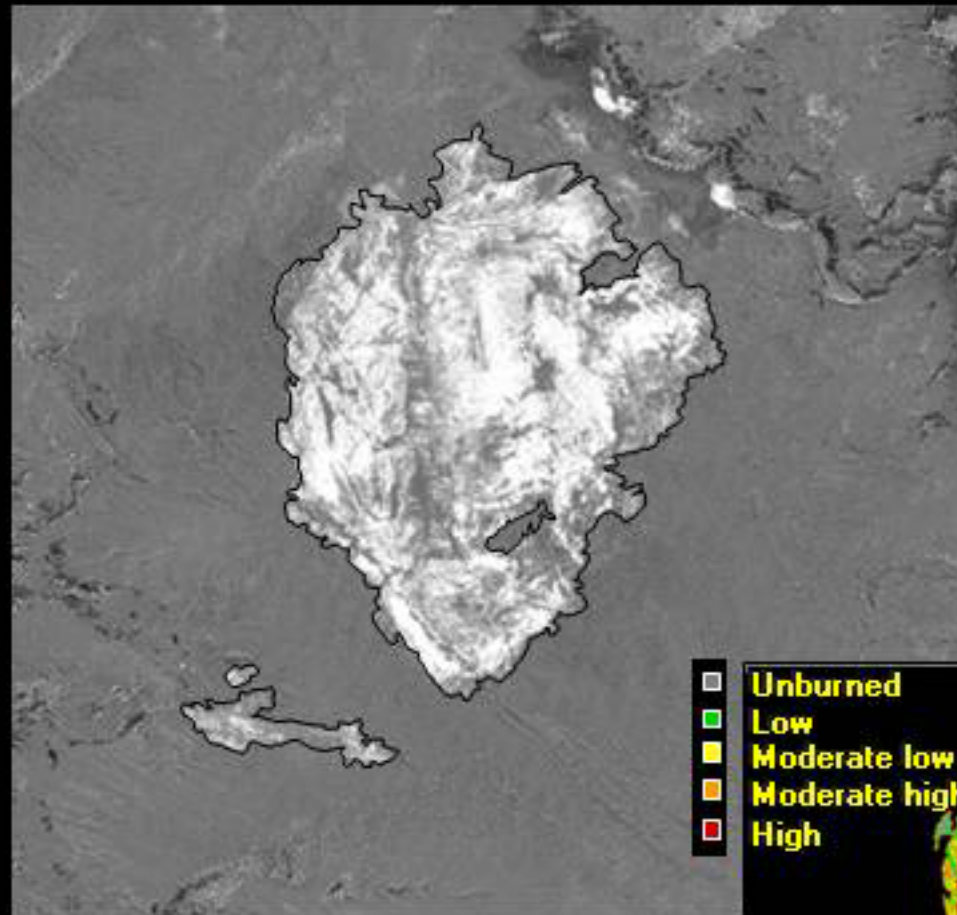
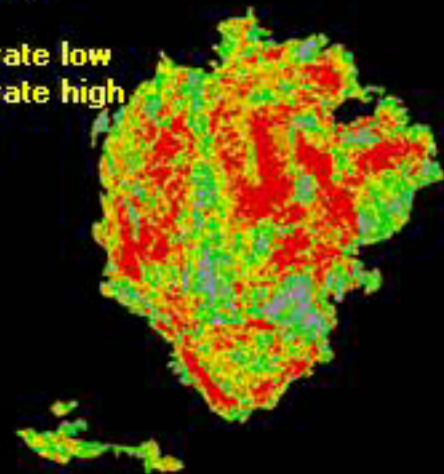


NPS BURN SEVERITY MAPPING UPDATE FOR YEAR 2002

Carl Key
USGS N. Rocky Mtn Sci Cent
Nate Benson
National Park Service
Brian Sorbel
National Park Service
Zhiliang Zhu
USGS EROS Data Center
Donald Ohlen
USGS EROS Data Center
Stephen Howard
USGS EROS Data Center
Brian Clement
USGS EROS Data Center



1998 Kootenai Complex
Glacier National Park
Delta NBR 8/8/1998 - 9/12/1999



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 In 2001, NPS established an operational cooperative project with U.S. Geological Survey Biological Resource Division (USGS/BRD) and the EROS Data Center (USGS/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 Carl Key (USGS/BRD) and Nate Benson (NPS). Currently, for most NPS fires over 300 acres, USGS/EROS Data Center produces a set of standardized map products and GIS data sets using primarily Landsat 7 ETM+ 30-meter resolution image data. These products include burn severity assessments and final fire perimeters. USGS/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 USGS/EDC that support burn severity mapping, distribution of results, and data archiving. Carl Key and Nate Benson oversee development and implementation of the Burn Severity Mapping Project, 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		Brian Clement
Paul Reeberg		

YEAR 2002 EXPENSES

- NPS:
 - In fiscal year 2001 and 2002, NPS allocated \$250,000 yearly to pay for production of burn severity mapping products of fires for year 2000, 2001, and 2002; and develop a web site to distribute and archive burn severity data,. EDC received money allocated in FY01 by NPS at the end of FY01, so no expenditures were incurred in FY01. By the end of fiscal year 2002 EDC had expended approximately \$237,992.

¹Burn 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 delineates final fire perimeter and provides more thorough information on the range of effects within the burn than any other tool federal land management agencies are currently using. It helps to define lasting impacts and environmental responses from fire and to prepare for long-term management of burned areas. Because many fires cannot be closely monitored while active, post-fire evaluations also yields insight into fire behavior across varying topography and vegetation, thus contributing basic information for research and modeling. Also, initial assessment products, when available, can provide emergency stabilization response teams with the critical burn severity map to base rehabilitation and stabilization actions.

EDC's 2002 EXPENDITURES

Category	Spending	Notes
<u>Total labor</u>	<u>123,969.85</u>	
Mapping/coordination	100,331.85	USGS donated \$13,488.26 in staff time
Metadata	14,277.00	
Web page	9,361.00	
Travel	2,002.48	
Data buy	53,355.00	Total of 103 Landsat scenes
Supplies/equipment	6,254.89	A computer
Other service	12,000.00	Transferred to USGS BRD
Computer server		USGS cost share (\$6,900)
IT services	3,482.00	
Subtotal	201,064.22	
Assessment	36,927.31	25% (not applied to data)
Total	237,991.53	

- Nate Benson spent approximately 25% (\$12,000) of his time developing, implementing, and coordinating NPS Burn Severity Mapping Program and conducting training on remote sensing and field validation methods.
- Approximately \$5,000 was spent on travel to provide CBI training and program oversight.
- NPS fire effects modules with assistance from other NPS staff collected ground validation data. NPS personnel spent an estimated 3,236 hours completing field validation work; this includes travel to and from plots and data entry². Approximately \$78,366 was spent in labor costs to collect this data; the fire effects modules absorbed base salary costs. Burn Severity Mapping Project assisted with travel and overtime costs.

Park Unit	Hours	Estimated Personnel Costs	Travel Costs
Denali	600	\$11,100	\$15,000
Everglades	80	\$1,480	\$0
Glacier	200	\$3,700	\$0
Grand Canyon	431	\$7,974	\$0
Grand Teton	513	\$9,491	\$1,000
Great Smoky	80	\$1,480	\$1,000
Northern Great Plains	460	\$8,510	\$1,000
Shenandoah	200	\$3,700	\$0
Yellowstone	70	\$1,295	\$0
Yosemite	602	\$11,137	\$500
Total	3236	\$59,866	\$18,500

² Bridger-Teton National Forest and Wyoming Game and Fish Department employees spent 190 hours assisting Grand Teton 's fire effects module with ground validation fieldwork. EDC and BRD staff also supported field validation. The time for non-NPS Staff was not included in NPS cost/and time estimates for field validation.

- USGS/BRD:
 - Carl Key (BRD researcher and developer of NBR/CBI) spent 50% of his time and base support funds (\$37,000) assisting NPS with the Burn Severity Mapping Project.
 - Park Oriented Biological Support grant - \$5,500
 - Purchased Landsat scenes for severity mapping of three park service units: Yosemite, Glacier and Santa Monica Mountains
 - Joint Fire Science - \$3,000
 - Funding Mr. Key received to support writing of remote sensing and field validation methods for FIREMON web site. The FIREMON web site is now the primary location to access Key and Benson's remote sensing and field validation methods for burn severity mapping.
 - USGS Regional Partnership and Venture Capital Funding: \$7,000
 - Funding used to attend meetings, conduct training, and complete fieldwork for related burn severity fire effects research on Cerro Grande Fire, Outlet Fire (Grand Canyon NP), Pumpkin Fire (adjacent to Grand Canyon NP), and High Meadow and Bobcat fires of central Colorado.
 - Purchased equipment to support burn severity mapping.

OUTLOOK FOR 2003

Funding

NPS funding for the National Burn Severity Mapping Project for FY03 is still uncertain. EDC does have carryover money from FY02 to support assessment of 2002 and 2003 fires. There is some funding available to support training and field validation. For FY03 funding was requested to initiate historical burn severity fire atlases in 2-4 parks. A burn severity fire atlas is created by generating burn severity products for all fires within a park as far back as the 1970s using archived Landsat imagery. We are also pursuing other means to complete fire atlases in parks.

Goals

- Complete extended assessment of requested 2000, 2001 and 2002 fires.
- Provide initial assessments of 2003 fires as requested.
- Field validate 50% of NPS units with burn severity maps of 2002 and 2001 fires.
- Work with Everglades and Big Cypress to map their 2002 and 2001 fires
- Initiate burn severity atlases in three parks.
- Provide two training sessions on remote sensing and field validation methods.
- Continue to improve burn severity web site to meet users needs.
- Complete and review analysis of 2000 and 2001 data.
- Develop training on analyzing burn severity data and use and application of burn severity maps and data.

- Install accuracy assessment CBI plots in at least 6 NPS units for Joint Fire Science grant.
- Have version 2 of remote sensing and field validation methods along with Access database for CBI plot data entry available on FIREMON web site by April 2003.
- Have NPS units complete short narrative of each of their fires that is on the web site.
- Work with NPS fire effects modules and GIS specialist to provide field validation support for NPS units that lack field validation expertise.
- Facilitate application development of severity maps, for example, applications that assist in updating fuels and vegetation maps.
- Develop pre-fire CBI type plot for vegetation monitoring.

2002 ACCOMPLISHMENTS

Training/Presentations in 2002

- Remote Sensing and Field Validation Methods seminar, Fire Lab, Missoula MT, 3/28/02
- Gave paper on NBR RS2002 Conference, San Diego, CA 4/8-14/02
- Remote Sensing and Field Validation Methods Training, Black Hills, SD, 5/11-18/02
- Field validation training for Venture Capital Project, Los Alamos, NM, 7/29-8/1/02
- Department of Interior and congressional staff briefing on burn severity mapping, Washington DC 8/5-6/02
- Remote Sensing and Field Validation Methods Training, Great Smoky Mt NP, TN, 9/3-6/02
- Remote Sensing and Field Validation Methods Training, Shenandoah NP, VA, 9/7-13/02
- Briefed NPS Fire Ecology Steering Committee on burn severity mapping program, Philadelphia, PA, 10/22/02
- Presented poster at Joint Florida Prescribed Burning Council, Ocala, FL, 11/14/02
- RSAC briefing on burn severity mapping, Salt Lake, UT, 12/9-10/02

Support Products Completed in 2002

- Overview and remote sensing and field validation methods are available on the FIREMON web site: <http://fire.org/firemon/>.
- National Burn Severity Mapping Project web site developed to deliver and archive burn severity mapping data: http://edc2.usgs.gov/fsp/severity/fire_main.asp.

Field Validation Plots Installed in 2002

NPS Unit	# of Plots Installed
Badlands	54
Denali	84
Glacier	105
Grand Canyon	113
Grand Teton/Bridger-Teton NF	193
Great Smoky Mountains	19
Gulf Islands	2
Jewel Cave/ Black Hills NF	74
Salmon-Challis NF	9
Shenandoah	40
Wind Cave	11
Yellowstone	50
Yosemite	57
TOTAL	811

Field Validation Plots Installed in 2001

NPS Unit	# of Plots Installed
Bandelier	5
Big South Fork	8
Glacier	20
Grand Canyon	54
Grand Teton/Bridger-Teton NF	60
Mesa Verde	31
Yellowstone	26
Yukon Charley	118
TOTAL	322

NPS Personnel That Assisted with Field Validation in 2002

Brian Sorbel, Nate Benson, Caroline Noble, Bob Merrow, Mike McClellan, Sheila French, Brian Stowe, Diane Taylor, Eric Gdula, Li Brannfors, Kara Leonard, Diane Abendroth, Dirk Shupe, Nancy Bockino, Bob Dellinger, Virginia McDaniel, Cody Wienk, Andy Thorstenson, Kevin Rehman, Julie Query, Jess Wilcox, Bob Kobza, Martha Jakobek, Eric Miller, Becky Seifert, Vicky Pecha, Melissa Spandl, Caroline Noble, Missy Karanosky, Deanna Fusco, Larry Weddle, John Cataldo, Dan Ostman, Eric Olson, Michelle Farnham, John Moeny, Kristin Kolanoski, Marcus Martin, Kara Paintner, Monica Buhler, Mark Grupe, Julie DuBose, Isaiah Hirschfield, Ilana Abrahamson, Kevin McKay, Jen Rockwell,

Burn Severity Assessments NPS Initiated in 2002

Assessment Type	Park Unit**	Fire Years	Size (acres)	Number of Fires**	Funding Source
Extended	Badlands	2001	3,876	2	NPS
Extended	Big Thicket	2001	1,635	2	NPS
Extended	Bryce Canyon	2001	1,361	2	NPS
Extended	Buffalo River	2001	2,497	4	NPS
Extended	City Of Rocks	2000	14,000	1	NPS
Extended	Craters of the Moon	2000	820	2	NPS
Extended	Death Valley	2000	4,780	1	NPS
Extended	Denali	2000&01	49,816	5	NPS
Extended	Dinosaur	2000-02	16,933	14	NPS
Extended/initial	Glacier/Flathead NF	2001	71,000	6	BRD/NPS
Extended	Grand Canyon	2001	5,052	4	NPS
Extended/initial	Grand Teton/BT NF	2001&02	13,227	17	NPS
Extended	Great Basin	2000	1,650	1	NPS
Extended	Great Smoky Mt	2001	8,500	2	NPS
Extended	Hawaii Volcanos	2001	1,010	1	NPS
Extended	John Day	2001	1,300	1	NPS
Initial/Extended	Kings Canyon	2001	1,190	1	NPS
Extended	Lake Meredith	2001	2,049	7	NPS
Initial	Mesa Verde	2002	2,475	1	NPS/JFS/Fire View
Extended	New River	2001	607	3	NPS
Extended	Noatak	1999	88,630	1	NPS
Extended	North Cascades	2001	56,445	3	NPS
Extended	Ozark	2001	852	3	NPS
Initial/Extended	Pecos	2000	144	1	BRD
Extended	Redwoods	2001	330	1	NPS
Extended	Saguaro	1999	6,477	1	NPS
Extended	Santa Monica Mts	1993	55,192	2	NPS/BRD
Initial/Extended	Sequoia	2001	510	2	NPS
Initial/Extended	Shenandoah	2002	5,685	2	NPS
Extended	Whiskeytown	2001	670	1	NPS
Extended	Wind Cave	2001	1,853	2	NPS
Initial/Extended	Yellowstone	2001	8,000	7	NPS
Initial/Extended	Yosemite	2001	8,076	3	NPS
Extended	Zion	2001	595	1	NPS
TOTAL	34 NPS UNITS		437,237	107	

*For some of these fires, images have been purchased and are currently being processed; they will be available on the National Burn Severity Mapping Project web site by January 2003.

**Scenes potentially include fires 10 acres or greater and fires adjacent to NPS units.

Burn Severity Assessments EDC and BRD Initiated in 2002

Assessment Type	Land Management Agency*	Fire Year	Size (acres)	Number of Fires	Funding Source
Initial	Ashland Resource Area	2002	2,850	1	BLM-NIFC/EDC
Initial	Black Hills National Forest	2002	24,200	2	FEMA/EDC
Extended	Cleveland NF	1999	30,000	10	BRD
Initial	Dixie National Forest	2002	87,000	1	BRD
Initial	Fort Apache Agency	2002	455,020	1	BLM-NIFC/EDC
Extended	Gallatin/Lewis&Clark NF	2001	50,000	3	BRD
Initial	Graig District-BLM	2002	2,180	1	FEMA/EDC
Initial	Grand Junction District	2002	2,550	1	FEMA/EDC
Initial	Gunnison County	2002	1,084	1	FEMA/EDC
Initial	Kemmerer Field Office BLM	2002	3,500	1	BLM-NIFC/EDC
Extended	Medford/OR Dist	2002	2,100	1	BLM-NIFC/EDC
Initial	Moab Field Office	2002	69,000	1	BLM-NIFC/EDC
Initial	Okefenokee NWR	2002	119,300	1	JFS
Initial	Pike National Forest	2002	140	1	FEMA/EDC
Initial	Pike-San Isabel NF	2002	138,170	1	FEMA/EDC
Initial	Rawlins District	2002	18,810	1	BLM-NIFC/EDC
Initial	Royal Gorge Field Office	2002	4,220	1	FEMA/EDC
Intl/Extnd	Salmon-Challis NF	2000	200,000	1	FireView/EDC
Initial	San Juan National Forest	2002	71,500	1	FEMA/EDC
Initial	Unitah & Ouray	2002	3,470	1	BLM-NIFC/EDC
Total	21 Land Mgt. Units		1,285,094	32	

*For some of these fires, images have been purchased and are currently being processed; they will be available on the National Burn Severity Web Site by January 2003.

Burn Severity Assessments NPS Completed in 2001

Assessment Type	Park Unit	Fire Year	Size (acres)	Number of Fires*	Funding Source
Initial	Yukon Charley	1999	154073	6	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
Extended	Wind Cave	2000	1136	1	NPS/Fireview
Initial/Extended	Yellowstone	2000	6257	4	NPS/Fireview
Initial	Yosemite	2001	8016	1	NPS
Initial	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		475869	41	

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

2002 GOALS

- Complete extended assessment of all high priority fires for year 2000 and 2001
- Provide initial assessments of 2002 fires as requested.
- Ground validate 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.

PRIORITIZATION OF 2001 FIRES

Fires are prioritized for burn severity 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 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. Initial prioritization is based on fire size: Ancillary fires are fires greater than 10 acres and less than 100 acres. Low priority fires are any fires greater than 100 acres and less than 300 acres. Medium priority fires are fires between 300 and 1000 acres. High priority fires are fires greater than 1000 acres in size. Parks need to have at least one low priority fire to be initially ranked. Parks that are not ranked can have fires completed on request.

INTERMOUNTAIN REGION 2001 FIRES

NPS Unit		High	Medium	Low	Ancillary	Total
Amistad	Sum of Acres			100	80	180
	Number of Fires			1	1	2
Big Thicket	Sum of Acres	1060	575		107	1742
	Number of Fires	1	1		2	4
Bryce Canyon	Sum of Acres	1191		170	25	1386
	Number of Fires	1		1	1	3
Dinosaur	Sum of Acres	2192	1180	395	295.5	4062.5
	Number of Fires	1	3	2	10	16
Glacier	Sum of Acres	71000				71000
	Number of Fires	1				1
Grand Canyon	Sum of Acres	3900	902	250		5052
	Number of Fires	2	1	1		4
Grand Teton	Sum of Acres	8507	800	231	266	9804
	Number of Fires	2	2	2	10	16
Lake Meredith	Sum of Acres		1622	407	20	2049
	Number of Fires		3	2	2	7
Yellowstone	Sum of Acres	6600	1150	240	10	8000
	Number of Fires	2	2	2	1	7
Zion	Sum of Acres		595			595
	Number of Fires		1			1
Total Acres		100,550	6,824	1,793	804	109,971
Total Number of Fires		11	13	11	27	62

ALASKA 2001 FIRES

NPS Unit		High	Medium	Low	Ancillary	Total
Denali	Sum of Acres	6238				6238
	Number of Fires	1				1

MIDWEST REGION 2001 FIRES

NPS Unit		High	Medium	Low	Ancillary	Total
Badlands	Sum of Acres	3572	303.8			3875.8
	Number of Fires	1	1			2
Buffalo River	Sum of Acres	1470	937		90	2497.4
	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		9173		64	9237.4
	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	1848			15	1863
	Number of Fires	1			1	2
Total Acres		6890	11336	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	62665	1511	729.8	357.9	65263.7
	Number of Fires	8	3	4	9	24
Everglades	Sum of Acres	39777	6011	1124	291	47203
	Number of Fires	11	10	6	10	37
Great Smoky Mt	Sum of Acres	8500	1331.6	671.4	55	10558
	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		110942	8853.6	3107.2	747.9	123650.7
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 NORTHWEST 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	1300				1300
	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
North Cascades	Sum of Acres	56445			30	56475
	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	4152	508		120	4780
	Number of Fires	1	1		2	4
Whiskeytown	Sum of Acres	1800	650		17	2467
	Number of Fires	1	1		1	3
Yosemite	Sum of Acres	8016			71	8087
	Number of Fires	1			3	4
Total Acres		71713	2445	851	642.8	75652
Total Number of Fires		6	5	6	16	33

Other Fires To Map in 2002

NPS Unit	Fire Name	Fire Year	Size (Acres)
Noatak	Uvgoon2	1999	88345
Everglades	All fires	1999	29107
Saguaro	Box Canyon	1999	6477