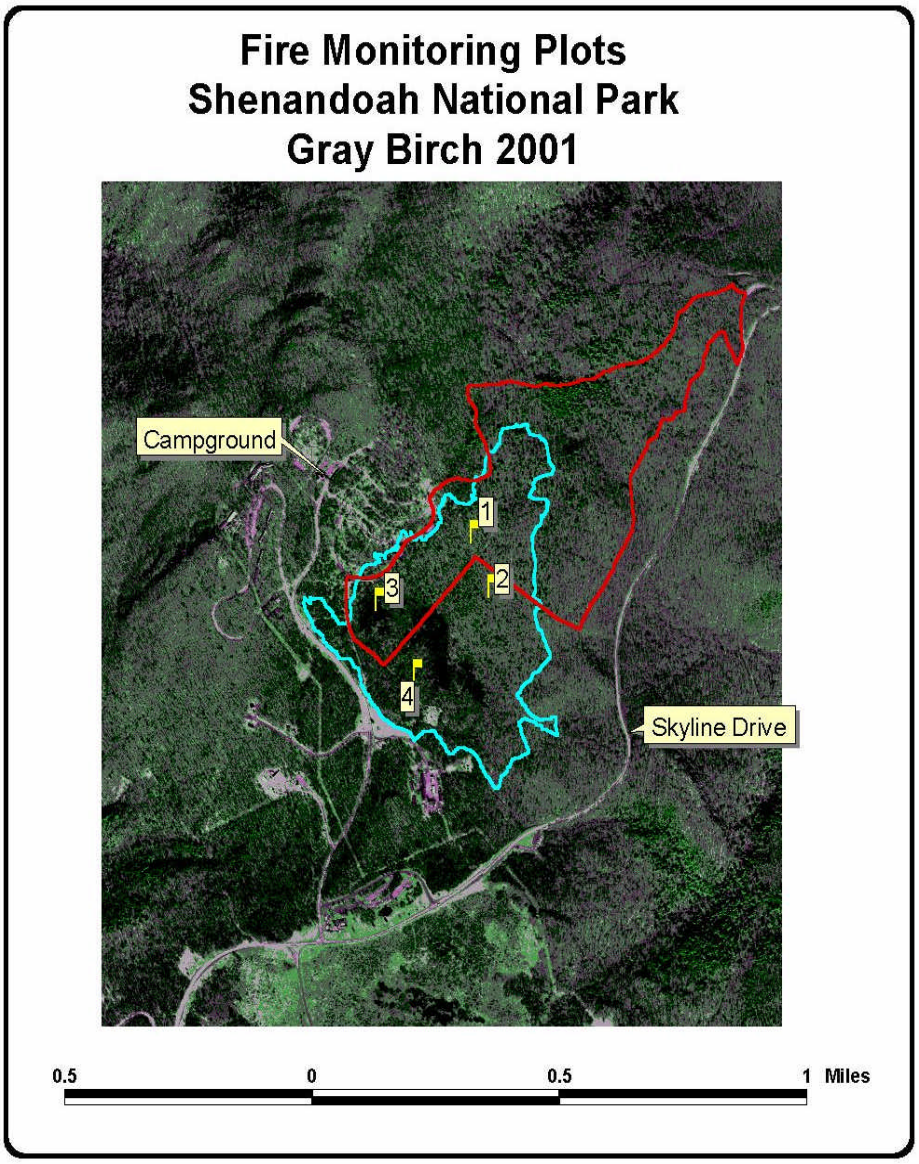
Detail and Trainings 2001

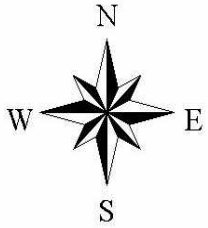
The year started out with the lead fire effects monitor attending RX-92, Fire Effects Monitoring Program Design and Implementation. Early in the summer the lead monitor traveled to Zion National Park to detail with the fire effects monitoring crew. A week was spent installing brush transects and learning other aspects of the program. The SCA volunteer completed S-130/190 and the lead fire effects monitor completed S-290. The lead monitor and the SCA volunteer also went on a detail as FFT2 in Washington state. The lead monitor attended burn severity mapping training at Glacier and participated in implementing this training at Big South Fork.

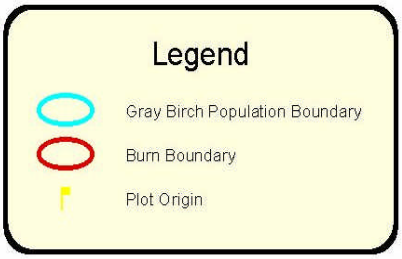
APPENDIX D


Prescribed Wildland Fire Monitoring Plots
Saratoga National Historical Park
Installed July 2001
1
2
3
4
5
6
1 0 1 2 Miles
N
W
E
S

APPENDIX E


Fire Monitoring Plots
Shenandoah National Park
Gray Birch 2001
Campground
1
2
3
4
Skyline Drive
0.5
0
0.5
1 Miles


N
W
E
S


Legend
Gray Birch Population Boundary
Burn Boundary
Plot Origin

PACIFIC WEST FIELD AREA

One of the most exciting things this year continues to be the involvement of fire ecologists in the planning process. The continued use of fire effects data to examine what parks have learned over the past ten years of burning is helping park managers apply these lessons to current work on several parks' fire management plans. This year three additional park fire ecologists were hired to oversee the quality of fire effects data and provide a bridge between results and management. These ecologists are: Karen Kopper (NOCA, LARO, SAJH, WHMI & JODA), Mary Rasmussen (CRLA, LABE & ORCA) and Marti Witter (SAMO & CHIS). Thanks to the two Intermountain fire ecologists for their assistance in Pacific West parks: Dennis Divoky (helps BIHO & NEPE) and Henry Bastian (helps GRBA & LAME). Thanks also go to Rhonda Loh, HAVO botanist who functions for all intent and purposes as a fire ecologist.

Another exciting thing is the integration of I & M networks and fire ecologists. Following years of limited coordination the recent growth of these two programs has provided an opportunity to work together. Each new park fire ecologist is now working with their new respective network coordinator and are involved in each I & M network's steering committee, which allows closer integration. Parks are also finding it useful to include fire ecologists in their I & M scoping sessions. By working together they are finding that they are becoming more effective managers and monitors of our natural resources. The following is a summary of the work accomplished in the region this year. Thanks to all the folks for their hard work (especially those overworked lead monitors)!

TABLE 1. Plot installation by Field Area

Number of Plots Installed 2001				*Total Number of Plots Installed*			
PWFA				PWFA			
41				1016			

TABLE 2. Workload by Team

Team	*# of Plots Installed*	*# of Plots Revisited*	*Total Plots Visited*
Klamath-Cascades	37	31	68
Central & S. Calif.	0	13	13
Sequoia-Kings	0	16	16
Yosemite	0	17	17
Columbia Cascades	0	16	31
Hawaii	0	54	54
Great Basin/Lake Mead	0	21	21

Team	*# of Plots Installed*	*# of Plots Revisited*	*Total Plots Visited*
Big Hole/Nez Perce	4	0	4

Sequoia and Kings Canyon National Parks
Fire Effects Monitoring Program - 2001 Annual Report

MaryBeth Keifer
Division of Science and Natural Resources Management
Sequoia and Kings Canyon National Parks
March 2002

EXECUTIVE SUMMARY

Highlights of recent findings:

- **Fuel reduction** objectives were met or exceeded for restoration burns in all monitoring types that have the required minimum sample size.
- **Stand densit**y objectives were met for restoration burns in the Giant sequoia-mixed conifer forest type. Other mixed-conifer forest types either do not yet have a sufficient sample size to make the assessment or do not meet stand density objectives for smaller diameter trees; conducting subsequent re-burns may help to achieve the restoration objectives in these types.
- **Giant sequoia regeneration** increases greatly following fire, while it is nearly absent in areas that have not burned in many decades. In addition, successful recruitment of postfire sequoia regeneration into larger diameter classes occurs by 10-years following fire. Subsequent re-burning of postfire sequoia regeneration leads to a mixed amount of mortality and survival that varies among patches.

PURPOSE AND HISTORY

The fire effects monitoring program is a critical component of Sequoia and Kings Canyon National Parks' (SEKI) fire management program. The purpose of the monitoring program is to evaluate the achievement of fire management objectives, to detect any unexpected or unwanted changes that may be a result of prescribed burning, and to provide this information to fire managers, other park staff, and the public.

Fuel and vegetation monitoring has been part of SEKI's fire management program for the last two decades. The monitoring program addresses fire effects on several ecosystem components (dead and downed fuel, overstory and understory vegetation). Until recently, few specific management objectives were developed for the prescribed fire program, other than those for fuel hazard reduction. To answer the question, "What would the resource look like if we achieved our goals?", target conditions are needed to describe resource goals more specifically and to serve as a standard by which to measure fire management program success. Therefore, over the last few years, park staff and local research scientists have developed preliminary target resource conditions and corresponding fire management objectives for each vegetation type where fire occurs.

Target conditions and management objectives were developed for two fire management program phases. First, restoration objectives describe structural attributes of the dominant vegetation (e.g. stand density) that apply in areas initially being treated with prescribed fire to restore conditions significantly altered by fire exclusion. Next, objectives for the maintenance phase of the program describe long-term, process-related attributes of the historic fire regime (e.g. fire frequency) and apply in areas that have not been greatly altered by fire exclusion or where conditions have been restored with prescribed fire. Corresponding monitoring objectives have also been developed to ensure an adequate method of assessing whether the management objectives are met.

PROGRAM BASICS

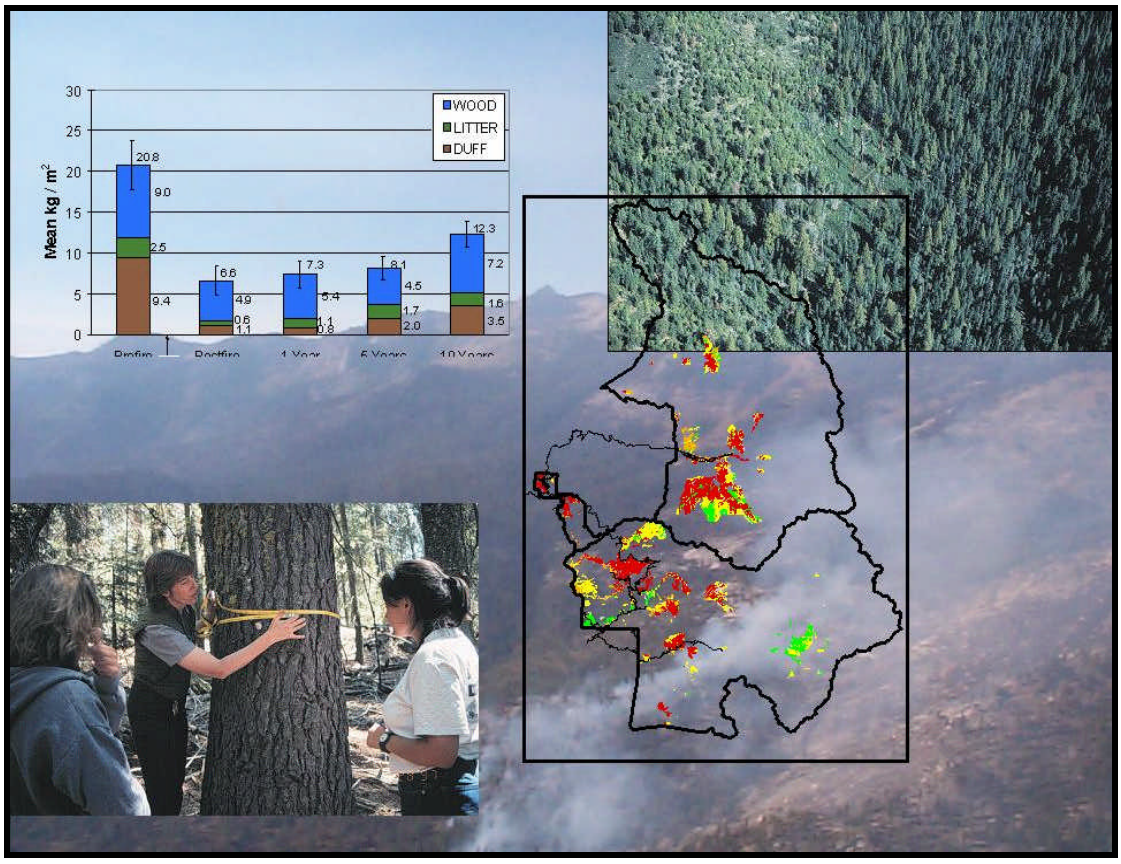
The monitoring program sampling design is intended to achieve the monitoring objectives as efficiently as possible. The vegetation and fuel monitoring methods generally follow the NPS Fire Monitoring Handbook (FMH; USDI National Park Service 2001) protocols, with some deviations because the parks' program was initiated prior to the NPS program.

Seven monitoring types occur in SEKI. Monitoring types are defined by vegetation, fuel, and site characteristics, and by burn prescriptions (the range of environmental conditions under which prescribed fires burn). The minimum sample size (number of monitoring plots) needed to meet the monitoring objectives is calculated for each monitoring type based on the variables that are defined in the management objectives. Plots are distributed using a restricted random method that randomly selects plot locations in areas scheduled for burning over the few years, while minimizing clumping of plot locations. Monitoring occurs according to the following schedule: preburn, immediately postburn (within 2 months of burning), and 1, 2, 5, and 10-years postburn, until the plot is burned again and the schedule restarts.

Attributes measured include fuel load, overstory and seedling tree density, shrub density or cover, and herbaceous vegetation cover, as well as postburn effects (bark char, crown scorch, and burn severity rating). Data collected from the monitoring plots are summarized annually after each phase in the monitoring schedule and updated results are distributed to park and agency staff and the public.

WORK ACCOMPLISHED IN 2001

Nineteen plot re-measurements were accomplished in 2001 in addition to data collected for several projects that provide supplemental information to the fire management program. No new plots were installed in 2001 because burn units where plots were planned for installation were not burned this year. Instead, additional time was dedicated to finish updating the species list, continuing the process of updating and maintaining the database, and assisting with monitoring wildland fires in the parks.



RESULTS – ARE WE MEETING OUR MANAGEMENT OBJECTIVES?

Analyses were updated to include data collected in 2001 and results were compared with objectives to determine progress towards achieving fire management objectives for each monitoring type (see Summary Table on next page). Management objectives and monitoring results are presented for the restoration phase of the program. Objectives related to the maintenance phase of the program are currently being refined and monitoring methods to address them will be developed.

In the Summary Table below, fuel reduction objectives refer to mean reduction between preburn and immediate postburn total fuel load. Stand density objectives refer to 5-year postburn stand density. All results are presented as 80% confidence intervals of the mean. For example, if the 80% confidence interval for mean total fuel reduction is 71-81%, this means that there is an 80% probability that the true mean total fuel reduction is between 71% and 81%. There is, therefore, a 20% probability that the true mean is either less than 71% or greater than 81% reduction. If the entire confidence interval falls within the target range, there is an 80% probability that the objective has been achieved.

Summary Table. Monitoring program results showing progress towards achieving restoration management objectives by monitoring type. All results shown are 80% confidence intervals of the mean. Fuel reduction objectives/results are mean percent reduction from preburn to immediate postburn. Stand density objectives/results are for five-year postburn mean stand density. An underlined number of plots indicates that the minimum sample size has been attained for that variable.

Monitoring Type	Management Objective	Monitoring Results (80% confidence interval)	Objective Achieved?
Giant sequoia-mixed conifer forest	60-80% total fuel reduction	Total fuel reduction = 71-81% *(n=28 plots, 18 fires)*	**YES** (slightly exceeded)
	stand density: 50-250 trees/ha <80 cm DBH 10-75 trees/ha >80 cm DBH	Stand density = 174-252 trees/ha <80 cm DBH 36-49 trees/ha >80 cm DBH *(n=29 plots, 18 fires)*	YES
White fir-mixed conifer forest	60-80% total fuel reduction	total fuel reduction = 62-85% *(n=10 plots, 6 fires)*	**YES** (exceeded)
	stand density: 50-250 trees/ha <80 cm DBH **10-75 trees/ha**	stand density = 272-356 trees/ha <80 cm DBH 28-44 trees/ha >80 cm DBH *(n=10 plots, 6 fires)*	**NO** for trees <80 cm DBH; **YES** for trees >80 cm DBH
Low elevation-mixed conifer forest	60-80% total fuel reduction	total fuel reduction = 75-93% *(n=5 plots, 3 fires)*	**YES** (exceeded)
	stand density: 50-250 trees/ha <80 cm DBH **10-75 trees/ha**	stand density = 310-562 trees/ha <80 cm DBH 9-35 trees/ha >80 cm DBH *(n=5 plots, 3 fires)*	Uncertain – sample size too small
Ponderosa pine forest	60-80% total fuel reduction	total fuel reduction = 92-100% *(n=4 plots, 2 fires)*	Uncertain – sample size too small
	stand density: 50-250 trees/ha <80 cm DBH 10-75 trees/ha >80 cm DBH	stand density = 143-262 trees/ha <80 cm DBH NA >80 cm DBH *(n=4 plots, 2 fires)*	Nearly achieved
Red fir forest	60-80% total fuel reduction	total fuel reduction = 84-98% *(n=2 plots, 1 fire)*	Uncertain – sample size too small
	stand density: 50-500 trees/ha <80 cm DBH **10-75 trees/ha**	stand density = 0-377 trees/ha <80 cm DBH 0-81 trees/ha >80 cm DBH *(n=2 plots, 1 fire)*	Uncertain – sample size too small
Chamise chaparral	objectives not yet defined	live chamise (*Adenostoma fasciculatum*) percent cover = 0-31.7% immed. postburn *(n=3, 1 fire)*	NA
Mixed chaparral	objectives not yet defined	live shrub percent cover = 77.9-87.1% one-year postburn *(n=2, 1 fire)*	NA

INTRODUCTION

The Sequoia and Kings Canyon National Parks' (SEKI) fire effects monitoring program had a productive season in 2001. The fire effects crew performed all scheduled fire effects plot rechecks in addition to each crewmember taking 1-2 park fire assignments that varied in length from a few days to over two weeks. The crew also completed work on several additional projects during the 11 pay period (22 weeks) season, which extended through September this year.

Quality work is emphasized and improvements to our fire effects monitoring program were made by carrying out additional studies to obtain important fire effects information. The fire effects monitoring crew, led by their excellent supervisor, Georgia Dempsey, accomplished a great deal of work in a highly professional manner.

PLOT NETWORK INFORMATION

The total number of fire effects plots installed includes plots that were established prior to FMH protocol (Table 1). Listed separately are unburned plots and plots installed at Devils Postpile National Monument (DEPO) that were established using FMH guidelines following the Rainbow Fire in 1992 to assess post-fire changes. At SEKI, a number of plots were established pre-FMH that are identical in shape and size to FMH plots. All recommended variables were measured in pre-FMH plots; however, two of these recommended variables were measured using different methods. As these "old-style" plots reach re-burn status, all variables are measured using both the older methods as well as the FMH protocol. Both park objective variables (total fuel load and overstory tree density) are measured using methods essentially identical to FMH protocols.

TABLE 1. Plot installation by plot type.

Number of Plots Installed Previous Years				**Number of Plots Installed 2001**				**Total Number Plots Installed**			
G	B	F	Total	G	B	F	Total	G	B	F	Total
-	15	59 (20U) (8D)	74 (20U) (8D)	-	0	0	0	-	15	59 (20U) (8D)	74 (20U) (8D)

G = grassland, B = brush, F = forest
U= unburned plots
D = plots installed at Devils Postpile NM after the Rainbow Wildfire

No new plots were installed in 2001 because burn units where plots are scheduled for installation were not burned this year. Instead, additional time was dedicated to finish updating the FMH-6 species list and continuing the process of updating and maintaining the FMH database.

The number of plot remeasurements in 2002 will increase greatly from 2001 levels (Table 2). This remeasurement workload, combined with the additional project workload will make for a busy and possibly extended season for the fire effects monitors in 2002.

TABLE 2. Plot remeasurements by plot type for 2001 and 2002.

Total Plots Remeasured 2001				**Total Plots to Remeasure 2002**			
G	B	F	Total	G	B	F	Total
-	-	13 3 U	16 3 U	-	2 (3 P)	27 (3 P)	29 (6 P)

U = Unburned Plots

P = Immediate Postburn Remeasurements

In 2003, it appears that plot rechecks for plots *currently* installed will decrease and then plateau over the next several years (Table 3). However, other factors will have an effect on the future fire effects workload. We plan to install more plots to address fire effects in new or under-represented monitoring types. These types include the ponderosa pine and lower elevation-mixed conifer forest types, and the chaparral and oak woodland types where more burning may be planned. The projected workload does not include these new efforts (Table 3), however, they will be added to the projected workload as they are planned and installed. We will initiate monitoring in new vegetation types or increase monitoring in existing types as needed as our fire management program continues to evolve and progress.

TABLE 3. Five-year projected number of plot remeasurements by year.

Number of Plots					
2002	2003	2004	2005	2006	2007
29	13	15	13	12	14

Up to 9 new plots may be installed in 2002 for a projected total of 83 burn plots installed (Table 4). Not shown in Table 4 are an additional 38 plots that were installed early in the program immediately after fires to examine post-fire recovery and will be used only as such (ie. no preburn vs. postburn analysis). Also, two plots are located in a currently undefined monitoring type along a narrow roadside strip burned to prevent ignition of wildfires by motorized vehicles.

TABLE 4. Projected plot installation.

Plots to be Installed 2002				Projected Total			
G	B	F	Total	G	B	F	Total
-	0	9	9	-	15	68 (20 U)	83 (20 U)

U = unburned plots

The 2001 workload was slightly less than requested for plot remeasurements. Six plots (two brush, four forest) in units that were scheduled for burning were not burned, therefore, immediate postburn remeasurements were not needed (Note: In our requests, I believe we no longer include immediate postburn remeasurements, which should eliminate this difference in the future.) The workload for plot installation was also lower than what was requested; 12 plots were requested but none were installed. These plots were not installed because the units they were located in were not burned. Plot installation is more difficult to predict as burn projects may or may not get accomplished for a variety of reasons. We request the funding to cover the work in case it is needed.

TABLE 5. Workload difference between budget request and actual work accomplished.

Workload Difference in 2002			
G	B	F	Total
0	-4 (-2 I)	-2 (-10 I)	-6 (-12 I)

Numbers indicate differences in plot remeasurements unless designated I

I = difference in new plot installations

Of the plots that meet FMH standards for the parks' objective variables, 65 plots have burned, 11 of these have been treated with prescribed fire twice (Table 6).

TABLE 6. Number of plots that have burned.

Total Plots Burned 2001				Total Plots Burned to Date			
G	B	F	Total	G	B	F	Total
-	0	0	0	-	10	55 (11 R)	65 (11 R)

R = reburns

Of the 55 forest plots that have burned, 52 have reached one-year, 34 have reached two-year (pre-FMH plots were not visited two-years postburn), 44 have reached five-year, and 21 have reached ten-year postburn stages. Eleven plots have been reburned, seven of which reached the one-year post-reburn stage and two of which reached the two-year post-reburn stage (Table 7). A number of unburned plots have also reached each of the equivalent post-establishment stages and 11 brush plots have burned with eight reaching the two-year postburn stage and five reaching the five-year postburn stage (Table 7).

TABLE 7. Postburn plot summary.

	G	B	F	Total
Immediate Postburn	-	11	54	65
1-Year Postburn	-	11	52	63
2-Year Postburn	-	8	35	42
5-Year Postburn	-	5	44	49
10-Year Postburn	-	-	26	26
Reburn Immed. Postburn	-	-	14	14
Reburn 1-Year Postburn			7	7
Reburn 2-Year Postburn	-	-	8	8
Reburn 5-Year Postburn	-	-	2	2

Note: The number of plots reaching the two-year postburn stage is less than those reaching the five-year postburn stage because plots installed prior to the FMH were not usually measured two-years postburn.

The 55 standard FMH burn plots are divided among six monitoring types (Table 8). The Giant sequoia/mixed conifer forest monitoring type has the greatest number of plots (29), followed by White fir/mixed conifer forest (11), Red fir forest type (six), Low elevation-mixed conifer forest (five), and Ponderosa pine-dominated forest type (four). In the brush types, five plots are installed in the Montane chaparral, three plots in Chamise chaparral, and six plots in the Mixed chaparral.

TABLE 8. Number of plots installed by monitoring type in 2001.

Monitoring Type Code	Monitoring Type Name	Number of Plots Installed in 2001	Total Number of Plots Installed
FABCO1T08	White fir-mixed conifer forest	0	11
FABMA1T08	Red fir forest	0	6
FCADE1T09	Low elevation-mixed conifer forest	0	5
FPIPO1T09	Ponderosa pine-dominated forest	0	4
FSEGI1T08	Giant sequoia-mixed conifer forest	0	29
BADFA1D04	Chamise chaparral	0	3
BARME1D04	Mixed chaparral	0	6
BARPA1T05	Montane chaparral	0	5

PROGRAM INFORMATION

Staff Participants

Georgia Dempsey (crew leader), Darren Kane*, Joel Metcalfe*, Amy Schultz*, Teri Young*, MaryBeth Keifer (program manager).

* = seasonal employees

Length of Season

The fire effects field season was 11 pay periods in length (22 weeks). Fire effects work includes FMH training, new plot installation, plot rechecks, fire behavior observations in plots, computer data entry, and additional fire effects projects. Other work that accounted for up to two additional pay period per person included fire training (attending or instructing), prescribed fire project preparation, monitoring wildland fires, and assisting with other resource management programs.

TABLE 9. Number of pay periods in field season devoted to fire effects.

Monitor	Starting Date	Ending Date	Total # of Pay Periods	# of Pay Periods Devoted to Fire Effects
Georgia Dempsey	4/30/01	9/29/01	11	11
Darren Kane	5/29/01	10/27/01	11	9
Joel Metcalfe	5/29/01	9/22/01	8.5	7
Amy Schultz	5/29/01	10/13/01	10	9
Teri Young	5/29/01	9/29/01	9	7
MaryBeth Keifer	Year round	Year round		12

Changes in Protocol

No new deviations from FMH protocol occurred. A few long-standing protocol deviations remained in effect so as not to compromise long-term data consistency. The discrepancies lie primarily in the definitions of overstory, pole-sized, and seedling trees. SEKI tree size definition is as follows: overstory = trees at breast height and greater; no pole-sized trees; seedling = trees less than breast height. These categories have been maintained because: 1) they are standard parkwide definitions, and 2) they were in place prior to the FMH guidelines and long-term consistency is extremely important. The tree diameter breakdown can be changed relatively easily by data manipulation, if necessary, so that the protocol deviation only affects trees in the seedling size class. For brush monitoring types, density measurements are not recorded due to difficulty distinguishing among individuals of many species. In addition, our current efforts to develop management objectives for chaparral are focused on brush cover and not density; therefore, we will not collect brush density measurements in these areas unless our management objectives change.

Recommended Changes in Protocol

None.

Changes in Protocol following a Program Review

No program review took place this year.

Equipment Information

No new equipment information to note.

Status of Multi-Year Burn Plan

The SEKI multi-year burn plan was revised and approved on 6/1/01. The proposed burn unit boundaries have been digitized which greatly assists in locating new plots for installation although an automated GIS method has not yet been developed.

Monitoring Plan

See the SEKI Fire and Fuels Management Plan, Appendix C, Monitoring Plan for the most current detailed information about the fire effects (fuels and vegetation) monitoring program.

PROGRAM OBJECTIVES

Fuels and vegetation monitoring has been part of Sequoia and Kings Canyon National Parks' fire management program for the last two decades. The Parks' fire effects monitoring program staff began installing permanent plots in 1982 in areas where prescribed burning was planned. Monitoring efforts first focused on the giant sequoia groves but expanded into other vegetation communities as the prescribed fire program grew.

Table 10. Vegetation and fuel management objectives and monitoring objectives. **Restoration objectives are in unshaded cells and maintenance objectives are in shaded cells.**

Variable **and Vegetation Type**	**Management Objective** (restatement of applicable target conditions from Table 1)	Monitoring Objective
Fuel Load [*restoration*] **All Forest Types**	Reduce total dead and down fuel load by 60-80% immediately following initial treatment with prescribed fire.	Measure total fuel load with a sample size sufficient to have an 80% probability of detecting at least a 40% reduction in mean total fuel load immediately postburn. A 20% chance that a change will be detected when a real change does not occur is acceptable.
Fuel Load [*maintenance*] **Mixed-Conifer Forest**	Use fire to maintain fuel load mosaic across the landscape as follows: 20-40% 5-30 tons/acre 20-50% 30-60 tons/acre 5-20% >60 tons/acre *Note: % is percent of landscape for all Mixed-Conifer Forest types.*	Measure total fuel load with a sample size sufficient to have an 80% probability of being within 25% of

Variable and Vegetation Type	**Management Objective** (restatement of applicable target conditions from Table 1)	Monitoring Objective
Fuel Load [*maintenance*] **Red Fir Forest**	Use fire to maintain fuel load mosaic across the landscape as follows: 1-25% 5-30 tons/acre 30-70% 30-60 tons/acre 5-20% >60 tons/acre *Note: % is percent of landscape in Red Fir forest.*	probability of being within 25% of the true mean total fuel load for all time intervals of interest.
Stand Structure [*restoration*] **Mixed-Conifer Forest**	Use prescribed fire to restore mixed-conifer forest mean stand density to: 50-250 trees/ha for trees <80 cm DBH Species composition by forest type: Ponderosa pine – 50-80% pine, 5-20% fir, 10-20% cedar, 1-10% oak; White fir – 40-80% fir, 15-40% pine, 0-20% cedar; Giant sequoia – 40-80% fir, 10-40% sequoia, 5-20% pine.	Measure total tree density with a sample size sufficient to have an 80% probability that the 5-year postburn mean total density of trees <80 cm in diameter at breast height (DBH) and trees =80 cm DBH is within 25% of the true population means.
Stand Structure [*restoration*] **Red Fir Forest**		

Variable and Vegetation Type	**Management Objective** (restatement of applicable target conditions from Table 1)	Monitoring Objective
Landscape Pattern [*maintenance*] **Mixed-Conifer Forest Types**	Use fire to maintain the distribution of gaps/patches across the landscape as follows: 75-95% 0.1-1 ha gaps/patches 5-25% 1-10 ha gaps/patches <1% 10-100 ha gaps/patches *Note: % is percent of landscape comprised of gaps of each size class.*	*Note: Specific monitoring methods for assessing landscape pattern objectives have not yet been developed.*
Landscape Pattern [*maintenance*] **Red Fir Forest**	Use fire to maintain the distribution of gaps/patches across the landscape as follows: 70-95% 0.1-1 ha gaps/patches 5-30% 1-10 ha gaps/patches <1% 10-100 ha gaps/patches	
Stand Structure [*maintenance*] **Brush Types**	Use fire to maintain a shrub stand age structure mosaic across the landscape as follows: 20-30% 0-20 year old stands 40-60% 20-50 year old stands 20-30% >50 year old stands. *Note: species composition varies depending on fire return interval*.	Measure live shrub cover with a sample size sufficient to have an 80% probability of being within 25% of the true preburn mean live shrub percent cover. (*Note: This objective may be better monitored by using the time since last fire GIS layer; see Fire Regime section H; species composition may still require plot-level monitoring*).

SAMPLING DESIGN AND FIELD METHODS

The sampling design is intended to allow the program to achieve the monitoring objectives as efficiently as possible. The vegetation and fuel monitoring program generally follows the NPS Fire Monitoring Handbook (FMH; National Park Service 2001) protocols, with some deviations because the parks' program was initiated prior to the NPS program. Currently, eight monitoring types (combination of vegetation type, fuel model, and burn prescription) exist, of which seven describe the vegetation and fuels located in areas where prescribed burning occurs. One monitoring type is associated with an area burned in a WFU fire.

For each monitoring type, the minimum sample size was calculated to determine the number of plots needed to achieve the monitoring objectives. This information, along with the current plots installed and new plots planned, comprises the plot installation plan (Table 11).

Table 11. Vegetation and fuels monitoring plot installation plan.

Monitoring Type Name	**Minimum Sample Size***		**Current # of Plots**	**# of New Plots Planned**	**Total # of Plots Planned**
	Total Fuel Reduc.	**Density (<80 cm, >80cm) or % Cover**			
Giant sequoia-mixed conifer forest	5	10, 9	29	1	30
White fir-mixed conifer forest	12	3, 7	11	2	13
Low elevation-mixed conifer forest	4	7, 29	5	5	10
Ponderosa pine-dominated forest	5	1, #	4	6	10
Red fir forest	#	# , #	6	4	10
Chamise chaparral	-	1	3	0	3
Mixed chaparral	-	2	6	4	10
Montane chaparral‡	‡	‡	4	0	4
TOTAL			**68**	**22**	**90**

Key:

* Minimum sample size was calculated for objective variables. In all forest types, calculations were performed for immediate-postburn total fuel reduction (precision R=25; confidence level=80%, power=80%, minimum detectable change=40%) and 5-year postburn total tree density for trees <80 cm DBH and >80 cm DBH (precision R=25; confidence level=80%). In all brush types, calculations were

performed for preburn live total shrub cover (precision R=25, confidence level=80%). Underline indicates minimum sample size has been met for that variable.

A minimum sample size for this category is not available because there are not enough plots or data to calculate.

‡ Monitoring type associated only with wildland fire use area; no minimum sample size calculated.

The National Park Service's Fire Monitoring Handbook (2001) methods are used for monitoring fire effects on vegetation and fuels, with some modifications due to program history and local conditions (see above section, Changes in Protocol). Monitoring plots in burn units are located randomly on a 100 x 100 meter grid within each of the vegetation types designated for monitoring. Criteria for grid point exclusion include proximity to roads/trails, riparian areas, anomalous physical or biological characteristics, and inaccessibility (both safety and time constraints). Specific location of individual plots (most geo-referenced) can be obtained from the Parks' plot location database located on the local area network (j:\data\study_sites\fire_effects).

Plots are installed in a sequence according to segments scheduled to burn. Monitoring occurs according to the following schedule: preburn, immediately postburn (within 2 months of burning), and 1, 2, 5, and 10 years postburn. Data from these monitoring plots are summarized after each step of the monitoring schedule and results are distributed to park staff and the public.

Unburned monitoring plots in other areas of the parks may be used to compare with burn program results. If existing unburned plots are not available, additional plots may be established adjacent to the project area in areas that are not currently scheduled for prescribed burning.

Additional Studies

The following studies complement SEKI's network of fire effects monitoring plots and provide additional information important to the fire management program.

Increasing giant sequoia sample size

Giant sequoia seedlings in reburns

Sugar pine preburn litter/duff removal

Large tree mortality following prescribed fire is a concern for land managers attempting to reduce fuels and restore the process of fire in fire-dependent **ecosystems. This information** is especially critical in areas where fuels have accumulated following an unnaturally long fire free period due to past fire exclusion. Pines, including sugar pine seem to be especially susceptible to mortality following fire. Whether this mortality is directly related to returning fire after a long absence in short-return interval regimes, or a combination of fire and other previously existing stressors, is unknown at this time. Research scientists from the USDA Forest Service Riverside Fire Lab found that removing some of the deep organic layer around trees prior to burning reduces large tree mortality in some forest types in Arizona. This type of preburn fuel removal may be an option in areas where large tree mortality is an important sociological or ecological issue. To see whether a difference in mortality occurs between trees with fuels removed and trees without fuels removed in park forests, and also to test the practicality of fuel removal methods, fuel was removed around large sugar pines in several prescribed burn units between 1996 and 2001. In 2001, a subset of trees receiving treatments were instrumented by the Fire Lab to directly measure changes in soil and cambium temperatures resulting from fuel removal treatments.

Heavy fuel effects on giant sequoia

MONITORING RESULTS

Results to date are summarized below by monitoring type. All analyses were performed with data collected through and including the 2001 field season. Mean values ± an 80% confidence interval are reported. The 80% confidence interval means that there is an 80% probability that the true population mean falls within the range of the sample mean plus or minus the confidence interval width. For example, if the mean total fuel load is 20.9 ± 2.0 kg/m^2, then this means that there is an 80% probability that the true population mean total fuel load value is between 18.9 and 22.9 kg/m^2.

To use the monitoring results to determine whether specific management objectives are met, the confidence interval results were compared with the target ranges specified in the objectives. If the entire confidence interval falls within the target range, there is an 80% probability that the objective has been achieved. For a summary of fire management restoration objectives and monitoring results used to determine whether these objectives have been met, see the Summary Table on page 4.

Giant sequoia-mixed conifer forest

Fuel load

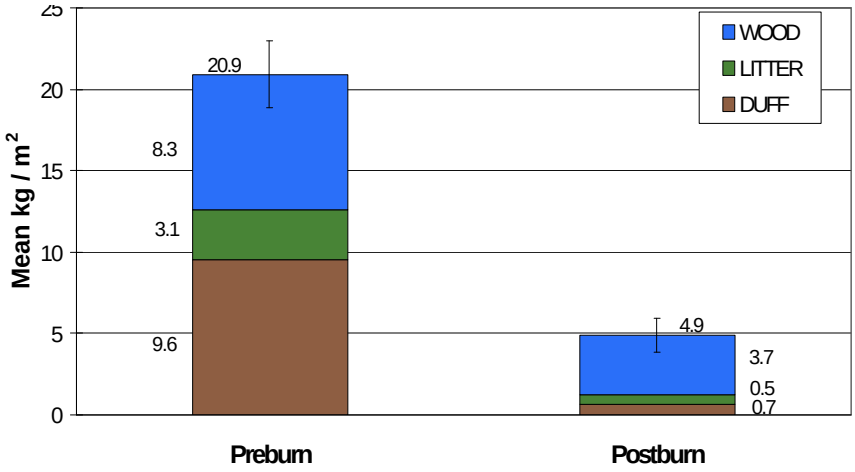


Figure 1. Fuel reduction in the Giant sequoia-mixed conifer forest type (n=29 plots).

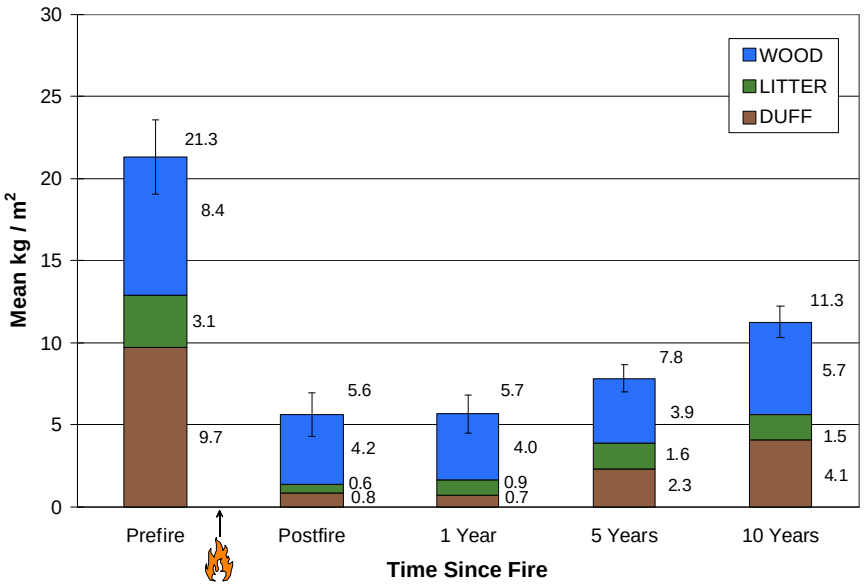


Figure 2. Fuel accumulation in the Giant sequoia-mixed conifer forest type

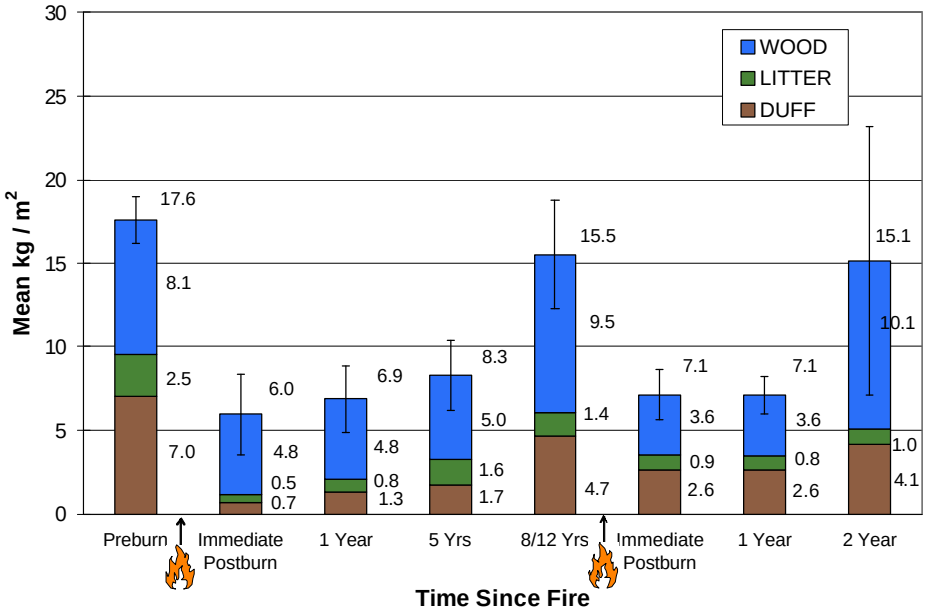


Figure 3. Fuel load in the Giant sequoia-mixed conifer forest type reburns (n=7 plots).

Stand structure and composition

Mean total tree density in the Giant sequoia-mixed conifer forest type was reduced by 56% ten years following the initial treatment with prescribed fire. Tree diameter distribution changed following fire, with the ten-year postburn mean density of the smaller diameter classes much reduced from preburn densities. Trees <80 cm in diameter at breast height (DBH) were reduced by 60% from 525 ± 118 trees/ha preburn to 209 ± 35 trees/ha ten-years postburn, while trees >80 cm DBH were reduced from 45 ± 8 trees/ha preburn to 41 ± 6 trees/ha 10-years postburn (n=21 plots; Figure 4).

Species composition changed slightly over this time period, with sugar pine (*Pinus lambertiana*), incense cedar (*Calocedrus decurrens*) and red fir (*Abies magnifica*) relative density decreasing slightly while white fir (*Abies concolor*) increased slightly and the relative density of giant sequoia (*Sequoiadendron giganteum*) tripled from 7% preburn to 21% ten-years postburn. This increase was due to the successful recruitment of postburn sequoia regeneration (seedlings) into the smallest diameter class of trees (0-10 cm).

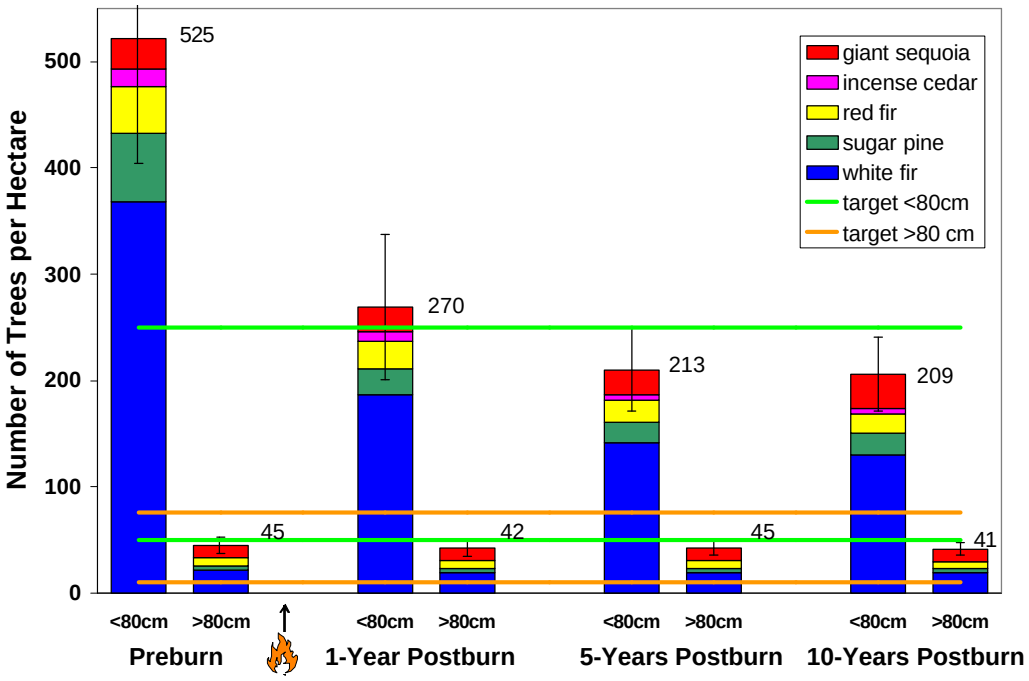


Figure 4. Stand density by species for two tree diameter classes in the Giant sequoia-mixed conifer forest type (n=21 plots).

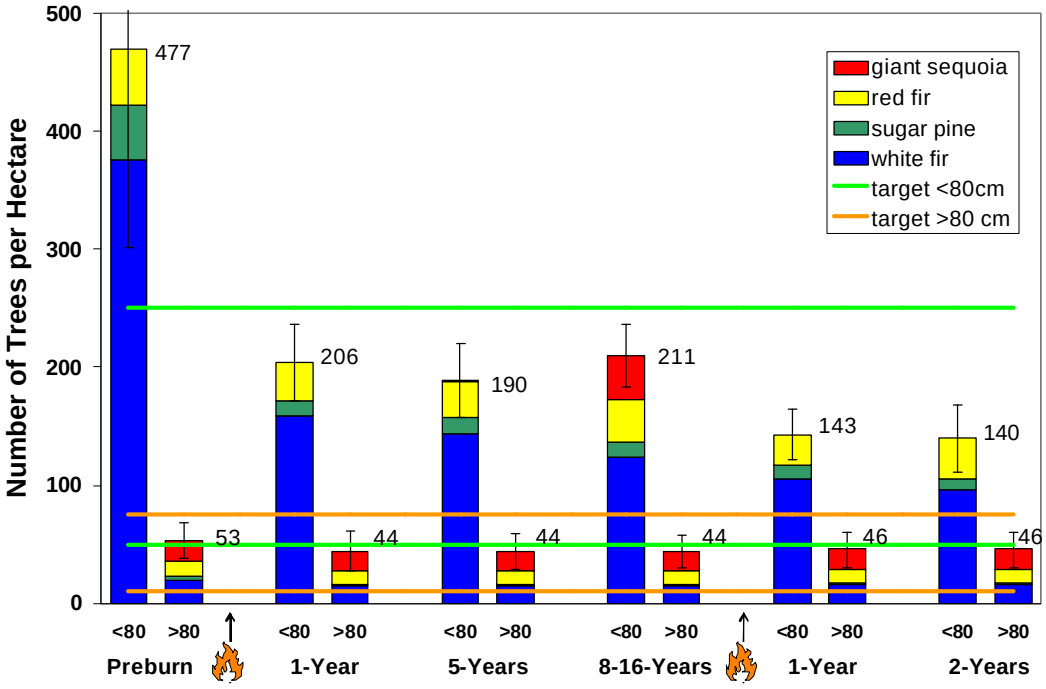


Figure 5. Stand density by species for two tree diameter classes in the Giant sequoia forest reburns (n=7 plots).

Management implications of results

White fir-mixed conifer forest

Fuel load

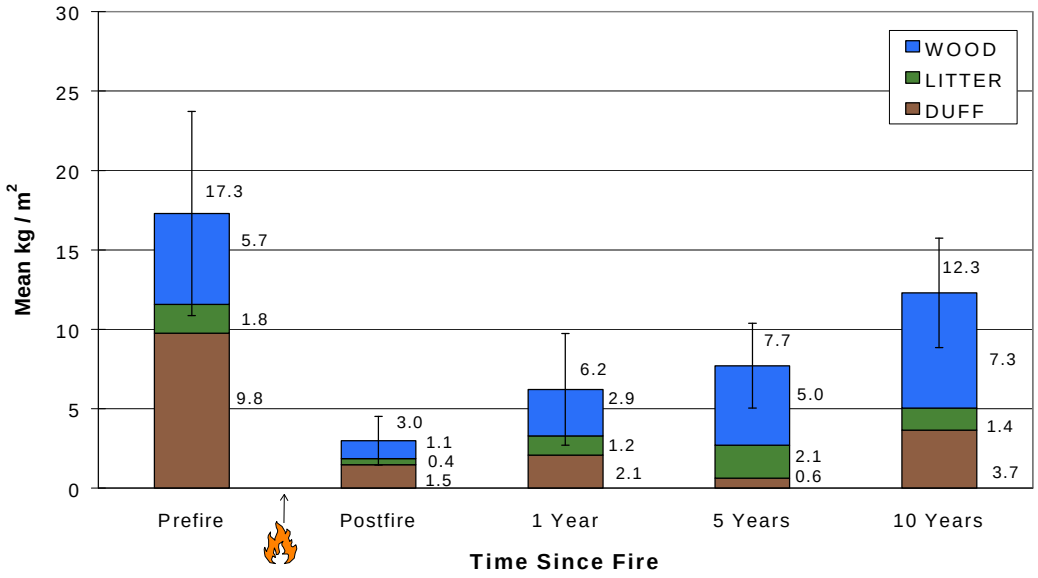


Figure 6. Fuel accumulation in the White fir-mixed conifer forest type (n=6 plots).

Stand structure and composition

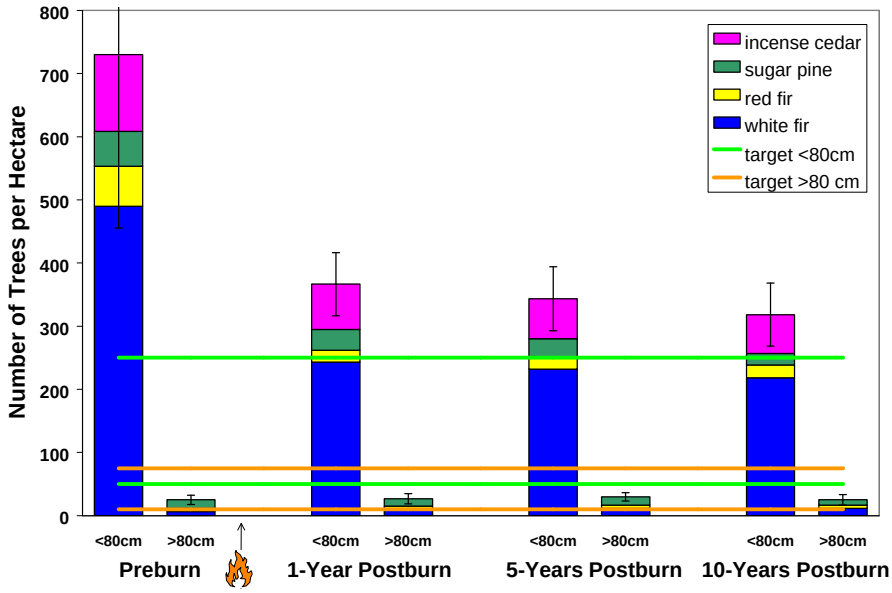


Figure 7. Stand density by species for two tree diameter classes in the White fir-mixed conifer forest type (n=6 plots).

Management implications of results

Low elevation-mixed conifer forest

Fuel load

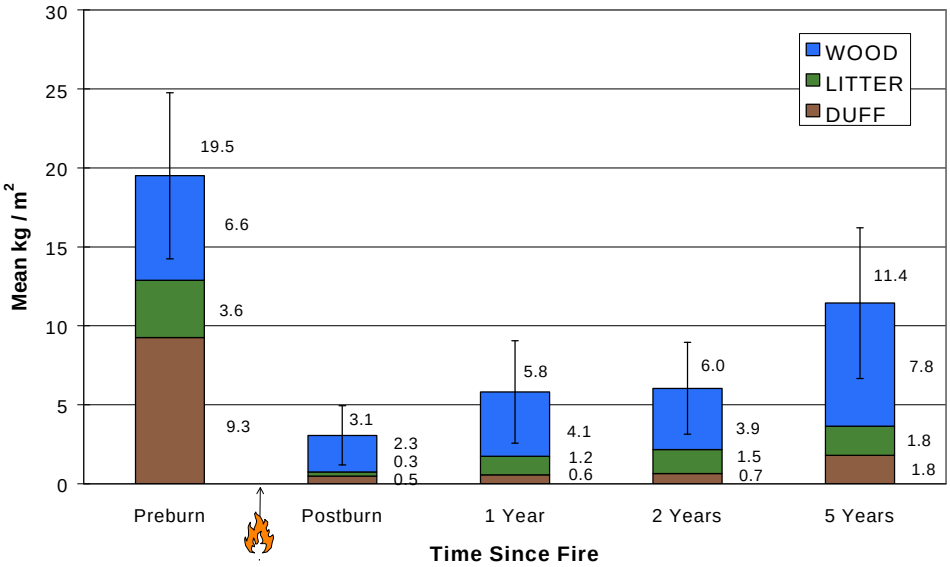


Figure 8. Fuel accumulation in the Low elevation-mixed conifer forest type (n=5 plots).

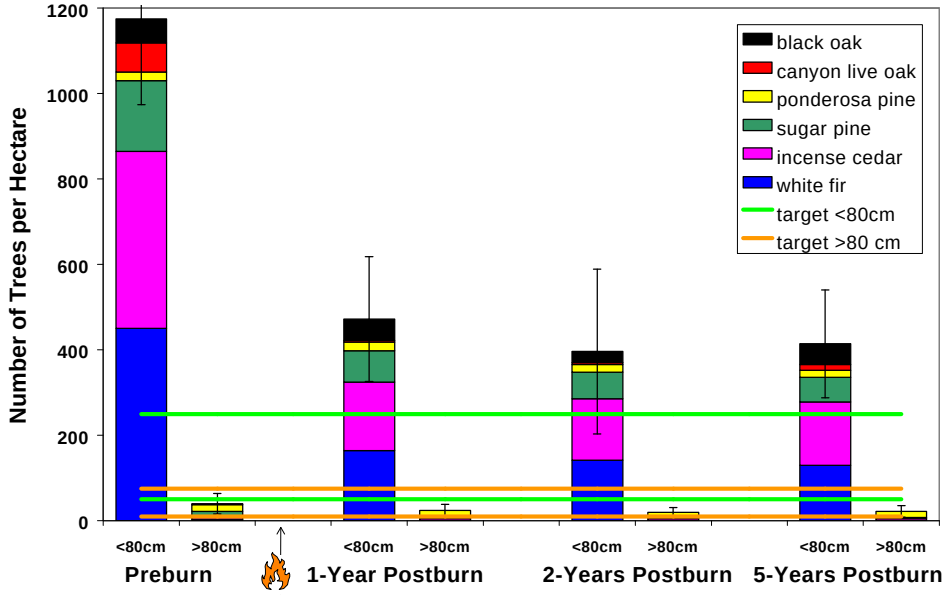


Figure 9. Stand density by species for two tree diameter classes in the Low elevation-mixed conifer forest (n=5 plots).

Management implications of results

Ponderosa pine-dominated forest

Fuel load

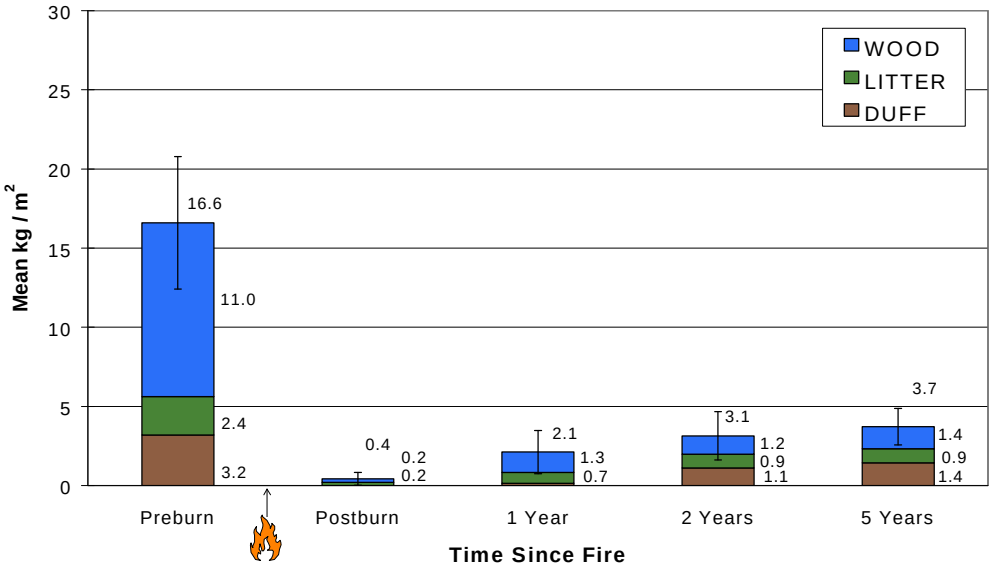


Figure 10. Fuel accumulation in the Ponderosa pine-dominated forest type (n=4 plots).

Stand structure and composition

Mean total tree density in the Ponderosa pine-dominated forest type was reduced by 66% five years following prescribed fire. Trees <80 cm DBH were reduced from 415 ± 196 trees/ha preburn to 143 ± 22 trees/ha five-years postburn (n=4 plots; Figure 11). Species composition changed slightly over this time period. The relative density of incense cedar and black oak (*Quercus kellogii*) increased by 5% each, while the relative density of canyon live oak (*Quercus chrysolepis*) decreased by 2% and ponderosa pine (*Pinus ponderosa*) decreased by 7% five-years postburn. The two ponderosa pine trees >80 cm DBH did not survive by two-years postburn.

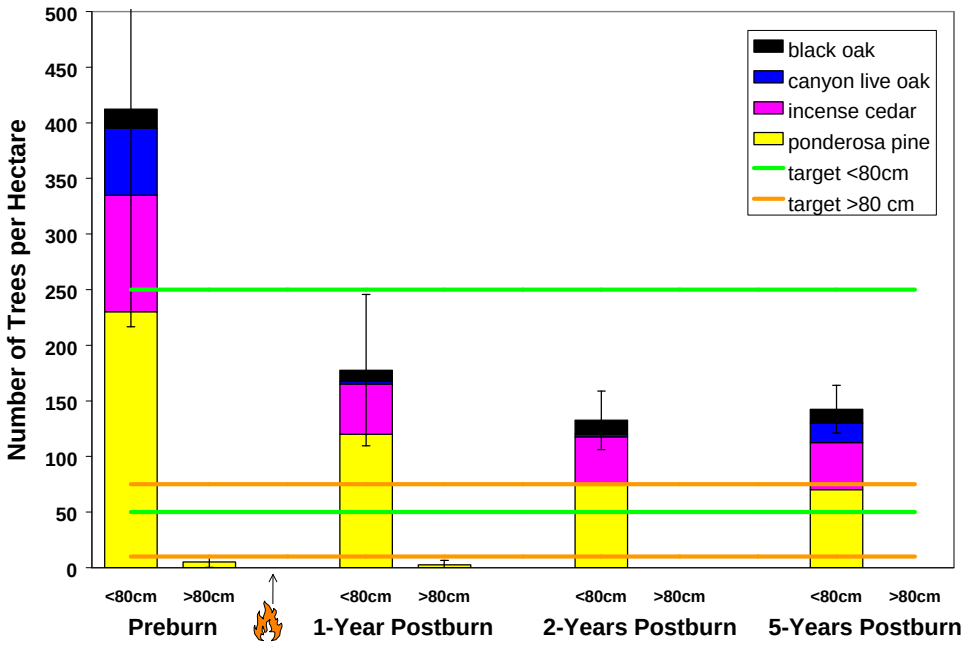


Figure 11. Stand density by species for two tree diameter classes in the Ponderosa pine-dominated forest (n=4 plots).

Management implications of results

Red fir forest

Fuel load

Stand structure and composition

Management implications of results

Mixed chaparral

Postburn conditions

The burn severity rating mean was 4.5 (unburned to scorched) for organic substrate and 4.0 (scorched) for vegetation indicating very low severity fire burned through these two plots.

Cover by lifeform
Mean percent cover changed only slightly for live shrubs (all shrub species combined), from 88.6 ± 20.0% preburn to 82.5 ± 4.6% one-year postburn to 86.0 ± 3.1 two-years postburn (Figure 12). Live tree (all tree species combined) and substrate mean percent cover also decreased slightly, while mean percent cover for grasses (all grass species combined) was slightly reduced one-year postburn but then returned to the preburn value two-years postburn. Substrate includes organic material (leaf litter or wood) as well as mineral soil, ash, or rock. Mean percent cover for forbs (all forb species combined)

increased from 2.0 ± 6.2% preburn to 8.5 ± 23.1% one-year postburn and then a large increase to 41.5 ± 103.1% two-years postburn (Figure 12). Note that percent cover can total more than 100% as more than one lifeform (or species) can occur at a sampling point. These results indicate that the only major change in cover of vegetative lifeform categories was a large increase in forbs, however, with such a small sample size (two plots), broad

Conclusions cannot be drawn from these data alone.

Cover by species

Mean percent cover for live *Arctostaphylos mewukka*, the dominant species, changed very

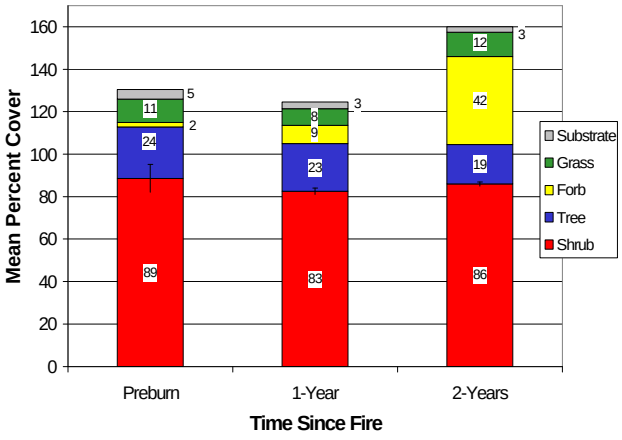


Figure 12. Percent cover by lifeform in the Mixed chaparral type (n=2 plots).

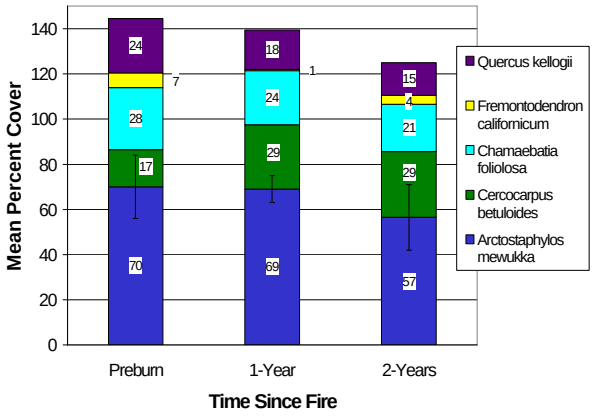


Figure 13. Percent cover by species in the Mixed chaparral type (n=2

little between preburn (70.2%) and one-year postburn (69.0%) visits, but decreased by about 20% by two-years postburn (Figure 13). Black oak (*Quercus kellogii)* and bear clover (*Chamaebatia foliolosa*) decreased somewhat in mean percent cover. Flannelbush (*Fremontodendron californicum*) mean percent cover decreased one-year postburn but then increased two-years postburn (Figure 13). Mountain mahogany (*Cercocarpus betuloides*) mean percent cover increased from 16.5 ± 13.9% preburn to 28.5 ± 38.5% one-year postburn. The large increase in forbs can be attributed primarily to one species, miner's lettuce (*Claytonia perfoliata*) which was not detected preburn but had a mean percent cover of 37.0 ± 95.4% five years after the fire. Cheatgrass (*Bromus tectorum*), a highly invasive exotic grass, was found within these plots before burning. The mean percent cover of cheatgrass decreased slightly, from 2.5 ± 1.5% preburn to 1.5 ± 4.6% one-year postburn but then increased to 4.5 ± 4.6% two-years postburn. The sample size is too small to make any conclusions about changes observed in cheatgrass cover following burning.

Management implications of results

Newly developed target conditions for brush monitoring types are stated in terms of the amount of landscape within a certain shrub age class. These targets have not yet been more defined into specific objectives for a monitoring type. Although the sample size is small (two plots), little change in shrub cover was observed in the two plots as a result of the low severity of the burn. If a reduction in shrub cover is desired, fire severity will need to be higher in this brush type.

Chamise chaparral

Postburn conditions

The burn severity rating mean for both organic substrate and vegetation was 1.9, indicating that the estimate of severity ranged from moderately to heavily burned.

Cover by lifeform

Mean percent cover for live shrubs (all species combined) decreased by 84% from 93.0 ± 6.6% preburn to 15.0 ± 28.3% postburn. An increase to 26.0 ± 25.6% one-year postburn and 63.0 ± 14.6% indicates that vigorous postburn resprouting occurred and continues to grow (Figure 14). A corresponding increase in mean percent cover of substrate occurred immediately after burning, from 7.0 ± 3.5% preburn to 74.0 ± 16.1% postburn indicating that much of the vegetative cover was consumed during the burn. Two years since the burn, substrate mean percent cover was quickly reduced to an average of 20.0 ± 6.6% (Figure 14).

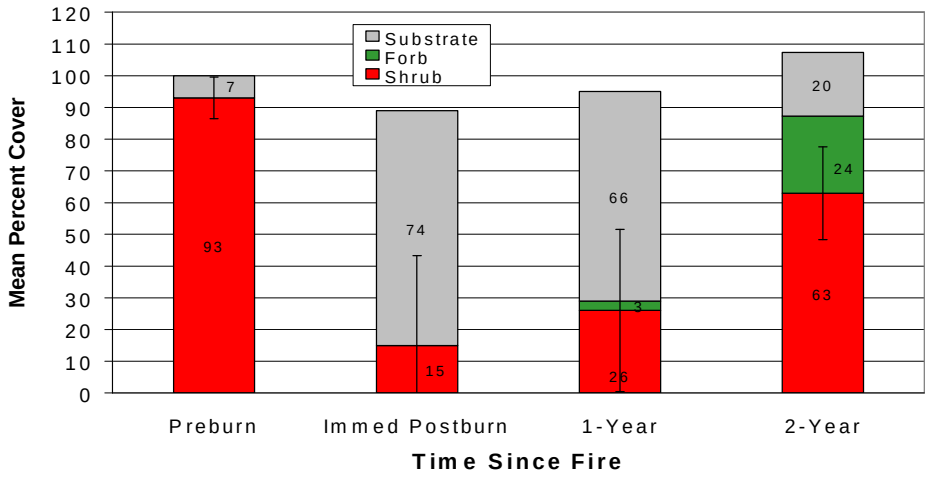


Figure 14. Percent cover by lifeform in the Chamise chaparral type (n=3 plots).

Cover by species

Mean percent cover for live chamise (*Adenostoma fasciculatum*), the dominant species, was reduced by 88% from 90.3 ± 11.6% preburn to 11.0 ± 20.7% postburn (Figure 15). Mean percent cover increased to 25.3 ± 16.4% one-year postburn and 48.7 ± 23.5% by two-years postburn. *Arctostaphylos mewukka* mean cover increased slightly, between the preburn and immediate postburn measurements, likely due to slight differences in transect location from one visit to the next (an artifact of sampling). Two-years postburn, mean percent cover of *Cryptantha muricata* and bush poppy (*Dendromecon ridgida*) was 24.3% and 15.3%, respectively, and neither species had been recorded in the plots prior to the burn.

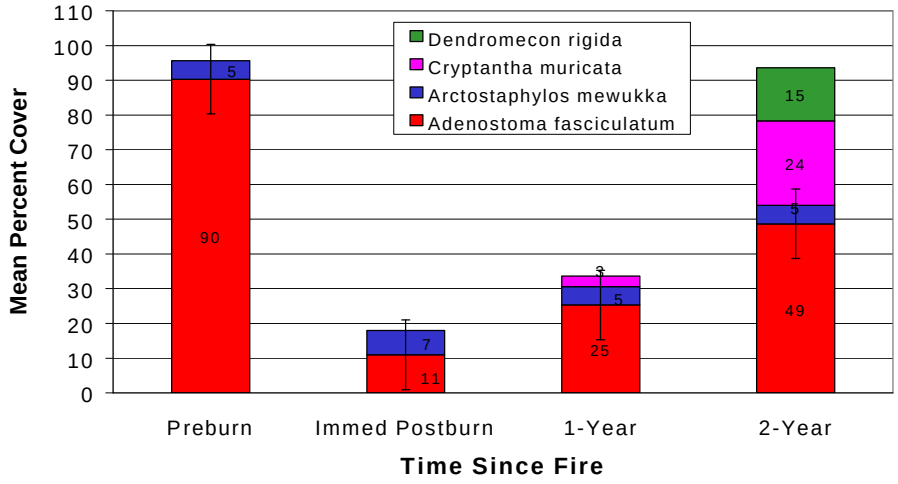


Figure 15. Percent cover by species in the Chamise chaparral type (n=3 plots).

Management implications of results

Montane chaparral

Cover by lifeform

Live shrub cover (all species combined) was reduced from 68.3 ± 10.6% preburn to 0.5 ± 0.5% one-year postburn, increased to 2.3 ± 1.4% two-years postburn followed by a large increase to 18.0 ± 6.0% by five-years postburn (n=4 plots; Figure 16). Forb and grass cover increased steadily from 0.2 to 24.8% and from 9.0 to 52.0%, respectively, from preburn to fives years following fire. Species that decreased in percent cover include greenleaf manzanita (*Arctostaphylos patula*) and sagebrush (*Artemesia tridenta*). While mountain whitethorn (*Ceanothus cordulatus*) decreased slightly in the first years following fire, a large increase occurred by five years postburn. Western needlegrass (*Achnatherum occidentalis*), blue wildrye (*Elymus glaucus*), and broad-leaved lotus (*Lotus crassifolius*) all increased in relative cover.

These plots were all opportunistically located within one prescribed natural fire, therefore, results do not apply to other areas that may fit the monitoring type description. Specific objectives do not exist for Montane chaparral because it is not a monitoring type where prescribed burning has historically occurred.

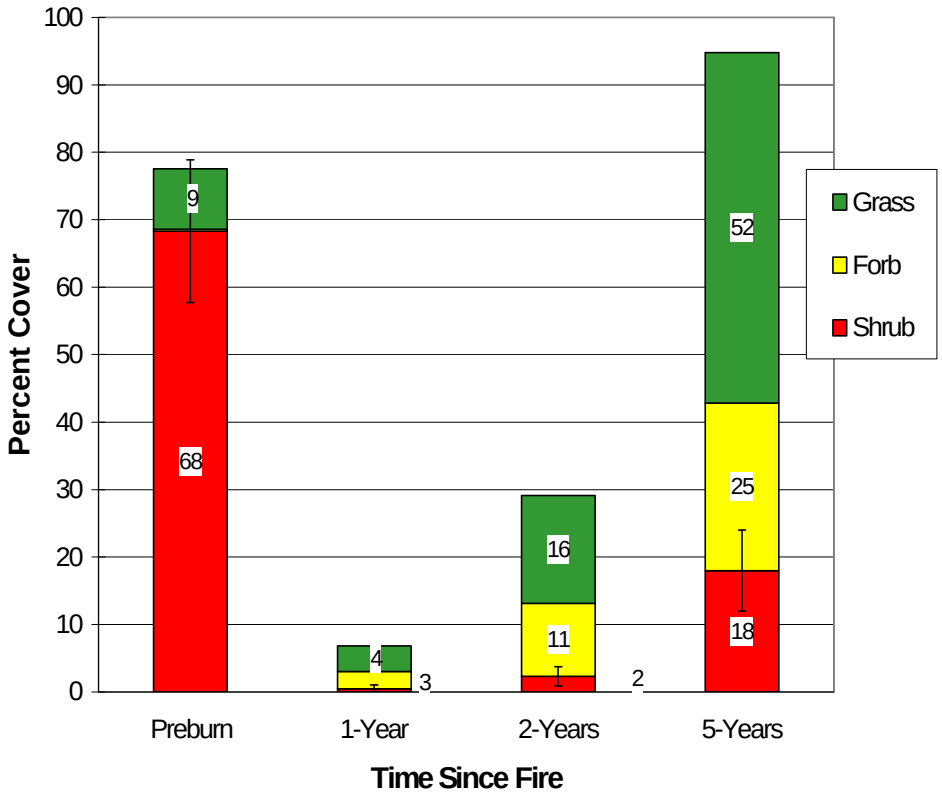


Figure 16. Percent cover by lifeform in the Montane chaparral type (n=4 plots).

APPENDIX A – PLOT DISTRIBUTION

Table 12. Plot distribution by burn unit and monitoring type.

Burn Unit Year Burned	Monitoring Type							
	FABCO 11 plots 7 fires	**FCADE** 5 plots 3 fires	**FPIPO** 4 plots 2 fires	**FSEGI** 30 plots 18 fires	**FABMA** 6 plots 4 fires	**BADFA** 3 plots 1 fire	**BARME** 6 plots 2 fires	**BARPA** 4 plots 1 fire
Hercules 1982,*1999	-	-	-	*1,2,3,4	-	-	-	-
Fire Class 1984,*1996	13,14	-	-	11*,12*	-	-	-	-
Garfield 1985	-	-	-	22	-	-	-	-
Muir PNF 1986	34	-	-	30	-	-	-	
Upper Garfield 1986	-	-	-	32	-	-	-	-
Keyhole 1987,*1998	-	-	-	15,24*	-	-	-	-
Tharps 1987,*1998	-	-	-	42*,43	-	-	-	-
Halstead 1987	44,45	-	-	-	-	-	-	-
Buckeye WF 1988	26	-	-	-	-	-	-	-
Huckleberry 1989 ,*1997	53*	-	-	52*	-	-	-	-
Crystal 1989	-	60	-	-	-	-	-	-
Tharps 1990	-	-	-	68	-	-	-	-
Highway 1990	-	-	-	79,80	-	-	-	-
Suwanee 1990	-	-	-	69	-	-	-	-
Grant West 1990	-	-	-	74	-	-	-	-
President SMA 1991	-	-	-	81	-	-	-	-
Tharps 1991	-	-	-	82	-	-	-	-
Deer Creek PNF 1991	-	-	-	87,88	-	-	-	-

Burn Unit Year Burned	Monitoring Type							
	FABCO 11 plots 7 fires	**FCADE** 5 plots 3 fires	**FPIPO** 4 plots 2 fires	**FSEGI** 30 plots 18 fires	**FABMA** 6 plots 4 fires	**BADFA** 3 plots 1 fire	**BARME** 6 plots 2 fires	**BARPA** 4 plots 1 fire
Grant West 1992	-	63	-	72,73,75	-	-	-	-
Suwanee 1992	76,77,78	-	-	70,71	-	-	-	-
Picnic Estates 1993,*1999	-	-	89*	-	-	-	-	-
Hole-in-the-Wall 1993	-	-	90,91 92	-	-	-	-	-
Empire PNF 1994	-	-	-	-	-	-	-	B2,3,4,5
Swale 1995	-	62,65	-	-	-	-	-	-
MK – Atwell 1995	-	94	-	93,95	96,97	-	-	-
MK - Lookout 1997	-	-	-	-	-	B12, 13,14	-	-
MK - Redwood 1997	-	-	-	-	-	-	B10,11	-
MK - Tar Gap 1999	-	-	-	-	101	-	-	-
MK - Redwood	-	-	-	-	-	-	B7,8,9, 15	-
MK - Tar Gap	-	-	-	-	100,102 ?	-	-	-
MK - Upper Deadwood	105	-	-	-	-	-	-	-
Wuksachi	-	-	-	-	103	-	-	-

Note: numbers indicate the FMH plot number; MK = Mineral King.

APPENDIX B – Fuel Reduction by Monitoring Type and Fuel Size Class

Monitoring Type	Size Class	Average Fuel Load (tons/acre) Preburn	Postburn	% Reduction
ponderosa pine-dominated forest (n=4 plots)	1-hr	0.0	0.0	-
	10-hr	0.5	0.0	100%
	100-hr	1.2	0.0	100%
	1000-hr	47.1	1.0	98%
	litter	10.8	0.9	92%
	duff	14.3	0.0	100%
	total	**74.0**	**1.9**	**97%**
low elevation-mixed conifer forest (n=5 plots)	1-hr	0.3	0.1	67%
	10-hr	0.9	0.2	78%
	100-hr	2.0	0.8	60%
	1000-hr	26.4	9.2	65%
	litter	16.2	1.1	93%
	duff	41.3	2.1	95%
	total	**87.1**	**13.6**	**84%**
white fir-mixed conifer forest (n=10 plots)	1-hr	0.5	0.1	80%
	10-hr	2.0	0.6	70%
	100-hr	2.0	1.0	50%
	1000-hr	18.9	7.0	63%
	litter	8.9	1.6	82%
	duff	39.4	4.7	88%
	total	**71.8**	**14.9**	**79%**
giant sequoia-mixed conifer forest (n=28 plots)	1-hr	0.4	0.1	75%
	10-hr	1.4	0.4	71%
	100-hr	2.8	0.6	79%
	1000-hr	32.4	15.3	53%
	litter	13.6	2.3	83%
	duff	42.7	3.0	93%
	total	**93.3**	**21.8**	**77%**
red fir forest (n=3 plots)	1-hr	1.3	0.2	85%
	10-hr	4.0	0.2	95%
	100-hr	4.5	0.1	98%
	1000-hr	48.2	3.5	93%
	litter	8.0	3.7	54%
	duff	57.4	15.0	74%
	total	**123.3**	**22.8**	**82%**
reburn giant sequoia-mixed conifer forest (n=7 plots)	1-hr	0.6	0.2	67%
	10-hr	1.8	0.8	56%
	100-hr	3.1	0.7	77%
	1000-hr	36.7	14.5	60%
	litter	6.1	3.9	36%
	duff	20.9	11.9	43%
	total	**69.1**	**31.9**	**54%**

APPENDIX C - Recent Publications

van Mantgem, P., M. Schwartz, and M. Keifer. 2001. Monitoring fire effects for managed burns and wildfires: Coming to terms with pseudoreplication. Natural Areas Journal. Vol. 21, No. 3.

Keifer, M., N. Stephenson, and J. Manley. 2000. Prescribed fire as the minimum tool for wilderness fire regime restoration: a case study from the Sierra Nevada, California. In: Cole, David N.; McCool, Stephen F. 2000. Proceedings: Wilderness Science in a Time of Change. Proc. RMRS-P-000. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.Wilderness Science in a Time of Change. Missoula, MT, May 23-27, 1999.

Keifer, M., N. Stephenson, J. Manley, and G. Dempsey. In prep. Restoring forest structure with prescribed fire in Sequoia and Kings Canyon National Parks. Proceedings of Fire Management: Emerging Policies and New Paradigms. November 16-19, 1999, Bahia Hotel, San Diego, CA.

Keifer, M., K. Folger, and P. Lineback. In prep. Scaling up: Are plot data useful to assess landscape-level goals? Proceedings of Fire Management: Emerging Policies and New Paradigms. November 16-19, 1999, Bahia Hotel, San Diego, CA.

Keifer, M. and J. Manley. In press. Beyond initial fuel reduction in the giant sequoia-mixed conifer forest: Where do we go from here? Proceedings of Fire in California Ecosystems: Integrating Ecology, Prevention, and Management. November 17-20, 1997, Bahia Hotel, San Diego, CA.

Keifer, M. 1998. Fuel load and tree density changes following prescribed fire in giant sequoia-mixed conifer forest: The first 14 years of fire effects monitoring. Pages 306-309 *in* Teresa L. Pruden and Leonard A. Brennan (eds.). Fire in Ecosystem Management: Shifting the Paradigm from Suppression to Prescription. Tall Timbers Fire Ecology Conference Proceedings, No. 20. Tall Timbers Research Station, Tallahassee, FL.

Southeast Region Fire Ecology Program Annual Report Summary FY2001

The vision of having mobile teams to support Fire Effects needs throughout the region came to fruition during FY01. Several positions were filled resulting in three Fire Effects Teams strategically located throughout the region (EVER, NATR, GRSM). Each team has a fire ecologist position at their home unit and together the teams and ecologists support various Parks within their designated Fire Effects Cluster. Fire Effects Clusters will incorporate additional Park units as these units complete their fire management plans and begin prescribed fire programs. The southeast region teams currently support 13 parks. During FY01 they installed a total of 60 new plots and conducted rereads on 97 plots. In addition to prescribed fire monitoring, fire effects monitors also initiated ground truthing of remotely sensed fire severity data (Composite Burn Index) at BICY and BISO. Crews also installed photo points to monitor both mechanical fuel reduction projects (TIMU) and wildfire effects (BICY). Additional work accomplished by the Fire Ecology program included providing input for fire management plans, assisting in burn plan preparation, prescribed burn implementation, and developing monitoring protocols for various Park units. Several employees from within the region also assisted with instructing RX-92 (Fire Effects Monitoring Program Design and Implementation). The region will host RX-80, Prefire Data Collection, at GUIS in May of 2002.

During FY01 Jeff Kitchens was welcomed to the EVER fire ecologist position and Bob Dellinger, formerly the GRSM lead monitor, was selected as the GRSM fire ecologist. The NATR ecologist position remains vacant at this time. The Fire Effects Team leaders are Gina Hernandez (EVER), Dana Cohen (NATR), and Virginia McDaniel (GRSM). Last year the EVER crew took on two additional units (TIMU and CANA) in addition to maintaining a very busy schedule at home due to an active prescribed fire year. The NATR crew is new for FY02 and Dana Cohen has been busy getting things in place to start the program off on the right foot this coming year. The GRSM team continued to support the greatest number of Parks in addition to handling a heavy workload at home. The fire effects monitoring plan for BICY was completed during FY01 thanks to the efforts of Marlena Hovorka.

EVER and GRSM monitors installing a plot At Gulf Islands National Seashore.