GRCA FES

# GRAND CANYON NATIONAL PARK

## FIRE EFFECTS MONITORING PROGRAM 1993


PREPARED BY:
PRESCRIBED FIRE STAFF
OCTOBER 1993

NATIONAL PARK SERVICE
BRANCH OF AVIATION & FIRE MGMT
P.O. BOX 129
GRAND CANYON, AZ 86023

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# Grand Canyon National Park
# Aviation and Fire Management
# Annual Summary
# 1993

**Prescribed Fires:**

**Prescribed Natural Fires (PNF):**

| Name | Size (acres) | Location | Fuel Model | Ignition Date |
|---|---|---|---|---|
| Crystal | 0.1 | Inner Canyon | 8 | 5/12/93 |
| Walhalla | 130.0 | North Rim | 9 | 8/12/93 |
| Emerald | 342.0 | North Rim | 9 | 8/10/93 |
| Burnt | 1.5 | Inner Canyon | 2 | 8/19/93 |
| Pearce | 20.0 | Inner Canyon | 2 | 8/19/93 |
| Mescalero | 2.1 | Inner Canyon | 6 | 8/20/93 |

PNF Acres: 495.7

**Management Ignited Prescribed Fires (MIPF):**

| | | | | |
|---|---|---|---|---|
| Quarry II | 370.0 | South Rim | 9,6 | 5/11/93 |
| Cedar | 20.0 | South Rim | 2 | 9/19/93 |
| Atchinson II | 621.0 | South Rim | 9,2,6 | 9/8/93 |
| NW III | 221.0 | North Rim | 9,10 | 9/20/93 |

MIPF Acres: 1232.0

**Wildfires:**

| | |
|---|---|
| lightning-caused | 18 |
| human-caused | 59 |

**Other:**

| | |
|---|---|
| support actions/mutual aid | 37 |
| false alarms | 5 |

Wildfire Acres: 1996.8

# 1993 FMH PROJECTS COMPLETED

**PLOTS INSTALLED:**

| 1993 Plots | |
|---|---|
| monitoring type | # |
| FPIED1D02 | 4 |
| FPIPO1D09 | 4 |
| FPIPN1D09 | 16 |
| FPIEN1D10 | 2 |
| TOTAL | 26 |

| Plots Installed to Date | |
|---|---|
| monitoring type | # |
| FPIED1DO2 | 13 |
| FPIPO1D09 | 14 |
| FPIPN1D09 | 19 |
| FPIEN1D10 | 2 |
| TOTAL | 48 |

**POSTBURN PLOTS:**

| Total Plots Reread 1993 | |
|---|---|
| monitoring type | # |
| FPIED1D02 | 10 |
| FPIPO1D09 | 7 |
| FPIPN1D09 | 4 |
| FPIEN1D10 | 0 |
| TOTAL | 21 |

| 1993 Postburn Plot Status | |
|---|---|
| status | # |
| Immediate Post | 12 |
| Year One | 9 |

**PLOTS BURNED:**

| Total Plots Burned 1993 | |
|---|---|
| monitoring type | # |
| FPIED1D02 | 6 |
| FPIPO1D09 | 4 |
| FPIPN1DO9 | 2 |
| TOTAL | 12 |

| Total Plots Burned to Date | |
|---|---|
| monitoring type | # |
| FPIED1D02 | 10 |
| FPIPO1D09 | 7 |
| FPIPN1D09 | 4 |
| TOTAL | 21 |

## Results of Minimum Plot Calcuations by Monitoring Type *

| Monitoring Type | Primary Monitoring Type Variable (Overstory) | | Secondary Monitoring Type Variable (Fuel Loading) | |
|---|---|---|---|---|
| | 20 | 25 | 20 | 25 |
| FPIED1D02** | 6 | 4 | 11 | 7 |
| FPIPO1D09 | 10 | 7 | 20 | 13 |
| FPIPN1D09 | 24 | 15 | 21 | 14 |

Make more user friendly?

* Precision Value = 0.80

** Overstory min. plots for PIED in table. JUOS values: R = 20, 11; R = 25, 7

## NARRATIVE FOR RX CREWMEMBER TIME EXPENDITURES

The graphs on the following pages depict to the best possible extent, a workload breakdown for the 1993 season. These activities addressed are: training, travel, fire effects, PNF/MIPF, suppression and unit preparation. The following information briefly describes these activities.

### Training

Most members of the prescribed fire crew were involved in the following courses conducted at Grand Canyon: S-130, S-190, S-217, S-212 and S-211. Additional training was provided to Rx staff members with the RX-91 being hosted at the park this spring. Finally, J. Silverstone, E. German and C. Letz attended S-390 at Sequoia NP in June.

### Travel

As the graphs illustrate, a somewhat significant amount of time was incurred traveling to the North Rim of the park. Travel to the North Rim involves a 274 mile one-way trip, taking 4-5 hours to drive. State highway 67 leading into the North Rim has been undergoing extensive road improvements, adding to travel delays.

### Fire Effects

The prescribed fire staff successfully completed all the required immediate post burn and 1 year re-read plots per the monitoring schedule. Also, 26 pre-burn monitoring plots were installed this season, see page 2 for details.

### PNF and MIPF

During the 1993 fire season at Grand Canyon, 6 prescribed natural fires occurred, totaling 495.7 acres. All Rx staff members were involved in various capacities in the management and execution of these fires. In addition 4 management ignited prescribed fires were conducted as of Oct. 27, 1993 totaling 1232 acres. See page 2 for details.

### Suppression

As resource availability and ambient conditions warranted, Rx personnel aided suppression crews in initial attack activity, helitack operations and in a variety of support functions, ie. logistics, dispatching, etc.

### Unit preparation

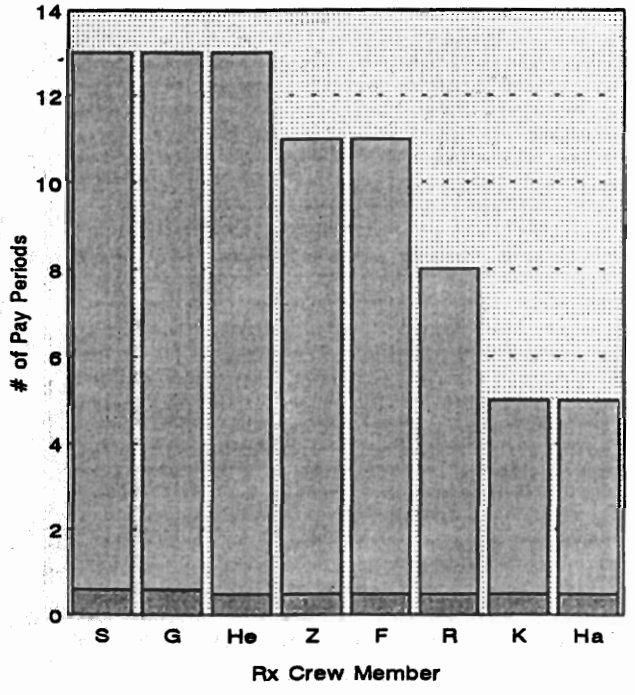
For the successful execution of the accomplished MIPF acreage this season, nearly all Grand Canyon fire personnel and misc. park personnel devoted a great deal of time and effort in unit preparations. Utilization of park suppression crews greatly contributed in completion efforts.

# RX CREW TIME EXPENDITURE ON PROJECTS

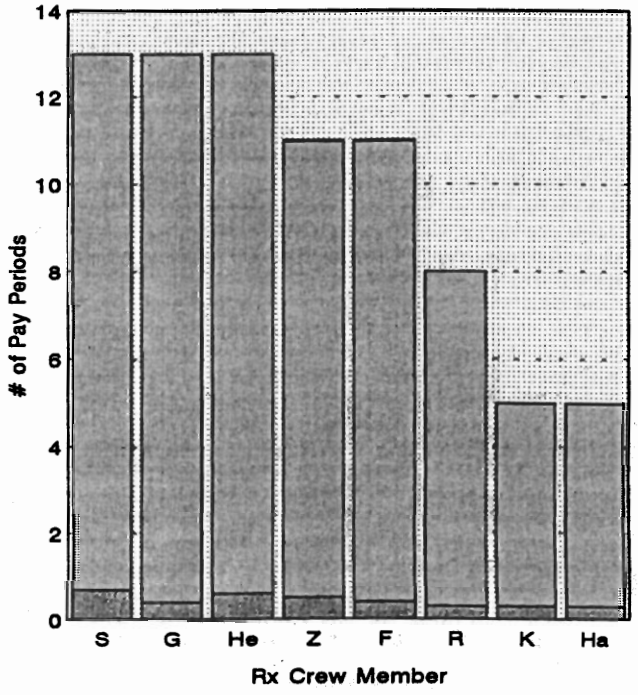
| Code | Name | Classification/Grade | Funding Source |
|---|---|---|---|
| S | James Silverstone | GS-0404-5 | Fire Effects |
| G | Eric German | GS-0404-5 | PNF Monitor |
| He | Carl Helquist | GS-0404-5 | PNF Monitor |
| Z | Brenda Zimpel | GS-0404-5 | Fire Effects |
| F | Roland Foss | GS-0462-5 | Hazard Fuel Reduction |
| R | Sandra Rosas | GS-0404-5 | PNF Monitor |
| K | Christy Klassett | SCA | Presuppression |
| Ha | Eric Harris | SCA | Presuppression |
| Sc * | Jim Schroeder | GS-0462-6 | Fire Effects |

* Not included in the following graphs

## Training

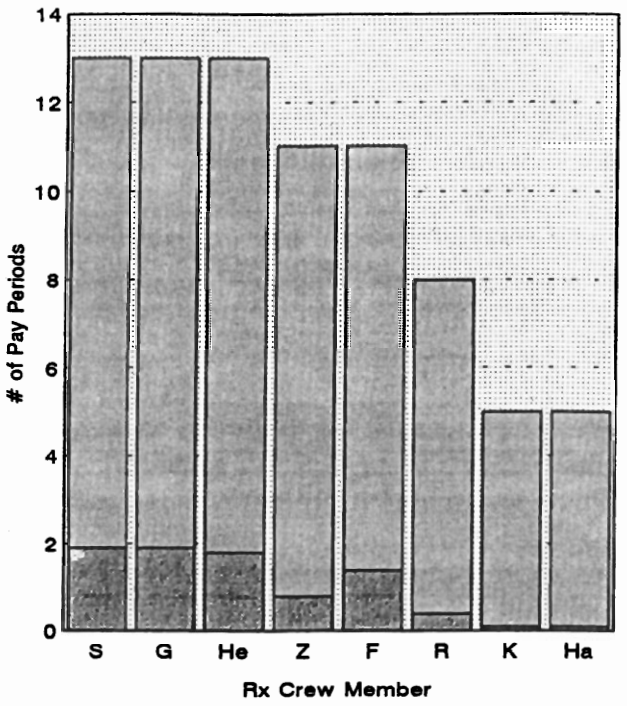



## Travel

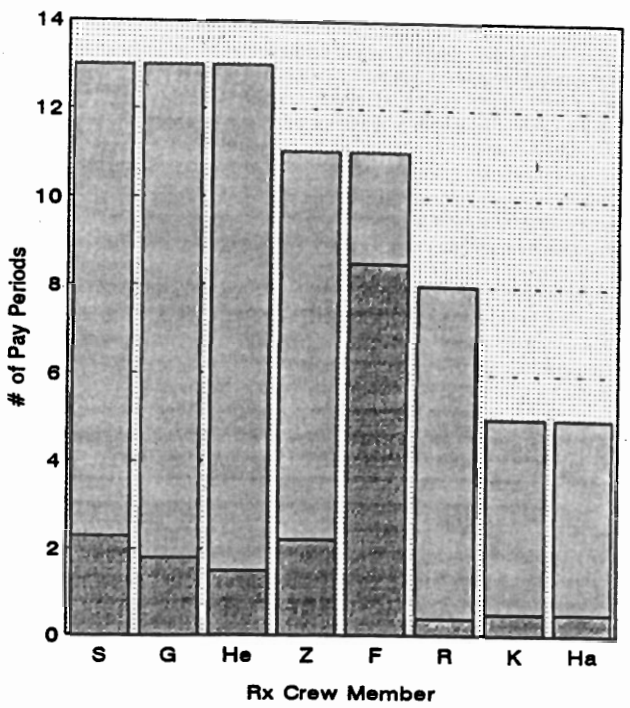



Time Expended  Pay Periods Worked

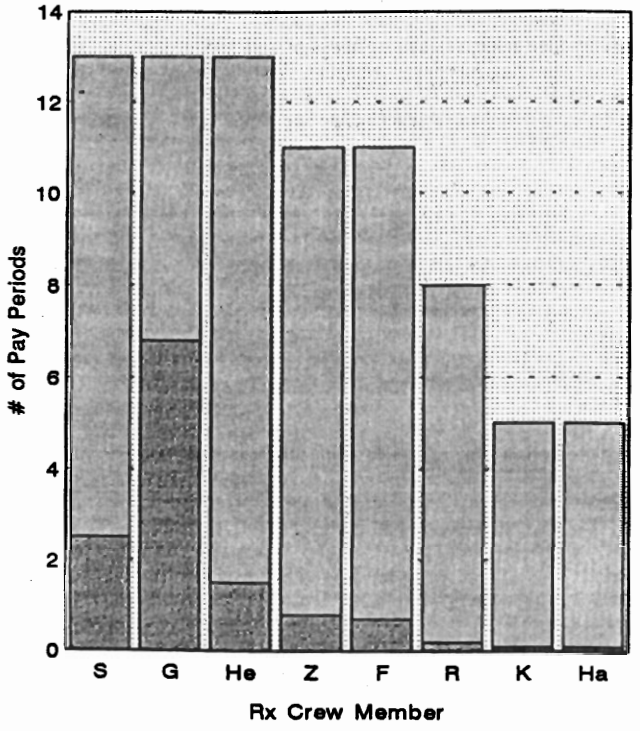
## PNF & Rx Burns



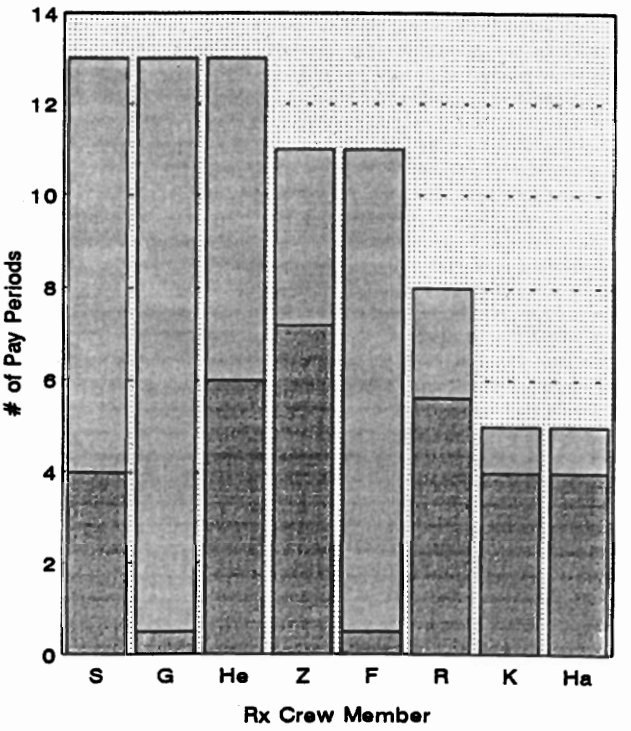

## Unit Prep. Work




## Suppression




## Fire Effects




Time Expended  Pay Periods Worked

## CHANGES AND RECOMMENDATIONS IN PROTOCOLS

Overall the parks 1993 fire effects monitoring program encountered few problems. There were no deviations from established protocols noted. Throughout all levels of monitoring, (1-4), the changes to standards and protocols addressed in the 1992 version of the handbook provided many solutions to defiencies encountered in previous versions of the handbook. As Grand Canyon's prescribed fire program remains active and plots are being burned, program managers can expect continued refinements in implementing the fire effects program.

As for a couple of recommendations, mandatory measuring of char heights while measuring scorch heights. The actual percent of overstory or pole-sized crown scorch can soley or in part be a result of bark charring. Furthermore, to better understand overstory tree crown scorch, pole-sized trees should require char and scorch sampling. Areas with higher densities of seedlings and pole-sized trees, provided ladder fuels that can greatly contribute to overstory crown scorch. In addition, while conducting immediate post-burn monitoring, a re-read of the 50-meter transects should be mandatory, providing researchers a more comprehensive view of fire intensities and overall extent of fire spread in and around the plot.

## PROBLEMS ENCOUNTERED WHILE MONITORING

To address problems encountered while monitoring, particularly during the NW III prescribed fire, there was not a sufficient safety margin to allow monitors near the plots to gather appropriate data as MAS dictates. Variables contributing to these conditions were:

* high fuel loadings, resulting in moderate to high fire intensities, accompanied by several active flame fronts
* significant smoke impact
* conditions stated above contributed to unacceptable escape routes and safety zones

Solution: Within the burn unit, identify similar plot conditions in locations that provide safe monitoring of fire behavior.

## EQUIPMENT INFORMATION

All equipment and supplies (e.g., tags, forms, tapes, etc.) are located and stored at the Fire Support Office, South Rim, Grand Canyon. Files containing raw data and FMH software generated copies are also located at the Fire Support Office. Copies of all database files have been duplicated, one set at Fire Support and the other at Ranger Operations, South Rim, Grand Canyon.

FMH equipment suppliers list:

Band and Tag Co.
721 York St., P.O. Box 430
Newport, KY 41072-0430

Patricia Ledley Bookseller Inc.
1 Bean Rd., P.O. Box 90
Buckfield, ME 04220

Trimble Navigation
2105 Donely Dr.
Austin, TX 78758

National Wildfire Coordinating Group
1849 C Street
Washington, DC 20240

## MONITORING TYPE INFORMATION

After evaluating data from the first 2 plots installed in the Engelmann Spruce/ Mixed Conifer vegetation type, it was determined that there is a need to better quantify species composition as described in the rejection criteria portion of FMH-4. Quantifying numbers of individual species as part of the selection criteria, will enable field technicians to accurately determine the acceptance or rejection of the random plot points. Once the selection criteria has been "tightened" a more realistic and obtainable number of required plot installations can be accomplished.

FMH-4 **MONITORING TYPE DESCRIPTION SHEET**

**Monitoring Type Code:*** F P I E N 1 D 1 0 **Date Described:** 01/25/93
**Monitoring Type Name** Rocky Mountain Subalpine Conifer Forest
**Preparers** (RxFS/RxFT): Duhnkrack/Schroeder
**Burn Prescription:** Prescribed fires will be conducted during summer and fall (May-December) to meet management objectives. Both backing and head fires will be used. Prescription parameters are identified in 1992 GRCA Fire Management Plan and include:

RH 20-60 %
Mid-flame Wind Speed 0-6 mph
10hr Time Lag Fuel Moisture 6-15 %
Rate of Spread .3 - 6.8 ch/hr

**Burn Goals:** Reduction of hazardous fuel accumulations and restoration of natural fire regimes.
**Monitoring Type Variables:** Fuel loading & overstory tree density.
**Physical Description:** Located on the North Rim, this monitoring type ranges from 7,500 to 9,165 feet (2,290 to 2,793 meters) elevation. Slopes range from 0 % to greater than 60 % and favors north and northeast aspects at the lower elevations, yet occurs on all aspects at higher elevations. Soils are relatively deep of loamy texture which are derived from Kaibab limestone material.
**Biological Description:** Vegetative associations 121.3111, 121.3171, and 121.3172 have been idenitified by Warren et al. (1982) adapted from the system of Brown, Lowe, and Pase (1979). *Picea engelmannii, Populus tremuloides and Abies concolor combine to form the main forest canopy. Abies lasiocarpa, Pinus ponderosa* and *Pseudotsuga menziesii* may be present, but to a much lesser degree. The understory is variable, composed of scattered stands of conifer and deciduous pole-sized and seedlings, deciduous shrubs, and evergreen shrubs. Ground cover is also variable to sparse, composed of grasses, sedges, and herbs. Fallen dead timber and deep litter are common on the forest floor.
**Rejection Criteria:** Initial random areas within 20 meters of large rock outcrops, boundary fences, anamalous vegetation patches, roads, trails, utility corridors, slash piles, or open bare ground. Areas with fuel loading less than 15 tons/acre. Areas within 10 meters of ecotones or transitional vegetative influences including areas void of *Picea engelmannii, Populus tremuloides* and *Abies concolor*. Areas with >50% *Pinus ponderosa* or *Populus tremuloides*. Areas within 10 meters of significant cultural resource features including prehistoric, protohistoric, and historic sites.

* Assign unique 9 character code as described below:
_ Plot Type (F=forest, B=brush, G=grass)
_ _ _ _ _ Dominant Species Alpha Code (see Appendix C of FMH)
_ Burn Period Phenology (phenological stage of key plants affected by and/or carrying the fire):
G=green-up (period of active plant growth)

# ANTICIPATED 1994 FMH PROJECTS

## PLOTS TO BE INSTALLED

| monitoring type | # | Location |
|---|---|---|
| FPIEN1D10 | 13 * | North Rim |

* Projected number to be installed assuming that 15 plots will meet minimum plot requirements.

## PLOTS TO BE REREAD

### Immediate Postburn *:

| monitoring type | # | Location |
|---|---|---|
| FPIPN1D09 | 16 | North Rim |
| FPIPO1D09[A] | 4 | South Rim |
| FPIED1D02 | 2 | South Rim |
| TOTAL | 22 | |

* Immediate postburn numbers based on projected 1994 burns.

### Year One:

| monitoring type | # | Location |
|---|---|---|
| FPIPN1D09 | 2 | North Rim |
| FPIPO1D09 | 4 | South Rim |
| FPIED1D02 | 6 | South Rim |
| TOTAL | 12 | |

### Year Two:

| monitoring type | # | Location |
|---|---|---|
| FPIPN1D09 | 2 | North Rim |
| FPIPO1D09 | 3 | South Rim |
| FPIED1D02 | 4 | South Rim |
| TOTAL | 9 | |

# 1994 SOUTH RIM PLOT RE-READ CHECKLIST

| COMPLETED? | PLOT I.D. | STATUS | MONTH TO READ |
|---|---|---|---|
| | PIPO 6 | YR 01 | APRIL |
| | PIED 10 | YR 01 | APRIL |
| | PIED 11 | YR 01 | APRIL |
| | PIED 13 | YR 01 | APRIL |
| | | | |
| | PIPO 1 | YR 02 | MAY |
| | PIED 1 | YR 02 | MAY |
| | | | |
| | PIPO 2 | YR 02 | JUNE |
| | PIED 8 | YR 02 | JUNE |
| | | | |
| | PIPO 13 | YR 01 | JULY |
| | PIED 14 | YR 01 | JULY |
| | PIED 15 | YR 01 | JULY |
| | PIED 4 | YR 02 | JULY |
| | PIED 5 | YR 02 | JULY |
| | | | |
| | PIPO 14 | YR 01 | AUGUST |
| | | | |
| | PIPO 7 | YR 02 | SEPTEMBER |
| | | | |
| | PIPO 10 | YR 01 | OCTOBER |
| | PIED 9 | YR 01 | OCTOBER |

# 1994 NORTH RIM RE-READ CHECKLIST

| COMPLETED? | PLOT I.D. | STATUS | MONTH TO READ |
|---|---|---|---|
| | PIPN 9 | YR 01 | JUNE |
| | PIPN 12 | YR 01 | JULY |
| | PIPN 1 | YR 02 | JULY |
| | PIPN 2 | YR 02 | JULY |

# SOUTH RIM 5 YEAR PROJECTED WORK LOAD

| | | | | FMH Workload by Year | | | | |
|---|---|---|---|---|---|---|---|---|
| PROJECT NAME | AC. | # OF PLOTS | BURN YR. | 1994 | 1995 | 1996 | 1997 | 1998 |
| | | | | QTY./INT. | QTY./INT. | QTY./INT. | QTY./INT. | QTY./INT. |
| ATCHISON I | 220 | 1 PIPO | 1992 | 1 YR02 | ---- | ---- | 1 YR05 | ---- |
| ENTRANCE | 424 | 4 PIED<br>2 PIPO | 1992 | 6 YR02 | ---- | ---- | 6 YR05 | ---- |
| SANTE FE | 275 | 1 PIPO | 1992 | 1 YR02 | ---- | ---- | 1 YR05 | ---- |
| TOPEKA | 824 | 1 PIED<br>1 PIPO | 1992 | 2 YR02 | ---- | ---- | 2 YR05 | ---- |
| VILLAGE | 170 | 1 PIPO | 1992 | 1 YR02 | ---- | ---- | 1 YR05 | ---- |
| ATCHISON II | 750 | 3 PIED<br>2 PIPO | 1993 | 5 YR01 | 5 YR02 | ---- | ---- | 5 YR05 |
| QUARRY | 370 | 3 PIED<br>3 PIPO | 1993 | 5 YR01 | 5 YR02 | ---- | ---- | 5 YR05 |
| PICNIC | 220 | 2 PIED<br>4 PIPO | 1994 | 6 POST | 6 YR01 | 6 YR02 | ---- | ---- |
| | | TOTAL PLOTS: | | 27 | 16 | 6 | 11 | 10 |

# NORTH RIM 5 YEAR PROJECTED WORKLOAD

| | | | | FMH Workload by Year | | | | |
|---|---|---|---|---|---|---|---|---|
| PROJECT NAME | AC. | # OF PLOTS | BURN YR. | 1994 QTY./INT. | 1995 QTY./INT. | 1996 QTY./INT. | 1997 QTY./INT. | 1998 QTY./INT. |
| NORTH WEST I | 210 | 2 PIPN | 1992 | 2 YR02 | ---- | ---- | 2 YR05 | ---- |
| NORTH WEST III | 1200 | 2 PIPN | 1992 | 2 YR01 | 2 YR02 | ---- | ---- | 2 YR05 |
| NORTH WEST V | 260 | 3 PIPN | 1994 | 3 POST | 3 YR01 | 3 YR02 | ---- | ---- |
| TIYO I | 740 | 4 PIPN | 1994 | 4 POST | 4 YR01 | 4 YR02 | ---- | ---- |
| TIYO II | 240 | 2 PIPN | 1994 | 2 POST | 2 YR01 | 2 YR02 | ---- | ---- |
| VISTA IV | 120 | 4 PIPN | 1994 | 4 POST | 4 YR01 | 4 YR02 | ---- | ---- |
| WIDFORSS I | 380 | 2 PIPN | 1994 | 2 POST | 2 YR01 | 2 YR02 | ---- | ---- |
| NANKOWEAP | 320 | 3 PIEN | 1995 | 3 INSTL | 3 POST | 3 YR01 | 3 YR02 | ---- |
| SOUTHBEAR | 400 | 3 PIEN | 1995 | 3 INSTL | 3 POST | 3 YR01 | 3 YR02 | ---- |
| IMPERIAL | 980 | 3 PIEN | 1996 | ---- | 3 INSTL | 3 POST | 3 YR01 | 3 YR02 |
| LOWER WILDCAT | 400 | 3 PIEN | 1996 | ---- | 3 INSTL | 3 POST | 3 YR01 | 3 YR02 |
| UPPER WILDCAT | 130 | 3 PIEN | 1997 | ---- | ---- | 3 INSTL | 3 POST | 3 YR01 |
| | | TOTAL PLOTS: | | 24 | 29 | 28 | 18 | 11 |

## NARRATIVE FOR NORTH RIM
## FIVE YEAR PROJECTED WORKLOAD

Based on minimum plot number projections, we anticipate the installation of at least 15 additional PIEN forest plots. Plot locations will be distributed randomly throughout the projects listed and within the individual units. For planning purposes and development of this report, it was assumed that an average of three plots would be installed per unit. These numbers will undoubtedly change based on the acceptance or rejection of identified random locations.

The five year plan for hazardous fuel reduction projects has inherent flexibility. The dynamic character of the list is driven by interagency cooperation, allocation of FIREPRO funds, and emerging park priorities. In addition, the execution of the individual projects is dependent on several factors, including wildfire activity, prescribed natural fire activity, environmental compliance procedures, completion of unit preparation work, availability of holding/monitoring/ignition resources, and, of course, ambient conditions. The implementation of the Western Region Fire Monitoring Handbook must be carefully applied and integrated into the dynamics of hazardous fuel reduction at Grand Canyon National Park.

The installation of PIEN plots will be coordinated with the evolution of this critical phase of the park management ignited prescribed fire program. In concurrence with the Western Region, we plan to locate proposed plot locations, determine if the location meets the monitoring type description, and install the origin point. Actual pre-burn sampling would occur within the two year period prior to ignition, once the project has been legitimized. A disadvantage to this strategy is the delay in calculating minimum plot values.

GRAND CANYON NATIONAL PARK
BRANCH OF AVIATION AND FIRE MANAGEMENT
MANAGEMENT IGNITED PRESCRIBED FIRE - PROPOSED FIVE YEAR SCHEDULE
1993 - 1997

| BURN PROJECT | PROJECTED BURN DATE | TOTAL ACRES | PROJECT LOCATION | ADDITIONAL COMMENTS | MULTI-PR PLANNING * |
|---|---|---|---|---|---|
| NW IV | JUNE 94 | 314 | NRIM | NPS/USFS BOUNDARY | NWBD |
| TIYO I | SEPT 94 | 740 | NRIM | NEAR THE BASIN | PNFX |
| VISTA IV | JUNE 94 | 120 | NRIM | WALHALLA | |
| PICNIC | MAY 94 | 220 | SRIM | ALONG ENTRANCE ROAD | |
| SHUTTLE | MAY 94 | 10 | SRIM | PILE BURN-INTERFACE | |
| WIDFORSS I | SEPT 94 | 380 | NRIM | NEAR DEVELOPED AREA | NRUI |
| NW V | SEPT 94 | 260 | NRIM | NPS/USFS BOUNDARY | NWBD |
| TIYO II | JUNE 94 | 240 | NRIM | NEAR THE BASIN | PNFX |
| CC HILL | OCT 94 | 85 | NRIM | URBAN/INTERFACE | NRUI |
| WATSON | MAY 94 | 300 | SRIM | NPS/USFS BOUNDARY | ERBD |
| TRANSCEPT I | NOV 94 | 30 | NRIM | URBAN/INTERFACE | NRUI |
| WIDFORSS II | JUNE 95 | 410 | NRIM | NEAR DEVELOPED AREA | NRUI |
| HOSPITAL | NOV 95 | 65 | SRIM | PILE BURN-INTERFACE | |
| UNCLE JIM | JULY 95 | 310 | NRIM | NE OF DEVELOPED AREA | NRUI |
| NW VI | SEPT 95 | 820 | NRIM | NPS/USFS BOUNDARY | NWBD |
| NANKOWEAP | SEPT 95 | 320 | NRIM | N OF PT. IMPERIAL | SMBD |
| SOUTH BEAR | SEPT 95 | 320 | NRIM | NPS/USFS BOUNDARY | NEBD |
| GRAPEVINE | MAY 95 | 260 | SRIM | NPS/USFS BOUNDARY | ERBD |
| TRANSCEPT II | NOV 95 | 40 | NRIM | URBAN/INTERFACE | NRUI |
| IMPERIAL | SEPT 96 | 980 | NRIM | NPS/USFS BOUNDARY | SMBD |
| OWEN | SEPT 96 | 160 | NRIM | URBAN/INTERFACE | NRUI |
| L WILDCAT | SEPT 96 | 400 | NRIM | NPS/USFS BOUNDARY | SMBD |
| FAWN | SEPT 96 | 310 | NRIM | NPS/USFS BOUNDARY | NEBD |
| HANCE | MAY 96 | 400 | SRIM | NPS/USFS BOUNDARY | ERBD |
| LONETREE | JUNE 96 | 860 | SRIM | NPS/USFS BOUNDARY | ERBD |
| WIDFORSS III | JUNE 96 | 240 | NRIM | NEAR DEVELOPED AREA | NRUI |
| U WILDCAT | SEPT 97 | 130 | NRIM | NPS/USFS BOUNDARY | SMBD |
| LYELL | JUNE 97 | 870 | SRIM | NPS/USFS BOUNDARY | ERBD |
| L FAWN | JULY 97 | 510 | NRIM | NPS/USFS BOUNDARY | NEBD |
| TOWER | SEPT 97 | 320 | NRIM | NPS/USFS BOUNDARY | SMBD |
| WALLA V | OCT 97 | 420 | NRIM | NORTH OF PT. SUBLIME | PNFX |
| HAYDEN | OCT 97 | 190 | NRIM | NEAR PT. IMPERIAL | SMBD |

* MULTI-PROJECT PLANNING (NPS-WILDLAND FIRE MANAGEMENT COMPUTER SYSTEM; HAZARD FUEL REDUCTION) DEFINITION FOR PROJECT CODE:

NWBD Northwest Boundary
NRUI North Rim Urban/Interface
SMBD Saddle Mountain Boundary
NEBD North Entrance Boundary
ERBD East Rim Boundary
PNFX North Rim PNF Zone Expansion

## SOUTH RIM PLOT LOCATIONS

| PROJECT NAME | BURN YEAR | FPIED1D02 PLOT NUMBERS | FPIPO1D09 PLOT NUMBERS |
|---|---|---|---|
| Atchison I | 1992 | ----- | 9 |
| Entrance | 1992 | 1,3,4,5 | 1,7 |
| Santa Fe | 1992 | ----- | 2 |
| Topeka | 1992 | 6 | 3 |
| Village | 1992 | ----- | 8 |
| Atchison II | 1993 | 13,14,15 | 13,14 |
| Quarry | 1993 | 9,10,11 | 6,10 |
| Picnic | 1994 * | 7,8 | 4,5,11,12 |

* Proposed year to burn

## NORTH RIM PLOT LOCATIONS

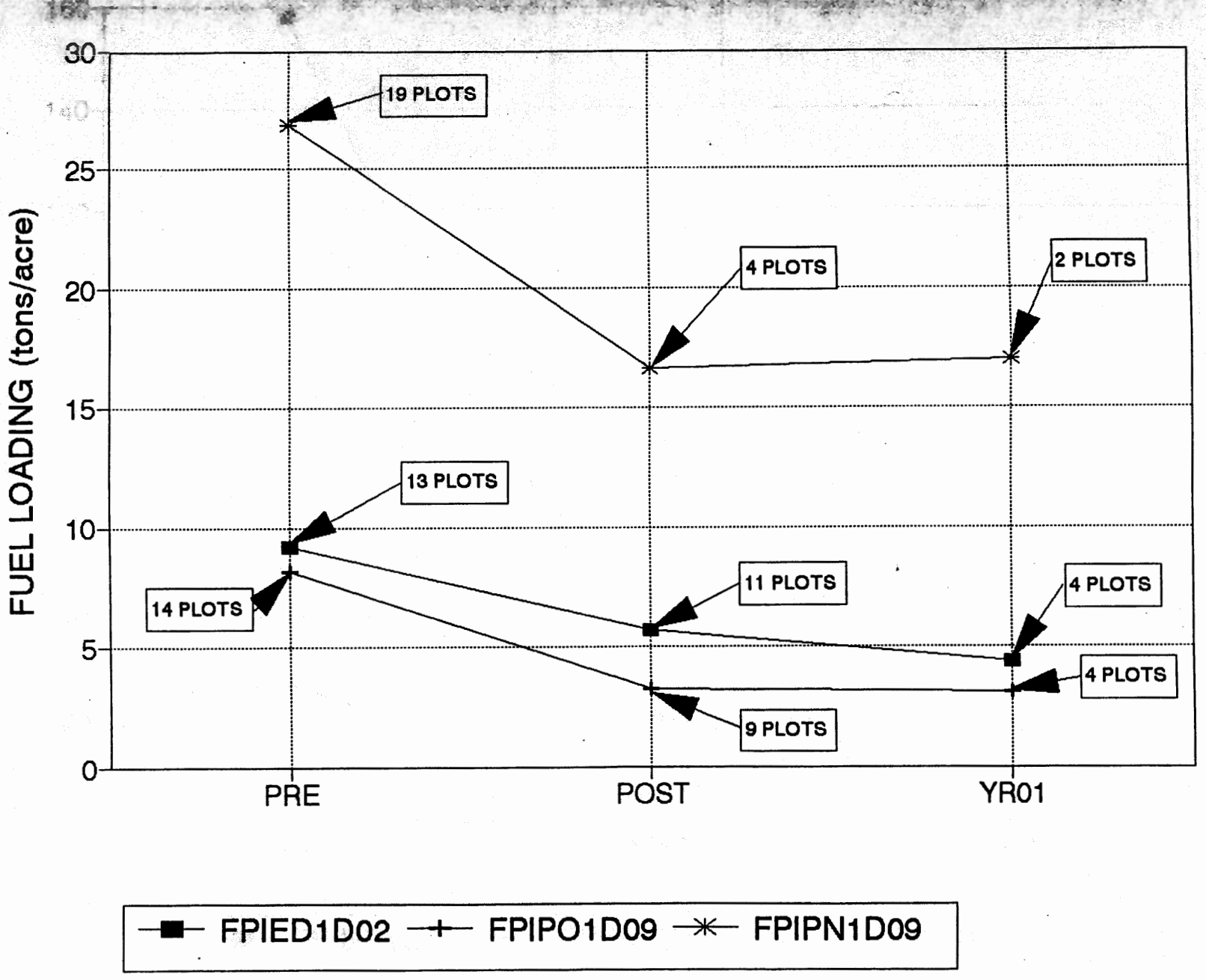
| PROJECT NAME | BURN YEAR | FPIPN1D09 PLOT NUMBERS | FPIEN1D10 PLOT NUMBERS |
|---|---|---|---|
| Northwest I | 1992 | 1,2 | ----- |
| Northwest III | 1993 | 9,12 | ----- |
| Northwest V | 1994 * | 11,14,19 | ----- |
| Tiyo I | 1994 * | 3,7,8,18 | ----- |
| Tiyo II | 1994 * | 13,16 | ----- |
| Vista IV | 1994 * | 5,6,10,15 | ----- |
| Widforss | 1994 * | 4,17 | ----- |
| Nankoweap | ** | ----- | 1,2 |
| Tower | ** | ----- | *** |
| Imperial | ** | ----- | *** |

* Projected

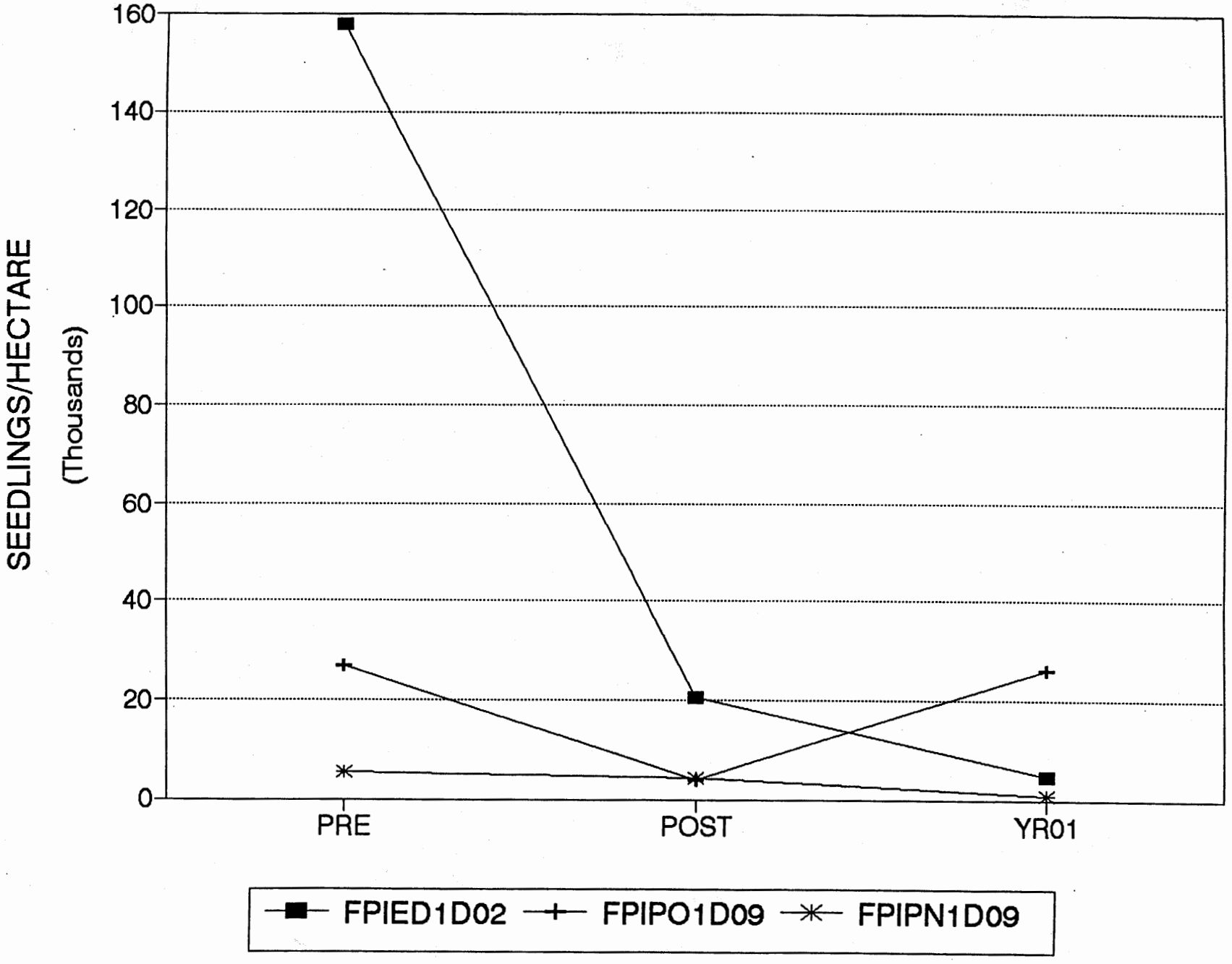
** Burn Date to be determined after the 1994 fire season.

*** FPIEN1D10 Plots installed in 1994 will be randomly located in Nankoweap, Imperial, and Tower burn units.

# POST BURN FUEL REDUCTION

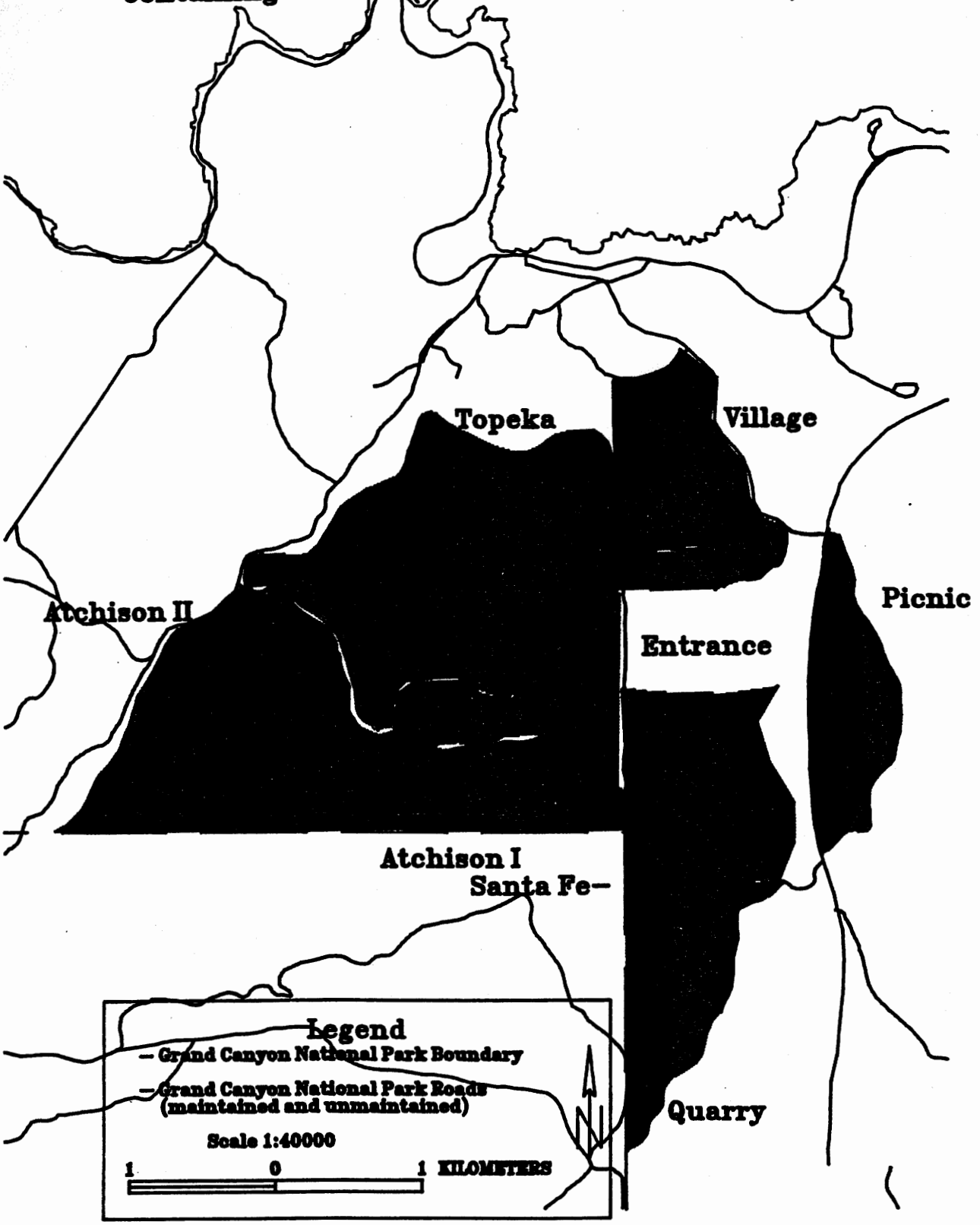


# POST FIRE SEEDLING DENSITY



# Management Ignited Prescribe Fire Units GRCA/SOUTH RIM

**Containing WR–FMH (FPIP01D09 and FPIED1D02) Plots**



# Management Ignited Prescribed Fire Units
## GRCA/NORTH RIM
### Containing WR–FMH (FPIRN1D09 and FPIEN1D10) Plots