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Memorandum

To: Associate Director, Natural Resources

From: Acting Regional Director, North Atlantic Region

Subject: Cooperative Park Studies Units in the National Park Service: Consensus of the Regional Chief Scientists

We are pleased to forward the attached analysis which was initiated by the Regional Chief Scientists Servicewide.

We believe the topic and recommendations will be useful to the Service and transmit them to you for appropriate distribution and use. Questions related to the text should be directed to our Regional Chief Scientist, Michael Soukup, who chaired the subcommittee (which also included CPSU leaders and Washington participants).

Our region has been pleased to support this effort on behalf of the science needs of the Service.

Steven H. Lewis

Enclosure

cc:
Regional Scientists

bcc:
R. Sellars, GRTE
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COOPERATIVE PARK STUDIES UNITS IN THE NATIONAL PARK SERVICE: CONSENSUS OF THE REGIONAL CHIEF SCIENTISTS

Prepared by

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U. S. Department of the Interior
National Park Service
North Atlantic Region

I. INTRODUCTION

Not only is the mandate of the National Park Service one of the great contributions to world culture, it is becoming apparent that it is a task of unforeseen technical challenge. Preserving natural systems "unimpaired for future generations" is an extremely engaging concept, yet effecting its achievement in this era of human impact involves difficulties that could not have been foreseen or understood in 1916.

Role of Science and the Need for Research

The pervasive changes accompanying human technology are crossing all boundaries, and National Parks will reflect in some measure these changes. Sorting the induced from natural changes requires an understanding of both. Understanding and resisting human-induced changes will be an increasing future role of the park manager. This will require competent acquisition, handling, and implementation of new information.

We must adequately and systematically define the natural systems we manage, both in form and function over time; we must understand the system's vulnerabilities to the kinds of use and disturbance regimes that will be inflicted. We must develop valid measures of our success in preserving them.

Because many systems entrusted to the National Park Service are already impaired or seriously threatened, we must develop appropriate and precise restoration programs. Yet the level of knowledge necessary for restoration and active impact mitigation--without incurring additional harm--is even higher, and often presently nonexistent.

Thus, providing technical support powerful enough to preserve our resources amid local, continental and global-scale developments must become an overriding priority. Management's need for information will become more and more apparent, as it has in this decade, eventually forcing the Service to provide for a stronger source of scientific support.

The need for a better, higher level of support, we believe, cannot be logically denied or indefinitely postponed in favor of other priorities, however pressing. What can be argued is the nature and organization, and operational attainment of this support. Recent and ongoing evaluations of the Service's science effort (Lemons 1986; Pring 1986; Chase 1987; NPCA 1988; Pritchard 1988;) suggest that now is an appropriate time to examine the overall nature of science support necessary for the future. This paper discusses one source of technical support among the available array: The role that Cooperative Park Studies Units, and the use of cooperative agreements in general, can play in successful management of our natural resources in the future.

Present Sources of Science Support

It is important to first recognize and emphasize the array of sources available for science support. Depending upon the precise nature of the

research needed and the role of Service personnel, the available array includes Service scientists (who may be located in parks, regional offices, Washington, or at Universities or other agencies), and scientists in other agencies, from private firms, or from Universities. Non-Service scientists are reachable by various mechanisms ranging from inter- and intra-regional cooperation, inter-agency assistance (either informally or through Memoranda of Understanding), by Schedule A appointment, by contract or purchase order, by cooperative agreement, or other means (including volunteerism). Through the services of the Contracting Officer, each of these sources is now actively and appropriately used and should remain available in the future. Flexibility can only enhance effective use of limited resources.

However, one source permits an extraordinary opportunity to augment the Service's scientists, resource managers, and resource management-assigned staff effectively, by capitalizing upon the undeniable attraction and advantages that parks present for research relevant to the public good. As discussed below, cooperative agreements allow cooperative approaches in support of park resources, joining the nation's education establishment with the nation's most precious and complex laboratories (Wink 1988). The vast resources of universities--resources the Service can not likely ever match--can be brought to bear on park management problems. With establishment of the Cooperative Park Studies Unit these resources become available and a strong alliance for mutual advantage is forged.

II. PRESENT STRUCTURE AND FUNCTION OF CPSU'S

Reflecting resourcefulness and opportunism more than strategic design, the Service has developed a substantial and unique network of cooperative agreements and CPSUs. We define a CPSU as a cooperative agreement-based arrangement which includes the presence of Service staff at the University, as active members of the University community, or a University coordinator whose salary is at least one-quarter reimbursed by NPS. To our knowledge these Units are unlike those of any other agency anywhere. Below we describe their history, how the successful CPSU generally functions, and the present array of CPSUs (Table I). We then present a plan for the future role and the optimal network of Cooperative Park Studies Units. An earlier summary of the CPSU function in the NPS can be found in Agee et al. (1982; see also Tobin, 1983).

History of CPSU Development in the Service

The earliest indication of the concept in the National Park Service apparently stems from testimony by James Bethel, Dean of the College of Forestry Resources (University of Washington) before Senator Henry Jackson's hearings on the establishment of North Cascades National Park in 1967-8. The theme stated by Dean Bethel was that it was up to the Service to decide what was to be done with the land, not the University, but then the University could advise on how it could be accomplished. Senator Jackson suggested that some means of such cooperation ought to be pursued and this resulted in a Memorandum of Understanding establishing the first unit in 1970 at the University of Washington (Agee, pers. comm., 1988).

The concept has grown substantially with each Region taking a different

approach, responding according to many factors such as number of scientists in parks, number of parks, geographical constraints, etc. Early leaders in this development were the Pacific Northwest and Western Regions, with the Southwest, Southeast and Midwest Regions also developing units (see Table I). Multi-regional CPSUs have also been executed with the most ambitious being established for the eastern barrier island/coastal parks by the NAR, MAR and SER at Rutgers University in 1983.

The Advent of NPS-20

Early use of CPSUs was severely constricted by the lack of a standard means to obligate Service operating funds for work under the various Memoranda of Agreements, Understanding, etc. However, with the passage of the Federal Grant and Cooperative Agreement Act of 1977 (which was re-defined by P. L. 97-258 and re-codified as 31 USC 63) the appropriate use of grant, cooperative agreement and procurement instruments, has been characterized and the Service has been given "discretion in its choice of the appropriate instrument" when the particular situation or project is difficult to determine (NPS, 1986).

As with most new endeavors, the early execution of Cooperative Agreements under NPS-20 was not greeted without apprehension. Early versions were cast in the language and protocol of procurement contracts (with emphasis on precise scopes of work, product delivery and payment schedules, etc.), which are more familiar to Contracting Officers and others charged with safeguarding against "giving away the store." Not surprisingly, many of these early agreements have been criticized as appearing to be more appropriately contracts (NPS 1986b). These concerns were superseded by concerns that, rather than "giving away the store," the relationship was more often solely for the benefit of the Service, and that the patron-partner aspect of P. L. 97-258 was unfulfilled. Another general and serious concern is the potential misuse of the cooperative agreement as a means to avoid competitive procurement regulations. This concern has led to a solicitor approval requirement for each CA transaction (NPS, 1986b).

Notwithstanding these initial difficulties in executing Cooperative Agreements, the need and the legal foundation for their sound application exist (see Dembling 1987). Thus, it becomes a matter of careful selection of cooperative opportunities, straightforward intent, and positive effort from the Program Manager and Contracting Officer to effect them for the benefit of the Service and its resources.

Aspects of Appropriate Use of Cooperative Agreements for Scientific Support

Fenn (1988) has recently evaluated the concerns cited above and has described the conditions and criteria for appropriate use of Cooperative Agreements. Briefly, the use of Cooperative Agreements is prescibed when:

1) the principal purpose of the relationship is to transfer a thing of value [including money, property, services] to the State, local government, or other recipient to carry out a public purpose of support or stimulation

authorized by a law of the United States instead of acquiring (by purchase, lease, or barter) property or services for the direct benefit or use of the United States Government; and

2) substantial involvement is expected between the executive agency and the State, local government, or other recipient when carrying out the activity contemplated in the agreement (NPS 1986).

These two conditions fit "hand in glove" with the needs of the Service for stronger scientific support. It is a means of leveraging the small number of Service scientists into large research teams with extraordinary support structures already in place. Laboratories, libraries, computer facilities, and students are thereby reachable in an interactive and mutual arrangement.

The Service can provide financial support as Graduate Assistantships, summer and part-time salaries, etc., to further educational opportunities in natural science research; it can provide equipment and logistical support such as onsite workspace, accommodations and access to hard to reach or restricted natural areas--all things of unique value to stimulate advances for the public good. Such opportunities have lasting implications.

Solutions to park problems often have general application to other park systems both in this country and abroad. The production of masters and doctoral theses expands the reach of basic knowledge--unarguably for the common good. Much of the university-generated research becomes part of the peer-reviewed literature of the appropriate profession, and often the popular literature for the general public as well. There can be little question that cooperatively-forged solutions to problems facing the preservation of the Nation's finest resources is an appropriate public purpose, and for the common good.

The Service can provide scientists who contribute as part of a team research effort, enhancing their professional performance and development while ensuring Service-relevant research programs and results. The Service can also provide the participation of its park-based resource managers and rangers (especially those with collateral duties in resource management).

An added benefit accrues when park employees participate in the gathering and evaluation of field data. These employees are more likely to understand, support, and use research results. At its highest return, these employees use their research participation towards master's and doctoral requirements, and this has already occurred. This enhances the caliber of our technical staff and gives career opportunities which are relatively limitless.

The CPSU Approach

An effective form of cooperative involvement is the establishment of a Cooperative Park Studies Unit. With Service presence on campus, the opportunities for interaction and exchange are equally limitless. Service scientists lead seminar courses which focus on park problems and solutions. Participation on graduate committees can encourage a park application of new

information as it is being generated. New developments are constantly circulated keeping the Service scientist constantly awash in the evolving tenets of his/her profession. Study sites for projects funded from other sources can be steered to parks which derive at least inventory data and usually more. Service scientists receive recognition and status from their peers, an important advantage when the Service must speak out on controversial issues. The CPSU scientist can learn the university environment and become a broker, efficiently matching NPS problems with university experts for Service and University advantage.

The Current CPSU Model

A successful CPSU currently performs three major functions. The first is a research function, where original research is funded and conducted in NPS areas serviced by the Unit. These research functions are accomplished by NPS scientists stationed at the University and/or university scientists via a research plan. A research project must be tied to a park Resource Management Plan and forwarded to the Regional Chief Scientist, who prioritizes a regionwide program. To initiate research appropriate for a cooperative approach, including university-based teams of NPS and university scientists, or university scientists and park-based scientists or other park staff, the regional program manager invites proposals (by Request for Proposal (or RFP)) from a CPSU through the Unit Leader. After review and joint development and refinement of the proposal, a Work Order or Modification (or "Supplement" in MAR) to the Cooperative Agreement is reviewed by the Regional Solicitor and executed by the Contract Officer. The role and participation of the park must be well-defined in advance and approved by the Superintendent before review by the Regional Solicitor.

The CPSU scientist usually optimizes the research yield by being an advisor of a number of graduate student research efforts.

The second function is a research administration function, which includes the successful initiation of a research project (roughly as above) where the Unit Leader assists parks and the region with the full process of research problem identification, proposal solicitation and development, and proposal evaluation and award. He/she then provides the Contracting Officer's Representative (COR, =GTR, =COTR) function to assure successful progress, completion, technical report publication and distribution. He/she can ensure that pre- and post- project presentations are provided and that Interpretation is aware and optimally a part of the effort. The third is an extension function, where the Unit Leader assists parks with routine consultation using expertise available on campus, and also assists parks (particularly the smaller parks) with revisions of their Resource Management Plans, etc.

A successful CPSU will have fully developed skills in all the above functions. Staffing must be carefully crafted to fit work load (number of parks and projects) and relative proportion of the above functions. In a large program the Unit Leader can be most effective for the broadest array of parks when the position is designed as a science administration position (with the option for designation as Research Grant Grade Evaluation).

If the Unit Leader is also functioning as a Research Grade Evaluation

scientist, then care must be taken by both the scientist and the Service so that neither are disappointed with the results. In a large program it may be simply too much to expect a unit leader to provide technical support to numerous parks and also conduct a full scale personal research simultaneously; factors such as the scientist's field of research, recent research regime, etc. will be important, as well as good supervision of that position. Notwithstanding this concern, there is strong sentiment that continued involvement in research lends credibility and status among academic peers, and each individual opportunity should be examined closely to accomodate this.

The staff of a successful CPSU must spend considerable time in the parks it serves. Above all the CPSU staff must be, and visibly so, responsive. The most likely source of dissatisfaction with a CPSU is that it is too detached and unresponsive. The more familiar the Unit Leader and staff are with park resource problems the more effective the CPSU can be in helping solve problems. Furthermore, it is important to have superintendents visit the CPSU at least once a year. Such meetings lead to a greater understanding of the resources at hand to help solve the problems he/she faces.

A model CPSU will be one in which the parks it serves understand that the unit is not just a research tool limited to natural science. The Agreement underlying the unit is mutual partnership with the entire university. Therefore, when the park superintendent needs advice, counsel, or research in areas such as sociology, anthropology, history, engineering, water resources, geology, etc., the CPSU can be called upon to assist in locating the needed research team. The model CPSU of the future could be much more useful (see later sections).

Finally, the unit staff of a successful CPSU should be involved with the teaching activities of the university. The appropriate level, as with all duties assigned, is controlled by the position supervisor--usually the Regional Chief Scientist. Supervisors usually favor some level of this involvement because it provides the NPS needed exposure within the academic community; more important, the university and the students benefit from this aspect of the patron function because of the "real world" perspective of the Service scientist. Part of this aspect of promoting the public good through park-related education is the impact and constituency-building associated with real lessons on park operations and resources. The quality of education students receive can be significantly enhanced by a unit leader teaching a class one semester per year and exposing students to NPS philosophy. A seminar offers the most efficient opportunity for addressing park issues (Schonewald-Cox, pers. comm. 1988). There are also opportunities to interest students, and especially to reach minority and women candidates, regarding career choices. Similarly, anyone who has ever taught realizes that lessons are learned more intensely by the teacher than by the student, and the rigor of college-level teaching benefits the Service employee and the Service at the same time.

It is important not to underestimate the importance of reaching students with the Service philosophy and the reality of striving to preserve in an era of consumption and modification. Students exposed to this struggle become supporters. Students involved in research in a park remain

interested in that park and its problems for life, and often become the research experts of the future. Access to students is one of the great advantages of the CPSU. This investment will bring far-reaching returns for parks and for the public good.

The Present Array of CPSUs

The present system includes CPSUs established for research in the biological, physical and social sciences. They are established by cooperative agreements (which may follow competition between institutions). The formal signatories are usually the Regional Office (Director, Contracting Officer and Chief Scientist) and the host institution (research or administrative vice president). In a few cases the NPS originating office may be the Washington Office (Colorado State Univ.) or park (Great Smokies/Univ. of Tennessee). Below the level of the signatories there is usually a Unit Leader representing the NPS at the institution and an institutional liason with the unit, usually a department chair, or Dean.

During FY88 there were 16 functioning CPSUs with staff duty-stationed at the host institution. Additionally, there were about 15 Cooperative Agreements functioning without NPS staffing (State Univ. of New York, Univ. of Vermont, Univ. of Massachusetts, Univ. of Maine, College of the Atlantic, Dartmouth, Univ. of Wisconsin, Univ. of Northern Michigan, Univ. of Minnesota, Georgia State University, Southern Illinois Univ., Iowa State Univ., Ohio State University, North Carolina State, Western Carolina University, Florida State University, University of Florida, Fairleigh Dickinson University--West Indies Laboratory, Eastern Kentucky University, Virginia Polytechnic University, University of South Carolina, Western Kentucky University, and Wake Forest). North Carolina State has a UGA post-doc (paid by NPS) as Unit Leader, as an experiment. One in the Western Region has been established at Humboldt State University by Redwood NP. Cooperative agreements, without NPS staffing are frequently established to accommodate cooperative research programs on a small scale while permiting NPS scientists access to institutional resources, including graduate students without encumbering annual staffing and support costs.

Cooperative Park Studies Units have one or more NPS scientists and sometime clerical/administrative support. Usually the scientist is designated the Unit Leader. The Unit Leaders are usually permanent NPS scientists or science administrators with duty station at the host institution. In a few cases the Unit Leader is a faculty member at the host institution whose salary is reimbursed, in part, by the NPS (Hawaii, 0.66 time; Wyoming, 0.25; Clemson, 0.42). The Unit Leaders (if NPS scientists) are usually supervised by their Regional Chief Scientist except at Colorado State Univ. (supervised by Chief, Water Resources Division, WASO), at Univ. of Tennessee (supervised by Superintendent, GRSM), and at Penn. State Univ. (where the Unit "Director" is the Regional Chief Scientist).

In some units the Unit Leader directly supervises other scientists stationed at the university (California, Arizona). In the Pacific Northwest Region, there are no formally designated Unit Leaders for three CPSUs (Washington, Oregon, Idaho). The scientists stationed at those CPSU's are called Project Leaders and do not supervise other NPS scientists stationed at their host

institution. In the Western Region, the California Unit Leader supervises two research scientists and an ecologist duty-stationed at the CPSU, and six scientists stationed at parks in California, who are associated with the CPSU. The latter have Research Associate appointments with library privileges. In Hawaii, two park scientists have a similar relationships with the CPSU.

Where the Unit Leader is a university employee (with some salary from NPS), NPS scientists stationed at the institution (Hawaii, Clemson) are supervised by the Regional Chief Scientist. University scientists carrying out research for the Service are supervised by institutional supervisors. Their performance is guided by the terms of the cooperative agreement or by sub-agreements covering their project(s). The clerical and administrative employees at the CPSU are usually employees of the host institution whose salaries are reimbursed in full or in part by the NPS. These employees are given their daily work direction by the Unit Leader but their supervision is given by the host institution.

Almost all of the staffed CPSUs conduct research through NPS scientists or institutional scientists. Some CPSU's also administer research carried out by researchers at the host institutions or other institutions (Arizona, California, Hawaii, Nevada (Las Vegas), Wyoming, Rutgers.) This is usually in a support role with the appropriate regional office. Two CPSUs, however, primarily house research administrators (Texas A & M, Penn State University) who essentially oversee research projects (under sub-agreements to the Cooperative Agreement) with the host institution or other institutions in cooperation with their regional office science and contracting office staff.

Most institutional cooperators provide space, computer and library access and utilities. The NPS usually pays for secretarial assistance, supplies and telephone service. Only the Wyoming CPSU receives a direct financial contribution for research from the state of the host institution, although many provide reductions in overhead costs, etc., as part of the cooperative program. The NPS often supports graduate student research under the direction or co-direction of the NPS scientist, and the NPS scientists may advise students and teach seminars. They usually receive adjunct appointments with computer and library privileges.

Some CPSUs seek or accept funding from non-NPS sources for a substantial portion of their research (Georgia, Hawaii, Clemson). Some, for example Rutgers and Michigan Technological Univ., carry out work for several regions in coastal and aquatic subject areas, respectively. The CPSU at Colorado State Univ. conducts a program of water quality investigations as part of the Water Resources Division, WASO. The Wyoming CPSU maintains and operates a research center at Grand Teton NP and pays the salary for a caretaker.

The CPSU established for the Barrier Island Initiative has been re-competed in 1989 and re-designed. The second phase will be expanded to a center in the northeast to service coastal parks from ASIS north to ACAD and one or two centers will be developed in the SER to provide service primarily to SER and possibly PAIS. Expertise from all centers will be available to all parks covered under the Initiative. As in Phase I, extension services for particular areas of interest (for example, coastal erosion, Lyme disease etiology) will be available on request to any unit of the Service.

As is apparent, the current network arose in the regions out of the practical needs of local parks, and has evolved as this need changes, and with the success or failure of the individual CPSU units. Few current units have more than one or two Service scientists. With large research programs, there is merit in a staff arrangement similar to the California/Davis unit, especially with a science administrator acting as a "broker" and Unit Leader.

With a 5-year span and 5-year renewal option for Cooperative Agreements, there are appropriate decision points so that units that do not produce or fail to meet the mutual expectations can be discontinued, moved or re-staffed. Management review, as with all positions and programs, is essential. In most regions new units will be created largely on "range of expertise available" and "proximity to parks criteria." Although each region's network of CPSU's will continue to be different, this is not a disadvantage. Diversity here reflects tailoring to the striking differences between the regions and their resources, and a dash of entrepreneurial spirit. The consensus among us is that this works and should be supported and expanded, as proposed below.

IV. FUTURE APPROACHES

Recognizing the need for greater technical strength, the National Parks and Conservation Association has recommended that the NPS should encourage more research by independent researchers, should enlarge the CPSU system, and should establish technical research centers--noting that they should be multi-agency and could also serve as continuing education and training centers for scientists, resource management specialists and park managers. Such Centers have been encouraged by the President in 1987, by NSF in its recent funding initiatives, by the Director, and by many of the Regional Directors at their recent meeting in the Everglades (January 1988) as a means of meeting future technical challenges. Based on our experience the following is our attempt to answer: What is the ideal system of increased scientific support for parks?

In designing a system for the Service, it is important to recognize that there are different levels of research needs (and to recognize that we are not now meeting all levels). One differentiation of levels (Hester, pers. comm., 1988) will illustrate:

> Park Specific--It can't be done elsewhere; e.g., Yellowstone Grizzly bear. It must be done there, and can't be done elsewhere.
>
> Biome/Biotic Province--Research on prairie ecosystems, for example. The role of fire; methods of vegetation restoration, etc. It can be done in one place and have general applicability through the biome.
>
> National--Studies of what is happening nationwide, especially in our 350+ NPS units. What effects are our policies having across system on species changes, for example. To some extent this can the synthesis of many park-specific or biome studies. Some, however, may need to be those like the Newmark study (Newmark 1987; see also Quinn et al.) of what is happening to populations across the entire system, or to parks in general because of the

fundamental nature of parks in a changing environment.

Global--These are the truly international subjects--global warming, ozone depletion, effects of tropical forest destruction on passerine birds, etc.

The design of the optimal science support system depends upon the weight given to each level of research endeavor. Although not without its problems, the Park specific research level is the strong suit of the present science program, partly because all research must be tied to a park resource management plan.

While ensuring that science is directly responsive to park needs this approach also eliminates any means of integration across the biome, national or global level. It explains why a graduate student working independently, as Newmark (1987) did, arrives at startling (but inaccurate; Quinn et al. 1987) conclusions about the effectiveness of parks in protecting species diversity, with no chance for immediate correction from the Service's science establishment. Synthesis research is not being done because no resource management plan-based request is likely to ask questions broader than their own current problems. And, if it did, would not likely compete successfully for funding in the regional science program. Such questions ought to be identified from regional syntheses of their own programs, by WASO synthesis of regional programs, and from the concerns of the Director and Congress (see Hill and Soukup 1987).

Because parks are the fundamental unit of the Service, there will be a natural pyramid of projects and funding, with the large majority of effort at the park level with far smaller programs for the biome, national and global. For the last category especially, much can be drawn from other agencies and research initiatives, but someone in the Service must be analyzing, translating and filling in gaps that are pertinent to the National Park System. We must construct the research aspects of the optimal CPSU network for the future congruent with this pyramid.

As in many cases, there are two levels for discussion: 1) projecting the current level of support and expected slow increases, and 2) designing the optimal system regardless of present practical constraints and past precedent. The latter, of course, is more difficult. In historically under-emphasized and under-funded programs, a tendency forms over time to ask for relief of day-to-day needs--for what might possibly be obtainable--and to lose sight of what is would actually be required to achieve the objective. Preparing for the future is a luxury never considered. We attempt to explore this unfamiliar territory only briefly.

Projecting the Current Approach

Park-specific research

We have only the basis for a well-developed network of regional units that taps the broad spectrum of major universities across the nation with specialties in many of the problem areas pertinent to park managers. Modest increases and changes in regional approaches are gradually adding to this network of units. New units are being established as each Region deems necessary and appropriate to their interests and ability to fully

participate according to the requirements of NPS-20, as amended, and are generally operating as described in the Model Unit section. We believe that there is merit to using unstaffed Cooperative Agreements when small programs can be established with nearby Universities or Colleges in support of parks and park scientists, if regional and park staff can effectively participate without being on the University campus.

Biome/Biotic Province level research

There is some precedent for Units operating at the second tier, with the establishment of the Coastal/Barrier Island Initiative at Rutgers University. That Unit was established to pursue all facets of research and extension services in 6 problem areas (Extra-park interference with shoreline processes, Backbeach and Dune Resource Deterioration, Recreational Use Impacts, Coastal Wildlife Management Problems, Fire suppression Impacts on Vegetation and Fuel Accumulation, Energy Development Impacts). The outcome of the competition was one center which had a slight edge technically and an attractive cost-sharing proposal. The unit and all expenditures were overseen by a Steering Committee of three Regional Chief Scientists, the CPSU Director (NPS), and the Director of the Center for Coastal Studies (faculty member, Rutgers University). Annual reports by the Steering Committee were provided to the Regional Directors of the three regions. The Director (or unit leader) directed overall operations (salary provided by the North Atlantic Region). The Director provided oversight of all expenditures and all research in progress, and carried a full individual research program (50% FTE) as well as serving as major advisor on graduate committees, etc. In restrospect more time must be set aside to provide the information transfer function that should accompany a new initiative. As noted above the level of staffing should be carefully planned according to the intended size of the program and the objectives for the Unit; design of the second phase of the coastal initiative addresses this.

In assessing the first 5 years of this arrangement, some aspects of its operation are relevant here: no one university has all the necessary expertise in a given area of interest. When necessary the Unit was able to direct the University to subcontract funds to other sources for the best available talent, but this is a cumbersome process and not interesting to most universities. The availability of sufficient numbers of graduate students at one university for Service projects throughout a biotic province was another limitation. The logistical and "familiarity" limitations of one center for a large geographical area are also formidable design challenges.

In re-designing and re-competing the second phase, the NAR and the MAR are establishing a Northern Consortium with a lead institution to coordinate with a Southern Consortium in the SER. These units are being developed with Service staff representing a number of disciplines focused upon a central problem area--future coastal resource conflicts. These units will function as a nucleus of subsequently-developed cooperative agreements with a number of universities having expertise in coastal disciplines, advantageous locales, and an interest in cooperative endeavors with the Service. These subsequent cooperative agreements will be executed through the Regional Offices but coordinated in terms of projects and performance by the staff of

the primary Center. The net effect will be a coordinated network of Universities wishing to work coastal problems.

National (or Servicewide) and Global level research

The role of the Associate Director, Natural Resources (WASO) must be primary in oversight of research at the National and Global level. We believe that Servicewide research programs must be developed with a lead role by this office but with regional participation in the identification, prioritization, scoping, and execution of the research. These programs can then be executed by the most advantageous source of expertise, possibly a CPSU or combination of CPSUs.

A well-developed nationwide network of regional CPSU's can be tapped for tackling Servicewide issues. If, for instance, nationwide emphasis was to be placed on ORV impact assessment, there are a number of Service scientists with experience in such studies as well as those knowledgable about the systems potentially impacted. At WASO-lead meetings of Regional Chief Scientists and CPSU leaders, the WASO project leader could select a team of Service and University scientists and programs that wish to participate. The project provides a scope, timetable and funding. Major study components (geophysical/geomorphic, vegetative/zoological, sociological, aesthetic impacts) will require various Units. Experienced Service scientists can be invited to coordinate one or more parts of the project at the field level. The Associate Director, Natural Resources, would negotiate with the appropriate Regional Directors, providing replacement staff when necessary and available.

Efforts at the Regional and Washington level should be made to establish better communications with the "Co-op" Units of USFWS, USFS, USGS (Univ of South Florida, Woods Hole), and the new NSF Science and Technology Centers (ESA 1988). The "nesting" of research centers can be a consideration in establishing new CPSUs, and in assembling the appropriate configuration of researchers. Use of Universities with USFWS and USFS units often allows inclusion under the low overhead rates negotiated for their relatively large programs.

Efforts at the Washington level can also include support for legislation for new approaches to the use of CPSUs (see below).

Driving the Future System

The alternative to projecting the current approach is to consciously and actively design the role and nature of CPSUs of the future. Earlier we stated our belief that preserving natural systems, while prescribing compatible visitor use, and closely monitoring the results, requires a high level of scientific support in a stable, organized framework. We recommend that NPS leadership begin to lay a foundation for a larger presence and role for science in the Service, and actively determine whether a network of CPSUs should be a part of that presence. Then that decision must be effected.

In making that decision the exact role of CPSUs must be clearly defined and understood. There are a number of things that Universities could do in the future:

1. serve as centers of basic and applied research on natural, social, and cultural resource issues; the Service would have a role in supporting University efforts to maintain the quality of these programs and their student's experiences in times of changing emphasis and tight budgets;

2. become focal points for long-term strategic monitoring efforts; the Service would encourage development of appropriate technology and protocols specific to park applications;

3. become focal points for long-term strategic planning efforts that impact policy; the Service woul stimulate involvement by regional planning departments to become involved in NPS issues and programs;

4. serve as sources of trained professionals for the agency's workforce (an important need in the next 5-10 years); the Service would be supporting graduate education in fields of interest to park management;

5. provide an external forum and focus for consensus-building for tackling the more complex issues of the future (e.g., extra-boundary development impacts); the Service would encourage University faculty to focus research efforts in these areas;

6. serve as Training Centers to keep career employees (especially scientists and resource managers) current in new developments; the Service would stimulate University development of courses pertinent to current and potential NPS employees;

7. provide extension services for solving short-term problems with available information; the Service would provide needed interest for continuance of the University's long-term commitment to extension work;

8. be focal points for contact and coordination with state and federal agencies, and for technology transfer to states in areas where NPS leadership is expected (such as recreation, park planning, etc.); the Service would be stimulating a strong alliance for regional approaches to solving problems of a regional nature;

9. be focal points where Service personnel can join with the University community in international programs that create and advise on park management issues worldwide (including management of 'international' migratory species); the Service would be developing a means for addressing problems it cannot reach without new avenues;

10. serve as joint information processing centers and repositories for efficient data retrieval and analysis;

11. become partners in attracting funding and congressional support for new programs related to preservation of park resources.

Some or all of these and other roles are possible for a future University/Service liaison. Some may be suitable for the CPSU network of the future. However, the traditional use of CPSUs, as we have described, has been as research centers in a narrow sub-discipline--a modest utilization of the potential of a well-designed alliance with academe. However we would caution that expansion of CPSU involvement in a less defined role be considered carefully.

An active, planned selection of uses for the future system will determine the criteria (whether subject/discipline-specific, geographical, or political) for the establishment of each CPSU. For example, if CPSUs are to be focal points for liason with state environmental agencies, we would ultimately want to have a CPSU in most states. Pending such decisions most of us would caution that the CPSU concept and terminology not be diluted by careless application.

The question of new legislation is highly pertinent to any discussion of the future. There are many aspects of the present system that are functioning amid constant pressure to increase regulation of cooperative agreements. Presently projects of any size undergo review by Service scientists, park resource managers, Superintendents, Regional Chief Scientists, Regional Cooperative Agreement Coordinators, Regional Contracting staff, RegionalContracting Officers, and Regional Solicitors. Accompanied by multiple, repetitive questionnaires, this process is becoming ever more elaborate and restrictive.

The question of mandatory competition for each amendment of each agreement is now current, notwithstanding that NPS-20 wisely encourages competition. Although competition can be very valuable in identifying the best source of cooperative endeavor, stringent requirements will destroy any stable, coherent program of close cooperation on research initiatives. Legislation to regularize and guarantee this opportunity may be necessary.

V. RECOMMENDATIONS

1.) We recommend that the Congressionally-mandated study of the NPS research program consider the Service's future science needs and make a recommendation regarding the roles that CPSUs should bear.

2.) This Congressionally-mandated study should also review the need for legislation establishing research as a fundamental requirement for the Service's stewardship of its resources. Included in this review should also be the need for legislative authority for the Service to establish, maintain, and operate CPSUs without ambiguity or hindrance.

3.) The current terminology for the use of cooperative agreements for natural resources research units should be regularized. The term CPSU is distinctive and descriptive if used for units largely addressing park-specific level research. The terms "NPS Cooperative Research Unit" for units addressing Biome/Biotic Province level issues and "NPS Center for (Topic) Research" might be adopted for Province/National and Global level research initiatives. There is a precedent for the latter use with the

establishment of the NPS Center for Coastal Research at the Graduate School of Oceanography, Univ. of Rhode Island (as Phase II of the multi-region coastal/barrier island iniative begun in 1983).

The Regional Chief Scientists strongly agree that the the term CPSU and any tiered system worked out for research initiatives at different levels of focus should be used only when career Service science personnel (preferably under Research Grade/Grant Grade Evaluation), or University faculty whose time is donated or reimbursed by the Service, direct the Unit onsite. Other (non-Natural Resource) research, task-specific centers, or cooperative personnel assignments should be differentiated by other terminology.

4.) The National Park Service should compare and where necessary modify its contracting and cooperative agreement guidelines so that they are consistent with those used by other federal agencies. The Service, because of its vast responsibility and relatively small technical program, needs the greatest flexibility, adaptability, and efficiency possible.

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TABLE 1.

The Current Network of Cooperative Park Studies Units in the National Park Service
(S. Veirs, 1988)

REGION	CPSU LOCATION	STATE	PROFESSIONAL STAFF	ACADEMIC APPOINTMENT	RESEARCH PRIORITIES SET BY	MAIN FUNCTIONS
AR	None					
PNR	University of Washington College of Forest Resources Seattle, WA 98195	WA	J. Agee, Project Leader, NPS D. Johnson, Project Leader, NPS	Professor Research Associate	Regional Chief Scientist/ Regional Director	Research, NPS areas in PNR and Alaska (Sociology).
	Oregon State University College of Forestry Oregon State University Corvallis, OR 97331	OR	E. Starkey, Project Leader, NPS G. Larson, Project Leader, NPS	Associate Professor Associate Professor	Regional Chief Scientist/ Regional Director	Research, NPS areas in PNR.
	University of Idaho College of Forestry Moscow, ID 83843	ID	G. Wright, Project Leader, NPS G. Machlis, Project Leader, University (1/2 time)	Associate Professor Associate Professor	Regional Chief Scientist/ Regional Director	Research, NPS areas in PNR and National (visitor services project).
WR	University of Arizona 125 Biological Science (East) Building 43 Tucson, AZ 85721	AZ	D. Fenn, Unit Leader, NPS R. Johnson, Research Scientist, NPS P. Bennett, Research Scientist, NPS	Faculty Adjunct Faculty Adjunct Faculty	Regional Chief Scientist/ Regional Director	Research, NPS areas in Arizona, research administration.
	University of California CPSU/Environmental Studies Davis, CA 95616	CA	S. Veirs, Unit Leader, NPS C. van Riper III, Research Scientist, NPS C. Schonewald-Cox, Research Scientist, NPS T. Stohlgren, Ecologist, NPS	Research Associate Adjunct Faculty Adjunct Faculty Research Associate	Regional Chief Scientist/ Regional Director	Research, NPS areas in California, resource management extension, research administration.

REGION	CPSU LOCATION	STATE	PROFESSIONAL STAFF	ACADEMIC APPOINTMENT	RESEARCH PRIORITIES SET BY	MAIN FUNCTIONS
	University of Hawaii Department of Botany Honolulu, HI 96822	HI	C. Smith, Unit Leader, University (3/4 time) D. Gardner, Research Scientist, NPS	Faculty Adjunct Faculty	Regional Chief Scientist/ Regional Director	Research, NPS areas in Hawaii, resource management extension, research administration.
	University of Nevada Department of Biological Science Las Vegas, NV 89154	NV	C. Douglas, Unit Leader, NPS	Adjunct Faculty	Regional Chief Scientist/ Regional Director	Research, NPS areas in Nevada, and California (DEVA, JOTR).
SWR	Texas A & M University Department of Recreation and Parks College Station, TX 77843	TX	Vacant, Unit Leader, NPS	Adjunct Faculty	Regional Chief Scientist/ Regional Director	Administration of research, NPS areas in Texas.
RMR	University of Wyoming NPS Research Center Box 3166 University Station Laramee, WY 82071	WY	K. Diem, Unit Leader, University (1/4 time)	Faculty	Request for proposals based on Regional and Park project list.	Research, NPS areas in Utah, N. Dakota, S. Dakota, Wyoming, and Montana, research administrati
MWR	Michigan Technological University Houghton, MI 49931	MI	R. Stottlemyer, Research Scientist, NPS	Adjunct Faculty	Regional Chief Scientist/ Regional Director, and outside fund sources.	Research, NPS areas in Midwest Region (ISRO) and nationally, (Biogeochemistry).
NAR	Rutgers University Center for Coastal and Environmental Studies The State University of New Jersey, Doolittle Hall New Brunswick, NJ 08903	NJ	P. Buckley, Director, NPS	Research Faculty	Unit Director and three Regional Chief Scientists/ Regional Directors.	Research, NPS areas in North Atlantic, Mid Atlantic, and Southeast Regions, coastal and environmental studies.

REGION	CPSU LOCATION	STATE	PROFESSIONAL STAFF	ACADEMIC APPOINTMENT	RESEARCH PRIORITIES SET BY	MAIN FUNCTIONS
MAR	PennsylvaniaState University 208 Ferguson Building University Park, PA 16802	PA	J. Karish, Unit Leader, NPS (Regional Chief Scientist)	None	Regional Chief Scientist/ Regional Director	Administration of research NPS areas in Mid Atlantic Region.
SER	University of Tennessee Knoxville, TN 37996	TN	S. Nodvin, Unit Leader, NPS	Adjunct Faculty	GRSM, Region and Special Programs.	Research, Great Smokies N.P. and other NPS areas in Southeast Region.
	Clemson University Parks, Recreation, and Tourism Management 263 Lehotsky Hall Clemson, SC 29631	SC	J. McCrone, Director, NPS (5/12 time) M. Rikard, NPS	Faculty None	Regional Chief Scientist/ Regional Director	Research, NPS areas in Southeast Region, training in resource computer use.
	University of Georgia Institute of Ecology Athens, GA 30608	GA	S. Bratton, Unit Coordinator, NPS S. Cover-Shabica, NPS	Research Associate Research Associate	Regional Office and outside fund sources.	Research, NPS areas in Southeast Region, especially coastal areas.
NCR	None					
WASO	Colorado State University Fort Collins, CO 80521	CO	R. Herrmann, Unit Leader, NPS T. Boyle, NPS J. Baron, NPS M. Flug, NPS	Adjunct Faculty Adjunct Faculty Adjunct Faculty Research Associate	WRD-WASO	Water Resources Research, national.