THE NATURAL RESOURCE MANAGEMENT CHALLENGE

THE NR-MAP REPORT

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Setting the Stage: The Need for Improved Natural Resource Management in the National Park System

The challenges of managing the natural resources of the National Park System today are much more complex than was anticipated a generation ago, yet the National Park Service's capability to keep the parks from being further degraded has not substantially increased. Parks lack the trained and specialized staff to do the complex natural resource management job required by modern scientific standards, law, and policy. Those are the stark results of a just-completed comprehensive assessment of the Service's natural resource management program known as NR-MAP -- the Natural Resource Management Assessment Program[1], examined in this report. This report also examines the natural resource management challenge facing the parks, the Park Service goal of doubling its natural resource management capability--the *Stewardship Today for Parks Tomorrow* initiative--and ways the NR-MAP analysis can be used to enhance stewardship of the national parks within the expected foreseeable budget and staffing constraints.

The Natural Resource Management Challenge

The 1916 National Park Service Organic Act articulated that the resource mission of the new agency was to:

> *conserve the scenery and the natural and historic objects and the wildlife therein ... by such means as will leave them unimpaired for the enjoyment of future generations.*

Today, we call this broad mission *resource stewardship* and we recognize that parks are dynamic, living systems that require more than fences around their borders to be sustained in perpetuity.

When the first national parks were established, beginning with Yellowstone in 1872, the wildlife, forests, and other natural resources were in essentially pristine condition and surrounded by seemingly endless, unexploited, wilderness. The parks were remote, lightly visited, and undeveloped. The ecosystems needed no assistance in maintaining themselves. All the pieces were still present, and the natural resources they contained did not need active management.

But the parks today are, without exception, no longer surrounded by expansive, unimpaired ecosystems. Development inside and outside the parks and large numbers of park visitors[2] have taken their toll. Park ecosystems are no longer pristine or self-sustaining. Air and water pollution from outside the parks come in and damage resources inside park boundaries. Many

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[1] A similar evaluation is underway for the Service's cultural resource management program, and it is expected that CR-MAP will also reveal significant resource management deficiencies at the park level. In addition, an assessment of visitor management and resource protection (law enforcement) needs (called V-MAP) is being completed.

[2] 274 million recreation visits in 1994.

previously impacted areas have been added to the National Park System. Historical sites, battlefields, and other cultural areas are now included in the System and have landscapes that are often vastly changed from the times they were set aside to commemorate. Finally, our understanding of natural systems has changed and increased. These changes have required a change in the way the National Park Service manages parks and their natural resources -- active management is a necessity today but the capability to carry out this more intensive management role is limited.

To conserve the natural resources of the parks unimpaired for future generations now requires extensive effort to understand, maintain, or restore natural conditions or prevent further damage. Park managers must frequently find ways to compensate for damaged or missing components of naturally functioning ecosystems. These activities require research to understand the natural functioning of the ecosystem and whether change or lack of change requires management responses. Inventories are needed to know what resources are present, their condition, and natural variation. Monitoring is required to detect natural and unnatural changes.

Active knowledge-based manipulation of park resources must counteract any adverse effects of human activities in the park as well as habitat fragmentation and pollution outside park boundaries. Animal populations that were once controlled by predators now frequently exceed the habitat available and must be controlled by park staff. Native species and habitats must be restored and maintained in the face of the introduction and spread of exotic -- non-native -- plants and animals that can damage or outcompete them. Intervention is often needed to protect rare or endangered animal or plant species. Fire must be controlled in some areas to prevent destruction of key resources and carefully introduced in others to mimic natural processes. These are examples of management actions required to preserve the natural resources the parks were established to protect.

Compensating for Altered Ecosystems

Fire is a necessary disturbance factor and plays a dominant role in many park ecosystems. To mitigate the loss of natural fire regimes caused by suppression efforts and landscape fragmentation, prescribed fires are used to mimic the effects of natural fires. In many cases, prescribed fire can be used with other management activities to restore and maintain natural resources, once the role of fire is understood and appropriate timing and frequency determined.

At **Indiana Dunes National Lakeshore**, fire is used to produce a mosaic of sand prairie and oak savannas, maintaining the open and semi-open areas needed for wild lupine that in turn is needed for the endangered Karner blue butterfly. The park contains the third largest population of this butterfly in the world. The butterfly lays its eggs on the wild lupine, which is also the only known food source for the larvae. Because fire can also burn the butterflies' eggs, the timing and extent of fires must be carefully prescribed and controlled. Prescribed fire is also being used to restore and maintain historic landscapes. Using a restoration plan that also requires exotic species control, the native oak savanna of the 1861 historic scene at **Wilson's Creek National Battlefield** is being reconstructed.

Finally, resource management must include active protective measures to prevent further damage to park resources. These include establishment and then enforcement of levels and

types of permitted park uses -- such as fishing, river use, backcountry use, and hunting -- that can be carried out without unacceptable harm to resources. Other important preventive actions include joint planning and coordinated management with neighboring jurisdictions and participating in the public review of external activities that may impact park resources.

Linking Monitoring and Management

Systematic annual brook trout population monitoring in 46 streams in **Shenandoah National Park** has been made possible by having a team of ecologists, data managers, and biological technicians on staff. Shenandoah has one of the Service's prototype monitoring programs and the positive impact on management is beginning to be clear. Resource specialists and rangers now sit down each spring and jointly calibrate the park's recreational fishing limits on a stream-by-stream basis to the level which is known to be within the ability of the aquatic ecosystem to withstand without harm. This is in marked contrast to the norm in most parks, where fishing rules are commonly the same as in waters outside the park, little data is available, and potential impacts to resources are unknown.

All of these resource management activities require highly skilled specialists in natural resource disciplines, as well as the contributions of rangers, maintenance personnel, and other members of the park team.

A medical analogy has often been used to help explain the role of natural resource management in parks. It illuminates not only the functions of resource management, but also the roles played by various individuals and parts of the organization. Specialists in natural resource disciplines act as the doctors in the delivery of health services to resources. The National Biological Service (NBS) and other research organizations which perform most scientific research for parks are analogous to the National Institutes of Health (NIH) and medical research hospitals, developing in-depth understanding of complex systems and testing new techniques for the medical practitioners to apply. Major roles are:

Park Element	Role	Medical Analogy
Scientific researcher (NBS, NPS[3], university, other agency, etc.)	Acquire new knowledge; develop and test new techniques	NIH or research hospital faculty
Park natural resource specialists	Routine physicals; diagnose condition; prescribe treatment or "wellness" regimen; administer treatment	General or specialist MD; public health specialist
Park rangers and others	Spot symptoms; apply emergency stabilization; assist in treatment; protect from further deterioration	Emergency medical technician; paramedic; first responder

[3] Limited to physical science research after NBS was established.

Just as hospital administrators, custodians, and others are also required to operate a medical facility, all park personnel are needed to manage natural resources, although the analogy has not been fully extended here. Of particular importance in many parks is the role maintenance personnel play in both preventing damage and restoring resources.

Most parks lack sufficient, well-trained resource management staff to do more than identify critical issues and attempt to address those that are most manageable or controversial. Many parks lack any specialists at all and instead assign these functions as collateral duties of park rangers and others with already full plates managing park visitors or facilities as well as enforcement activities. There are examples, however, of the positive impact a good resource management program can have on a park. The investment in qualified people generally pays dividends which far exceed the salary costs.

Professionalization

The National Park Service recently completed an evaluation of the park ranger profession and determined that ranger positions need to be better structured to meet the complex challenges of today's park management. Inherent in that effort was the recognition of the role park rangers play in resource education and protection, and therefore the ranger of the future will be required to have academic training in the cultural or natural resource fields. Even with an increasingly sophisticated ranger workforce, however, the demands placed on rangers to perform visitor services and other responsibilities require that there be additional personnel with sophisticated resource management expertise.

Even One Specialist Makes A Difference

The addition of a professional hydrologist at **Buffalo National River** has made a marked difference, technically, financially, and most importantly, in the community. In addition to the expected technical program improvements (e.g. physical and biological monitoring, riparian restoration), the park has made big strides in addressing the fundamental reasons for water quality degradation -- poor land use practices in the watershed. The hydrologist has established a watershed council to bring public and private organizations together to discuss and remedy water quality issues and started a cooperative "Water Education Team" to teach water quality monitoring methods to area students and promote a conservation ethic in the younger generation residing in the watershed. Proposals he has written have brought more NPS natural resource management funding into his park in the last three years than all of the other parks in the Southwest Region combined.

In 1994 there were just under 500 permanent and temporary full-time personnel in non-ranger professional natural resource specialist positions in field areas of the National Park System. With about 370 park units, this translates into an average of slightly more than one specialist per park. In reality, however, there are a few specialists in a handful of parks and no specialists in many parks. While the National Park Service maintains small centralized programs for some of the most highly technical needs, principally in physical sciences, parks must generally rely on their own staffs to identify and address the much more common and widespread biological issues.

Most parks have but one natural resource professional and this is most commonly a general biologist rather than a true specialist. Regardless of discipline, the one person that most parks have to call on must handle the range of natural resource issues involving exotic plants, endangered wildlife, water quality problems, geohazards, and host of others, most in fields in which he or she has little specialized knowledge or training. The sidebar gives an idea of the magnitude of natural resources to be managed relative to the number of natural resource professionals available to address them.

Recognizing the need for more specialists, the NPS began a program in the 1980s to augment the number of professionals in natural science disciplines -- to diagnose resource health, prescribe treatments, and with others (including rangers) to deliver "health" services to resources, to continue the previously used medical analogy. In launching this initiative, the Service recognized that more and greater expertise is needed, for example:

* forest ecologists to provide advice and plans on restoring and maintaining forests as part of the historic landscape in battlefield parks;

* wildlife disease specialists to address diseases that can impact both park and neighboring animal populations; and

* fisheries biologists to monitor fish populations and prescribe catch restrictions to allow levels of recreational fishing that ensure sustainable fish populations.

Resources Managed vs. Management Capabilities

* 10,646 park populations of exotic plant species, impacting 7,185,886 acres
  Of these, 2,146 park populations of exotic plant species are planned for treatment in resource plans to restore natural systems and cover 1,525,353 acres
* 132 park populations of threatened or endangered plants in at least 30 parks
* 709 park populations of threatened or endangered animals in at least 143 parks
* 2,602 park occurrences of aquatic species harvested
* 8,320 park occurrences of terrestrial animals legally trapped or harvested

Another way to look at it is that, on average, each park biologist must plan for and manage the restoration, protection, and monitoring of the following:

* 6 exotic plant species requiring control, and covering 4,460 acres
* 1 exotic animal species requiring control
* 2 threatened or endangered species
* 7 harvested aquatic species
* 24 harvested terrestrial species
* 88,452 acres of biological resources for general oversight (except in Alaska, where it averages 1 million acres)

These estimates cover only those resources we have currently identified. As such, they represent minimums.

An intensive, two-year resource management training program that existed from 1982 to 1994 provided training to 130 NPS employees. FY 1994 and 1995 funding initiatives for new professional natural resource specialists have resulted in nearly 100 new positions in parks for biologists, physical scientists, geographic information system specialists, and biological and physical science technicians to assist higher-graded specialists, as well as the conversion or upgrading of a number of existing

positions. While these efforts represent important first steps toward increasing the natural resource management capability in the parks, there remains a long way to go. A tool to guide this process has been needed.

The Natural Resource Management Assessment Program (NR-MAP)

Park managers normally have considerable discretion in setting their priorities and therefore programs and issues receive different emphasis in different parks. The dilemma has always been how to set priorities and allocate scarce funding and staffing among parks in a consistent way that reflects true needs as measured by criteria that could be applied in every park.

Recognizing this dilemma, a group of park superintendents in 1990 asked for an objective analysis of what numbers and types of staff positions are needed to implement a comprehensive natural resource management program in national park units. This assessment -- the Natural Resource Management Assessment Program (NR-MAP) -- has now been developed and applied to 269 parks with significant natural resources. Over 4 years in development, testing and implementation of NR-MAP involved over 900 NPS managers and natural resource professionals.[4]

What makes NR-MAP different from previous analyses of natural resource programs in the NPS is that this one is resource-based rather than manager-based. It begins with an inventory (called a "profile") done by each park which catalogs information about its natural resources and its management setting. Over 164 elements were identified for this profile, such as:

* number of neighboring political jurisdictions and landholders
* miles of rivers, streams, etc.
* park configuration, size, and degree of remoteness
* types of and extent of terrestrial and aquatic habitats
* air quality and Clean Air Act status
* numbers of native, exotic, threatened and endangered plant and animal species
* consumptive resource uses (such as commercial grazing, and oil and gas operations, hunting and fishing, subsistence activities)
* visitor use

As comprehensive as the list of questions was, each park is different and it wasn't possible to determine every factor that determines workload for every park. Instead, these questions served as "surrogates" and experienced experts developed indices of workload for each of the 15 major program areas (e.g. wildlife management, exotic plant management, planning) in a comprehensive natural resource management program. Tables were also developed which identify typical program support and infrastructure needs.

[4] Key individuals who were responsible for this effort are listed in Appendix B.

This computerized "expert system" was subjected to rigorous statistical analysis, management review, and refinement throughout its development. The final NR-MAP staffing allocations are therefore based on the best and most complete database ever developed about national park natural resources and the workload to manage them. In addition to placing the focus of the evaluation on the resources themselves, this approach allows greater consistency among parks of similar size and resource base, and offers a far more objective foundation for determining resource management and research needs than has been established in the past.

What the NR-MAP Is Designed To Tell Us

The NR-MAP analysis provides park-by-park figures on current -- and needed -- natural resource management staffing broken out by the 15 program areas. The differences between the need and the current capability (the "gap analysis") is intended to be used in developing staffing plans, resource management plans, and budget priorities. In other words, NR-MAP provides important new information and is also a tool which can improve our planning and budgeting using other, existing administrative procedures.

A key assumption of the NR-MAP system is that parks are required to meet certain legal, regulatory, and policy standards of activities in natural resource management and that they are required to do them all simultaneously. While this is not the way we do business NOW, the NR-MAP data indicate what it should take to do the complete job and do it to those standards.

It is important to realize that an NR-MAP full-time equivalent (FTE) allocation does not dictate that the NPS hire an additional employee. Rather, it quantifies the NPS need for expertise and assistance. University personnel or cooperators may in many instances be more appropriate "providers" than additional Park Service employees.

Some NR-MAP numbers may appear to be too high or too low, but to determine that managers must fully understand the factors behind the NR-MAP allocations. For example, the wildlife management program allocation, although averaging less than one FTE per park, is as high as 19 in one park and greater than 10 in several parks. While up to 19 FTEs for a wildlife section may seen unreasonably high, it is important to understand the range of activities involved and the extent of involvement of personnel parkwide in addressing the program. After evaluating the allocations, managers will be expected to make adjustments as needed.

Ecosystem Restoration

The biggest restoration story in the National Park System is **Redwood National Park**. With the adjacent state parks, it contains the largest remaining stands of old-growth redwoods in the world. It is affected by upstream activities on 10 drainages and the activities of more than 100 adjacent landholders and made particularly vulnerable by its extremely erodible soils. Restoration of previously logged areas in the park and prevention of adverse effects from external activities demands a substantial and very skilled staff. The success of the restoration efforts to date, and the extent to which the Redwood staff is looked to, both within and outside NPS, testifies to the benefits of this level of expertise. It exemplifies the goals stemming from NR-MAP, exceeding parkwide the 50 percent of total staffing needs interim goal and achieving 100 percent of the staffing goal in its vegetation management program.

To evaluate specific results for individual parks, it is necessary to take a close look at what each of the 15 major program areas involve, relative to each park's resources. Using the wildlife program example, a park's FTE allocation depends on the diversity of its wildlife species, their population levels, and their management complexity. This program area includes all of the following:

* basic inventory and monitoring of wildlife -- knowing what constitutes the park's wildlife generally and its condition;

* identification, monitoring, and the full range of activities necessary to protect threatened or endangered wildlife;

* identification, control and monitoring of exotic wildlife and the threat posed to native species;

* restoration of extirpated species that may be called for in park management plans;

* management of fisheries and any hunted and trapped species, including identifying appropriate harvest levels, managing the harvest, and monitoring populations; and

* management of bears and any other major wildlife populations, such as deer, that may cause special problems and concerns.

The Challenge of Restoring and Maintaining Damaged Ecosystems

One of the greatest threats to the integrity of System resources is exotic, or non-native species. Over 9 percent of the native terrestrial flora and fauna of **Hawaii Volcanoes National Park** are found only in Hawaii, but these biological resources are seriously threatened by feral goats and pigs which disturb soils and native vegetation and spread non-native plants. Approximately 400 non-native plant species threaten native ecosystems by forming single-species stands, altering fire regimes by providing unnatural fuels, and changing nutrient and soil-moisture regimes. The park has developed both vegetation and wildlife management programs that are staffed at about the current target level (50 percent of assessed need) and a fencing program for feral animals that is at the 67 percent level. While research continues on biological control agents, the staff have developed and implemented a control strategy targeting control of (1) all disruptive non-native plants in 12 Special Ecological Areas containing 30,000 acres; (2) one particularly menacing widespread species, fountain grass, park-wide; and (3) 42 potentially disruptive, localized non-native plant species throughout the Park. These efforts, combined with pig and goat fencing and removal, have yielded dramatic results.

The bear management allocation alone involves the full scope of bear management and monitoring activities, including eliminating the availability of human food sources (e.g., garbage cans or stored food); minimizing interactions between humans and bears through appropriately planned development, use management, and visitor education; mitigating conflicts that do occur; handling of bears; and monitoring of bear populations.

Another factor in understanding the NR-MAP allocations is that the FTEs identified include employees or other capabilities at different levels and in different park programs, not just "specialists" in the "resource management division." In the bear management example, the

FTEs may include all or part of a specialist's time, and also workload in campsite maintenance, ranger assistance in removal of nuisance bears, and contacts with visitors regarding appropriate ways to store food to keep it away from bears.

The unmet needs for a particular park may need some explanation. Park managers listed their current staffing based on their own understanding of what constitutes ongoing resource management work, and it should be expected that these interpretations varied considerably. This, of course, is the very problem NR-MAP is designed to address, and in future iterations inconsistencies in definition should be less of a factor. In the aggregate, however, the NR-MAP current staffing figures are consistent with other data on FTEs devoted to natural resource management throughout the Service.

What Is the Message of NR-MAP?

The NR-MAP data suggest that currently, Servicewide, we are only at about 25 percent of the needed staffing level -- or equivalent capability -- in natural resource management (See Figure 1 in Appendix A). These figures *do not include* research and the contributing resource protection function, especially enforcement, typically performed by rangers and being evaluated separately. The numbers *do include* some ranger resource management workload and that of technicians, maintenance staffs, and others who assist directly or indirectly in supporting the natural resource management staff. Research needs *were* assessed as part of NR-MAP and are being given to the NBS. As indicated in Figure 2 and Table 1 in Appendix A, needs and capabilities vary widely among parks and program areas. Specific information is being provided to every park manager that participated in the NR-MAP process.

As a first step, the National Park Service has established a first phase goal of reducing the unmet gap from 75 percent to 50 percent, in effect, doubling our current natural resource management capability. This implementation strategy, termed "Stewardship Today for Parks Tomorrow," recognizes that both well-trained resource professionals and adequate support and other staff are needed to improve our resource stewardship.

What Good Are the Results and How Should They Be Used?

The gap between the current natural resource management capabilities and the optimum level is daunting and raises a significant question -- in a period of severe FTE restrictions and limited budgets -- why use a tool like NR-MAP?

The answer is that an objective, though coarse, comparative tool like NR-MAP is now more important than ever. The scarcer the resources, the more important that they be allocated wisely. Hard decisions will need to be made and different balances will likely be created as we focus on the most important things the agency can do with limited staff and dollars. NR-MAP results can be used in these ways to support managers through these challenging times:

* To help managers and others understand the range and extent of the natural resource management job facing the parks;

* To distribute scarce positions and dollars where the need is greatest, among parks, park clusters, and regions;

* To allocate specialists within park clusters to provide the best mix of, and locations for, specialized expertise which effectively meets the needs of a group of parks, especially when one specialist can serve the needs of more than one park;

* To develop strategies for future park staffing as a basis for hiring decisions today, including the type of specialists that should be hired first;

* To ensure that Resource Management Plans address a park's most critical needs as determined by the NR-MAP profile.

The NR-MAP numbers do not substitute for the good judgement and experience of park managers. Rather, NR-MAP supports that judgement and experience by providing a gauge that can be applied equally to all parks. The broad comparison is only the first step, after which park-specific factors such as the urgency of particular issues need to be considered in allocation and priority-setting decisions.

Decision-makers must also face the reality of infrastructure and logistics problems at some parks. No matter how great the need, some parks will not be able to absorb additional personnel in the short-term due to restrictions in housing, office space, or other factors. On the other hand, the FTE allocations identified by NR-MAP can assist in planning for future infrastructure and logistical needs.

Finally, the numerical analysis should be combined with the principles enunciated in the Natural Resources Professional Development Program when individual staffing strategies are being developed. For example, a park's principal natural resource issue may be exotic plant management. Generally, a plant ecologist or botanist should be hired first, on the assumption that someone well-qualified in one of those disciplines will have the scientific foundation to

learn what is needed to address the basics of other, lower priority, natural resource issues in that park. However, the Professional Development Program also cautions that if only one professional is hired, that person should be more of an "integrator" than a specialist. In other words, a single resource manager must be able to develop at least the beginnings of a broad natural resource program and not focus too narrowly within only one specialty.

The NR-MAP is expected to be updated as new information about park resources is generated and new staff are added. It can help us track our progress and changes in our workload. The NR-MAP can be used as a teaching tool for ourselves and others, to help us systematically understand all of the natural resource management jobs to be carried out in our parks to fully protect the resources under our stewardship. Finally, NR-MAP results should be incorporated into the budget priority-setting process and other planning and decision processes to assist the National Park Service in the wise distribution of scarce resources.

NATIONAL PARK SERVICE
NATURAL RESOURCES MANAGEMENT STAFFING NEEDS
NR-MAP 1994

ST	PARK AREA	CURRENT PERCENT FUNDED	TOTAL FTE'S AT 50% LEVEL	FTE'S TO REACH 50% LEVEL
AK	ANIAKCHAK NATIONAL MONUMENT	4%	12	11
AK	BERING LAND BRIDGE NATIONAL PRESERVE	20%	15	9
AK	DENALI NATIONAL PARK	27%	23	11
AK	GATES OF THE ARCTIC NATIONAL PARK	16%	19	13
AK	GLACIER BAY NATIONAL PARK	13%	18	13
AK	KATMAI NATIONAL PARK	23%	23	12
AK	KENAI FJORDS NATIONAL PARK	15%	11	8
AK	LAKE CLARK NATIONAL PARK	8%	16	13
AK	NORTHWEST ALASKA AREAS	6%	20	17
AK	WRANGELL-ST ELIAS NATIONAL PARK	17%	24	16
AK	YUKON-CHARLEY RIVERS NATIONAL PRESERV	8%	20	17
AL	HORSESHOE BEND NATIONAL MILITARY PARK	4%	7	6
AL	RUSSELL CAVE NATIONAL MONUMENT	1%	4	4
AR	ARKANSAS POST NATIONAL MEMORIAL	6%	4	4
AR	BUFFALO NATIONAL RIVER	26%	17	8
AR	FORT SMITH NATIONAL HISTORIC SITE	3%	2	2
AR	HOT SPRINGS NATIONAL PARK	32%	6	2
AR	PEA RIDGE NATIONAL MILITARY PARK	0%	4	4
AS	NATIONAL PARK OF SAMOA	0%	5	5
AZ	CANYON DE CHELLY NATIONAL MONUMENT	16%	10	7
AZ	CASA GRANDE NATIONAL MONUMENT	10%	2	2
AZ	CHIRICAHUA NATIONAL MONUMENT	14%	8	6
AZ	CORONADO NATIONAL MEMORIAL	7%	5	5
AZ	FORT BOWIE NATIONAL HISTORIC SITE	7%	3	3
AZ	GLEN CANYON NATIONAL RECREATION AREA	13%	26	20
AZ	GRAND CANYON NATIONAL PARK	27%	33	15
AZ	HUBBELL TRADING POST NHS	4%	2	2
AZ	MONTEZUMA CASTLE NATIONAL MONUMENT	29%	4	2
AZ	NAVAJO NATIONAL MONUMENT	2%	3	3
AZ	ORGAN PIPE CACTUS NATIONAL MONUMENT	14%	16	11
AZ	PETRIFIED FOREST NATIONAL PARK	11%	10	8
AZ	PIPE SPRING NATIONAL MONUMENT	3%	2	2
AZ	SAGUARO NATIONAL MONUMENT	16%	16	11
AZ	TONTO NATIONAL MONUMENT	24%	4	2
AZ	TUMACACORI NATIONAL MONUMENT	39%	1	0
AZ	TUZIGOOT NATIONAL MONUMENT	21%	3	2
AZ	WUPATKI NATIONAL MONUMENT	5%	8	7
CA	CABRILLO NATIONAL MONUMENT	12%	6	5
CA	CHANNEL ISLANDS NATIONAL PARK	25%	30	15
CA	DEATH VALLEY NATIONAL MONUMENT	12%	23	17
CA	DEVILS POSTPILE NATIONAL MONUMENT	10%	3	2
CA	EUGENE O'NEILL NATIONAL HISTORIC SITE	46%	1	0
CA	GOLDEN GATE NATIONAL RECREATION AREA	23%	25	14
CA	JOHN MUIR NATIONAL HISTORIC SITE	11%	2	2
CA	JOSHUA TREE NATIONAL MONUMENT	31%	17	7
CA	LASSEN VOLCANIC NATIONAL PARK	18%	15	10
CA	LAVA BEDS NATIONAL MONUMENT	11%	10	8
CA	PINNACLES NATIONAL MONUMENT	26%	13	6
CA	POINT REYES NATIONAL SEASHORE	12%	20	15
CA	REDWOOD NATIONAL PARK	57%	22	-3

NATIONAL PARK SERVICE
NATURAL RESOURCES MANAGEMENT STAFFING NEEDS
NR-MAP 1994

ST	PARK AREA	CURRENT PERCENT FUNDED	TOTAL FTE'S AT 50% LEVEL	FTE'S TO REACH 50% LEVEL
CA	SAN FRANCISCO MARITIME NHP	0%	1	1
CA	SANTA MONICA MOUNTAINS NRA	17%	25	17
CA	SEQUOIA & KINGS CANYON NATIONAL PARKS	21%	38	22
CA	WHISKEYTOWN UNIT,	13%	14	11
CA	YOSEMITE NATIONAL PARK	27%	41	19
CO	BENT'S OLD FORT NATIONAL HISTORIC SITE	17%	6	4
CO	BLACK CANYON OF THE GUNNISON NM	12%	7	5
CO	COLORADO NATIONAL MONUMENT	11%	8	6
CO	CURECANTI NATIONAL RECREATION AREA	16%	15	10
CO	DINOSAUR NATIONAL MONUMENT	33%	20	7
CO	FLORISSANT FOSSIL BEDS NATIONAL MONUM	28%	3	1
CO	GREAT SAND DUNES NATIONAL MONUMENT	15%	8	6
CO	HOVENWEEP NATIONAL MONUMENT	0%	3	3
CO	MESA VERDE NATIONAL PARK	7%	14	12
CO	ROCKY MOUNTAIN NATIONAL PARK	35%	22	6
DC	NATIONAL CAPITAL PARKS-EAST	17%	7	5
DC	PRESIDENT'S PARK	42%	2	0
DC	ROCK CREEK PARK	43%	11	2
FL	BIG CYPRESS NATIONAL PRESERVE	35%	27	8
FL	BISCAYNE NATIONAL PARK	35%	11	3
FL	CANAVERAL NATIONAL SEASHORE	18%	13	8
FL	CASTILLO DE SAN MARCOS NATIONAL MONUM	15%	2	2
FL	DE SOTO NATIONAL MEMORIAL	0%	2	2
FL	DRY TORTUGAS NATIONAL PARK	21%	7	4
FL	EVERGLADES NATIONAL PARK	62%	42	-10
FL	GULF ISLANDS NATIONAL SEASHORE	4%	16	14
FL	TIMUCUAN ECOLOGICAL & HIST PRESERVE	8%	8	7
GA	ANDERSONVILLE NATIONAL HISTORIC SITE	0%	2	2
GA	CHATTAHOOCHEE RIVER NATL REC AREA	10%	6	4
GA	CHICKAMAUGA & CHATTANOOGA NMP	5%	9	8
GA	CUMBERLAND ISLAND NATIONAL SEASHORE	21%	11	6
GA	FORT FREDERICA NATIONAL MONUMENT	3%	2	2
GA	FORT PULASKI NATIONAL MONUMENT	18%	5	3
GA	JIMMY CARTER NATIONAL HIST SITE	0%	1	1
GA	KENNESAW MOUNTAIN NATL BATTLEFIELD PA	0%	5	5
GA	OCMULGEE NATIONAL MONUMENT	5%	2	2
GU	WAR IN THE PACIFIC NHP	0%	5	5
HI	HALEAKALA NATIONAL PARK	33%	16	5
HI	HAWAII VOLCANOES NATIONAL PARK	34%	21	7
HI	KALAUPAPA NATIONAL HISTORIC PARK	0%	9	9
HI	KALOKO-HONOKOHAU NATIONAL HISTORIC PA	11%	6	5
HI	PU'UHONUA O HONAUNAU NHP	6%	6	6
HI	PUUKOHOLA HEIAU NATIONAL HISTORIC SITE	5%	4	4
HI	USS ARIZONA MEMORIAL	38%	1	0
IA	EFFIGY MOUNDS NATIONAL MONUMENT	18%	6	4
IA	HERBERT HOOVER NATIONAL HISTORIC SITE	14%	4	3
ID	CITY OF ROCKS NATIONAL RESERVE	44%	9	1

NATIONAL PARK SERVICE
NATURAL RESOURCES MANAGEMENT STAFFING NEEDS
NR-MAP 1994

ST	PARK AREA	CURRENT PERCENT FUNDED	TOTAL FTE'S AT 50% LEVEL	FTE'S TO REACH 50% LEVEL
ID	CRATERS OF THE MOON NATIONAL MONUMEN	16%	8	6
ID	HAGERMAN FOSSIL BEDS NATIONAL MONUME	8%	6	5
ID	NEZ PERCE NATIONAL HISTORICAL PARK	14%	7	5
IL	LINCOLN HOME NATIONAL HISTORIC SITE	14%	2	1
IN	GEORGE ROGERS CLARK NHP	3%	1	1
IN	INDIANA DUNES NATIONAL LAKESHORE	30%	19	7
IN	LINCOLN BOYHOOD NATIONAL MEMORIAL	19%	3	2
KS	FORT LARNED NATIONAL HISTORIC SITE	2%	4	3
KS	FORT SCOTT NATIONAL HISTORIC SITE	3%	3	2
KY	CUMBERLAND GAP NATIONAL HISTORICAL PA	8%	11	10
KY	MAMMOTH CAVE NATIONAL PARK	15%	22	16
LA	JEAN LAFITTE NATL HIST PARK & PRES	14%	11	8
MA	BOSTON NATIONAL HISTORICAL PARK	10%	3	2
MA	CAPE COD NATIONAL SEASHORE	32%	13	5
MA	FREDERICK LAW OLMSTED NHS	34%	2	1
MA	MINUTE MAN NATIONAL HISTORICAL PARK	70%	4	-2
MA	SALEM MARITIME NATIONAL HISTORIC SITE	12%	1	1
MA	SAUGUS IRON WORKS NATIONAL HISTORIC SIT	12%	2	2
MD	ANTIETAM NATIONAL BATTLEFIELD	26%	6	3
MD	ASSATEAGUE ISLAND NATIONAL SEASHORE	29%	15	6
MD	CATOCTIN MOUNTAIN PARK	14%	10	7
MD	CHESAPEAKE & OHIO CANAL NHP	17%	17	11
MD	FORT MCHENRY NATL MONUMENT & HIST SHR	35%	2	1
MD	HAMPTON NATIONAL HISTORIC SITE	22%	2	1
MD	MONOCACY NATIONAL BATTLEFIELD	10%	4	3
ME	ACADIA NATIONAL PARK	42%	16	2
MI	ISLE ROYALE NATIONAL PARK	9%	22	18
MI	PICTURED ROCKS NATIONAL LAKESHORE	45%	12	1
MI	SLEEPING BEAR DUNES NATIONAL LAKESHOR	6%	15	13
MN	GRAND PORTAGE NATIONAL MONUMENT	4%	3	3
MN	MISSISSIPPI NATL RIVER & REC AREA	12%	7	5
MN	PIPESTONE NATIONAL MONUMENT	6%	4	4
MN	VOYAGEURS NATIONAL PARK	20%	16	10
MO	GEORGE WASHINGTON CARVER NM	14%	4	3
MO	HARRY S TRUMAN NATIONAL HISTORIC SITE	10%	1	1
MO	JEFFERSON NATIONAL EXPANSION MEM NHS	33%	2	1
MO	OZARK NATIONAL SCENIC RIVERWAYS	16%	19	13
MO	WILSON'S CREEK NATIONAL BATTLEFIELD	28%	5	2
MS	NATCHEZ NATIONAL HISTORICAL PARK	0%	3	3
MS	NATCHEZ TRACE PARKWAY	11%	23	18
MS	VICKSBURG NATIONAL MILITARY PARK	4%	4	4
MT	BIGHORN CANYON NATIONAL RECREATION AR	13%	14	10

NATIONAL PARK SERVICE
NATURAL RESOURCES MANAGEMENT STAFFING NEEDS
NR-MAP 1994

ST	PARK AREA	CURRENT PERCENT FUNDED	TOTAL FTE'S AT 50% LEVEL	FTE'S TO REACH 50% LEVEL
MT	GLACIER NATIONAL PARK	41%	24	4
MT	GRANT-KOHRS RANCH NATIONAL HISTORIC SI	16%	5	4
NC	BLUE RIDGE PARKWAY	10%	23	19
NC	CAPE HATTERAS NATIONAL SEASHORE	21%	11	7
NC	CAPE LOOKOUT NATIONAL SEASHORE	18%	7	5
NC	CARL SANDBURG HOME NHS	18%	2	1
NC	FORT RALEIGH NATIONAL HISTORIC SITE	7%	1	1
NC	GUILFORD COURTHOUSE NMP	45%	4	0
NC	KINGS MOUNTAIN NATIONAL MILITARY PARK	12%	3	3
NC	MOORES CREEK NATIONAL BATTLEFIELD	9%	3	3
ND	FORT UNION TRADING POST NHS	25%	2	1
ND	KNIFE RIVER INDIAN VILLAGE NHS	8%	8	7
ND	THEODORE ROOSEVELT NATIONAL PARK	29%	20	9
NE	AGATE FOSSIL BEDS NATIONAL MONUMENT	12%	5	4
NE	BROWN V. BOARD OF EDUCATION NHS	0%	1	1
NE	HOMESTEAD NATIONAL MONUMENT OF AMERI	47%	3	0
NE	NIOBRARA/MISSOURI NATIONAL RIVERWAYS	82%	3	-2
NE	SCOTTS BLUFF NATIONAL MONUMENT	4%	6	5
NH	SAINT-GAUDENS NATIONAL HISTORIC SITE	11%	3	3
NJ	MORRISTOWN NATIONAL HISTORICAL PARK	14%	3	2
NM	AZTEC RUINS NATIONAL MONUMENT	5%	2	2
NM	BANDELIER NATIONAL MONUMENT	26%	16	8
NM	CAPULIN VOLCANO NATIONAL MONUMENT	45%	3	0
NM	CARLSBAD CAVERNS NATIONAL PARK	18%	17	10
NM	CHACO CULTURE NATIONAL HISTORICAL PARK	14%	7	5
NM	EL MALPAIS NATIONAL MONUMENT	5%	17	15
NM	EL MORRO NATIONAL MONUMENT	9%	4	3
NM	FORT UNION NATIONAL MONUMENT	6%	2	1
NM	GILA CLIFF DWELLINGS NATIONAL MONUMENT	82%	2	-1
NM	PECOS NATIONAL HISTORICAL PARK	17%	5	3
NM	PETROGLYPH NATIONAL MONUMENT	24%	3	2
NM	SALINAS PUEBLO MISSIONS NATL MONUMENT	9%	3	2
NM	WHITE SANDS NATIONAL MONUMENT	5%	11	10
NV	GREAT BASIN NATIONAL PARK	20%	12	7
NV	LAKE MEAD NATIONAL RECREATION AREA	38%	24	6
NY	FIRE ISLAND NATIONAL SEASHORE	15%	12	8
NY	GATEWAY NATIONAL RECREATION AREA	61%	16	-3
NY	MARTIN VAN BUREN NATIONAL HISTORIC SITE	0%	1	1
NY	ROOSEVELT-VANDERBILT HEADQUARTERS	13%	5	3
NY	SAGAMORE HILL NATIONAL HISTORIC SITE	0%	2	2
NY	SARATOGA NATIONAL HISTORICAL PARK	14%	8	6
NY	STATUE OF LIBERTY NATIONAL MONUMENT	39%	3	1
NY	UPPER DELAWARE SCENIC & REC RIVER	62%	6	-1
OH	CUYAHOGA VALLEY NATIONAL RECREATION A	5%	14	13
OH	DAYTON AVIATION HERITAGE NHP	0%	1	1
OH	HOPEWELL CULTURE NATL HISTORICAL PARK	19%	4	2

NATIONAL PARK SERVICE
NATURAL RESOURCES MANAGEMENT STAFFING NEEDS
NR-MAP 1994

ST	PARK AREA	CURRENT PERCENT FUNDED	TOTAL FTE'S AT 50% LEVEL	FTE'S TO REACH 50% LEVEL
OH	PERRY'S VICTORY & INTERNATL PEACE MEM	6%	1	1
OH	WILLIAM HOWARD TAFT NHS	10%	1	1
OK	CHICKASAW NATIONAL RECREATION AREA	19%	8	5
OR	CRATER LAKE NATIONAL PARK	28%	17	8
OR	FORT CLATSOP NATIONAL MEMORIAL	30%	5	2
OR	JOHN DAY FOSSIL BEDS NATIONAL MONUMEN	20%	11	6
OR	OREGON CAVES NATIONAL MONUMENT	11%	7	5
PA	ALLEGHENY PORTAGE RAILROAD NHS	25%	5	3
PA	DELAWARE WATER GAP NAT RECREATION ARE	21%	21	13
PA	FORT NECESSITY NATIONAL BATTLEFIELD	27%	6	3
PA	FRIENDSHIP HILL NATIONAL HISTORIC SITE	26%	5	2
PA	GETTYSBURG NATIONAL MILITARY PARK	19%	7	4
PA	HOPEWELL FURNACE NATIONAL HISTORIC SIT	9%	4	3
PA	INDEPENDENCE NATIONAL HISTORICAL PARK	33%	2	1
PA	JOHNSTOWN FLOOD NATIONAL MEMORIAL	51%	3	-0
PA	STEAMTOWN NATIONAL HISTORIC SITE	42%	2	0
PA	VALLEY FORGE NATIONAL HISTORICAL PARK	9%	9	7
PR	SAN JUAN NATIONAL HISTORIC SITE	0%	3	3
SC	CHARLES PINCKNEY NATIONAL HISTORIC SITE	6%	1	1
SC	CONGAREE SWAMP NATIONAL MONUMENT	13%	10	7
SC	COWPENS NATIONAL BATTLEFIELD	3%	2	2
SC	FORT SUMTER NATIONAL MONUMENT	11%	3	2
SD	BADLANDS NATIONAL PARK	23%	21	11
SD	JEWEL CAVE NATIONAL MONUMENT	23%	5	3
SD	MOUNT RUSHMORE NATIONAL MEMORIAL	20%	4	2
SD	WIND CAVE NATIONAL PARK	24%	13	7
TN	ANDREW JOHNSON NATIONAL HISTORIC SITE	1%	1	1
TN	BIG SOUTH FORK NATIONAL RIV & RECR AREA	45%	20	2
TN	FORT DONELSON NATIONAL BATTLEFIELD	17%	3	2
TN	GREAT SMOKY MOUNTAINS NATIONAL PARK	83%	32	-21
TN	OBED WILD & SCENIC RIVER	9%	6	5
TN	SHILOH NATIONAL MILITARY PARK	10%	5	4
TN	STONES RIVER NATIONAL BATTLEFIELD	8%	4	3
TX	AMISTAD NATIONAL RECREATION AREA	2%	14	14
TX	BIG BEND NATIONAL PARK	13%	22	17
TX	BIG THICKET NATIONAL PRESERVE	22%	24	13
TX	FORT DAVIS NATIONAL HISTORIC SITE	0%	3	3
TX	GUADALUPE MOUNTAINS NATIONAL PARK	5%	16	15
TX	LAKE MEREDITH NATIONAL RECREATION AREA	6%	10	9
TX	LYNDON B JOHNSON NHP	33%	3	1
TX	PADRE ISLAND NATIONAL SEASHORE	36%	17	5
TX	PALO ALTO BATTLEFIELD NHS	7%	3	3
TX	SAN ANTONIO MISSIONS NATL HIST PARK	5%	4	4
UT	ARCHES NATIONAL PARK	16%	9	6
UT	BRYCE CANYON NATIONAL PARK	36%	12	3
UT	CANYONLANDS NATIONAL PARK	44%	18	2

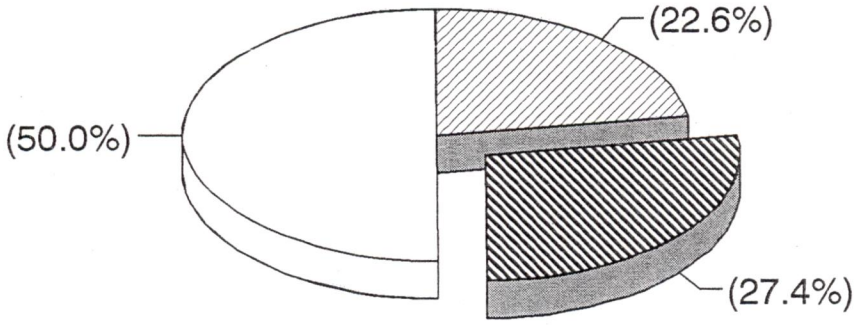
NATIONAL PARK SERVICE
NATURAL RESOURCES MANAGEMENT STAFFING NEEDS
NR-MAP 1994

ST	PARK AREA	CURRENT PERCENT FUNDED	TOTAL FTE'S AT 50% LEVEL	FTE'S TO REACH 50% LEVEL
UT	CAPITOL REEF NATIONAL PARK	36%	15	4
UT	CEDAR BREAKS NATIONAL MONUMENT	7%	4	3
UT	NATURAL BRIDGES NATIONAL MONUMENT	19%	4	3
UT	TIMPANOGOS CAVE NATIONAL MONUMENT	18%	4	3
UT	ZION NATIONAL PARK	16%	18	12
VA	APPOMATTOX COURT HOUSE NHP	11%	4	3
VA	BOOKER T. WASHINGTON NATIONAL MONUME	2%	4	3
VA	COLONIAL NATIONAL HISTORICAL PARK	41%	11	2
VA	FREDERICKSBURG & SPOTSYLVANIA NMP	14%	12	9
VA	GEORGE WASHINGTON BIRTHPLACE NAT MON	7%	4	4
VA	GEORGE WASHINGTON MEMORIAL PARKWAY	9%	12	10
VA	MAGGIE WALKER NATIONAL HISTORIC SITE	7%	1	1
VA	MANASSAS NATIONAL BATTLEFIELD PARK	4%	12	11
VA	PETERSBURG NATIONAL BATTLEFIELD	37%	4	1
VA	PRINCE WILLIAM FOREST PARK	14%	11	8
VA	RICHMOND NATIONAL BATTLEFIELD PARK	16%	5	3
VA	SHENANDOAH NATIONAL PARK	42%	22	4
VA	THOMAS STONE NATIONAL HISTORIC SITE	24%	2	1
VA	WOLF TRAP FARM PARK	6%	3	2
VI	BUCK ISLAND REEF NATIONAL MONUMENT	26%	3	2
VI	VIRGIN ISLANDS NATIONAL PARK	20%	14	8
WA	COULEE DAM NATIONAL RECREATION AREA	21%	19	11
WA	FORT VANCOUVER NATIONAL HISTORIC SITE	26%	2	1
WA	KLONDIKE GOLD RUSH NHP - SEATTLE UNIT	0%	1	1
WA	MOUNT RAINIER NATIONAL PARK	31%	19	7
WA	NORTH CASCADES NATIONAL PARK	28%	29	13
WA	OLYMPIC NATIONAL PARK	16%	33	23
WA	SAN JUAN ISLAND NATIONAL HISTORICAL PAR	12%	5	4
WA	WHITMAN MISSION NATIONAL HISTORIC SITE	7%	4	3
WI	APOSTLE ISLANDS NATIONAL LAKESHORE	25%	11	5
WI	SAINT CROIX NATIONAL SCENIC RIVERWAY	34%	12	4
WV	HARPERS FERRY NATIONAL HISTORICAL PARK	10%	5	4
WV	NEW RIVER GORGE NATIONAL RIVER	29%	17	7
WY	DEVILS TOWER NATIONAL MONUMENT	19%	8	5
WY	FORT LARAMIE NATIONAL HISTORIC SITE	0%	5	5
WY	FOSSIL BUTTE NATIONAL MONUMENT	19%	6	3
WY	GRAND TETON NATIONAL PARK	41%	25	4
WY	YELLOWSTONE NATIONAL PARK	54%	34	-3

NATIONAL PARK SERVICE
NATURAL RESOURCES MANAGEMENT

STAFFING NEEDS

NR-MAP -- 1994



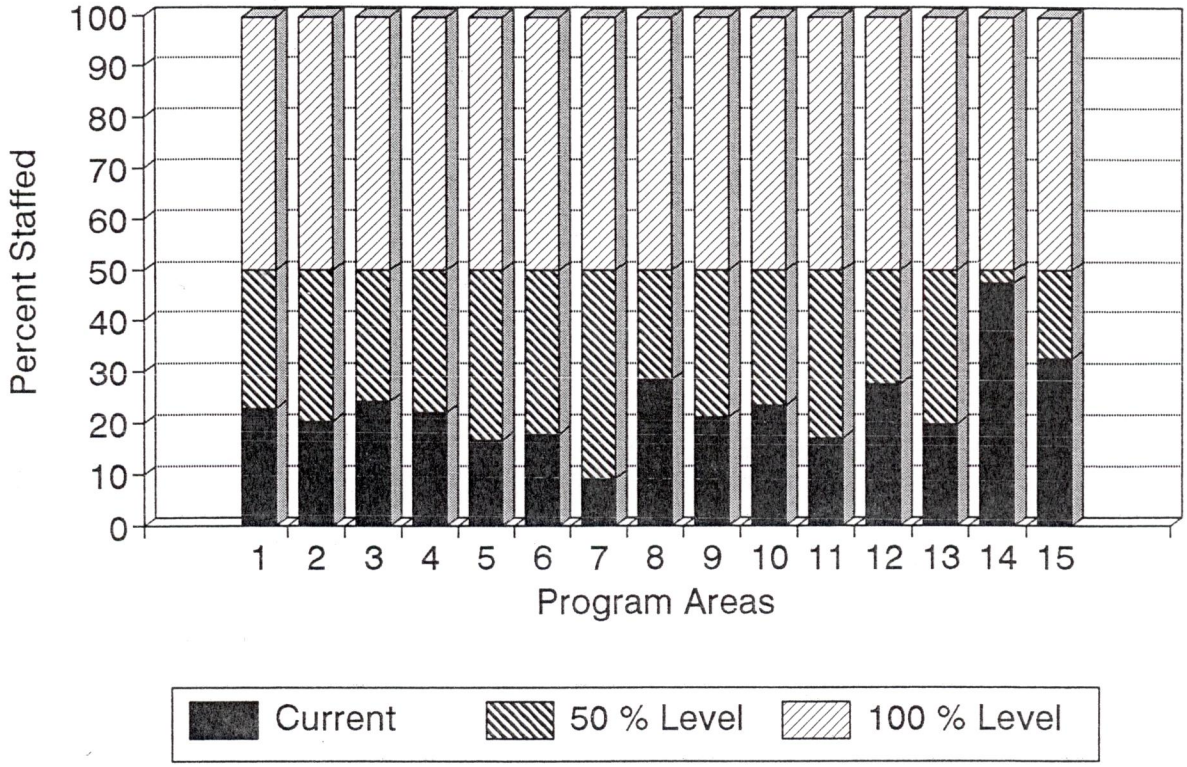
CURRENT LEVEL

ADDITIONAL STAFF NEEDED TO REACH 50% LEVEL

Figure 1

NATIONAL PARK SERVICE
NATURAL RESOURCES MANAGEMENT

STAFFING NEEDS (NR-MAP -- 1994)



1 VEGETATION
2 WILDLIFE
3 PRESCRIBED FIRE
4 WATER
5 AIR
6 GEOLOGIC
7 PALEONTOLOGICAL
8 GRAZING
9 FENCE MAINTENANCE
10 REHABILITATION OF DISTURBED AREAS
11 PEST & HAZARD MANAGEMENT
12 ENVIRONMENTAL PLANNING
13 GIS/DATA MANAGEMENT & COLLECTIONS
14 INTERPRETATION OF NATURAL RESOURCE ISSUES
15 SCIENCE CONSULTATION & OVERSIGHT

Figure 2

Appendix A

Table 1 and Figures 1 and 2

Appendix B

Key Individuals Who Contributed to the Development and Implementation of NR-MAP

ASSESSMENT TOOL REQUESTED BY:

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Jack Davis, Superintendent, Grand Canyon
Bill Ehorn, Superintendent, Redwood
Mike Finley, Superintendent, Yosemite
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Debbie Sanders, Publications Specialist, Shenandoah
Jay Goldsmith, Natural Resource Management Specialist, Western Region
John Dennis, Acting Deputy Associate Director, Natural Resources