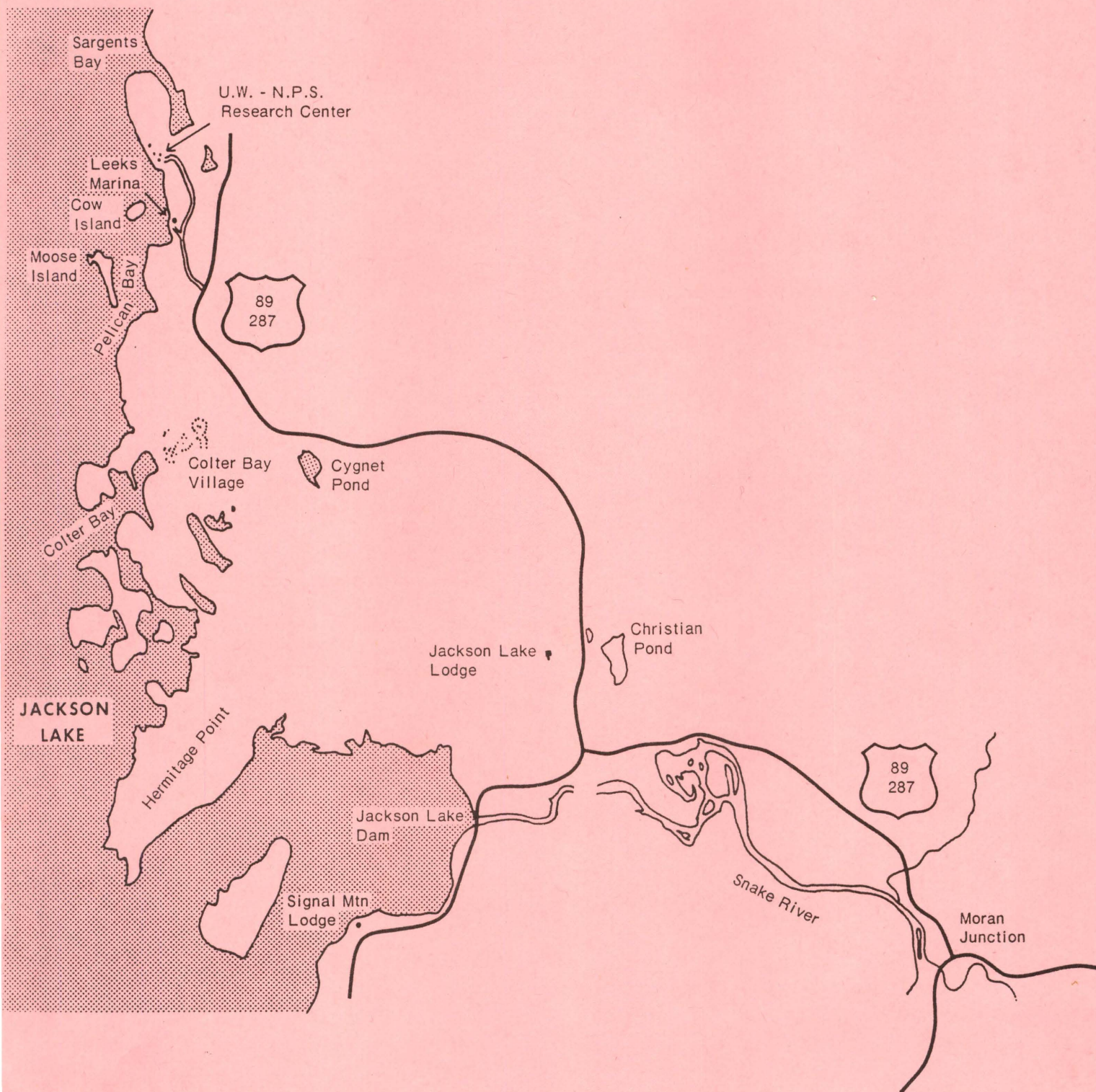




University of Wyoming
National Park Service Research Center
Twelfth Annual Report
1988





Box 3166 University Station
Laramie, Wyoming 82071

Telephone: (307) 766-4207 or 4227

Published by Wyoming Scholars Repository, 1988

Box 170
Moran, Wyoming 83013

Telephone: (307) 543-2463

PREFACE

The University of Wyoming-National Park Service Research Center sponsors and supports substantial and significant research in the biological, physical and social sciences which can best be done in National Park areas of Wyoming, Montana, North Dakota, South Dakota and Utah because of the unique features those areas possess. Administratively, the Research Center is governed by a 10-member Steering Committee composed of 5 University of Wyoming representatives and 5 National Park Service representatives. The Dean of the Arts and Sciences College serves as Committee Chairperson. A faculty member of the University of Wyoming is Director of the Research Center program and is administrator of the Research Center facilities. Also, the Director is an ex-officio member of the Steering Committee. The Research Center physical plant consists of laboratory, library, living, seminar, shop and storage accommodations. Those facilities are normally operational from mid-May to mid-October.

The Director annually calls for research proposals in October from institutions and individuals requesting such notification. Included with this solicitation are 1) guidelines for proposal preparation, 2) housing and laboratory information, 3) Research Center operational policies, and 4) the Research Center operational calendar. Topics for research include 1) those research problems identified by Park personnel, and 2) research problems suggested by outside individuals on basic or applied proposals they consider to be timely and important and uniquely appropriate to the National Park areas of the five states concerned. While many of the research topics will be directed at solution to management problems and improvement of interpretation information, there will be a concerted effort to encourage and maintain support for a substantial basic research program. Research projects may extend beyond the exact boundaries of the Park areas to work on problems common to the Park lands and adjacent lands. Limited funds are available for support of meritorious research projects. Also, research studies may be funded by other institutions or by individuals.

Investigator(s) submitting proposals to the Research Center should be a faculty member of an academic institution or a full-time member of a governmental research institution. Scientific and fiscal accountability must be assigned to an academic or governmental research institution. Normally all proposals should reach the Director no later than early December. The decisions of the Steering Committee concerning approval and where applicable, funding, are released no later than early March.

STEERING COMMITTEE MEMBERS

- Mr. Robert Barbee, Superintendent, Yellowstone National Park, National Park Service;
- ✓ Dr. Donald Brosz, Agricultural Engineering, University of Wyoming;
- Dr. Arthur Denison, Physics & Astronomy, University of Wyoming;
- Dr. Kenneth L. Diem, Ex-officio Member, and Director, UW-NPS Research Center;
- ✓ Dr. Walter Eggers, Dean, Arts and Sciences College, University of Wyoming and Steering Committee Chairperson;
- ✓ Dr. Wayne Hubert, Wyoming Coop Research Unit, University of Wyoming;
- Dr. Dan Huff, Chief Scientist, Rocky Mountain Region, National Park Service;
- Ms. Sandra Key, Superintendent, Bryce Canyon National Park, National Park Service;
- ✓ Dr. Anne Martha Slater, Department of Anthropology, University of Wyoming;
- Mr. Jack Stark, Superintendent, Grand Teton National Park, National Park Service;
- Mr. Jimmy D. Taylor, Superintendent, Grant-Kohrs Ranch National Historic Site, National Park Service;

CONTENTS

	PAGE
PREFACE	iii
STEERING COMMITTEE	vi
DIRECTOR'S REPORT	vii
RESEARCH PROJECT REPORTS	1
Badlands National Park	
Hoffman, G.	7
Bighorn Canyon National Recreation Area	
Coates, K.	17
Knight, D.	25
Bryce Canyon National Park	
Roberts, D.	33
Roberts, D.	35
Canyonlands National Park	
Hughes, H.	43
Capitol Reef National Park	
Heil, K.	51
Cedar Breaks National Monument	
Roberts, D.	63
Dinosaur National Monument	
Kuntz, D.	69
Glen Canyon National Recreation Area	
Nations, D.	77
Waring, G.	78
Grand Teton National Park	
Connor, M.	87
Freilich, J.	93
Jannett, F.	99
Lageson, D.	103
McKnight, K.	105
Miller, S.	107
Negus, N.	109
O'Dell, W.	113
O'Dell, W.	117
Pierce, K.	119
Pinter, A.	121
Sakaluk, S.	125

Smith, R.	133
Thiers, H.	143
Knife River Indian Villages NHS	
Saylor, R.	151
Theodore Roosevelt National Park	
Reed, P.	159
Irby, L.	163
Wind Cave National Park	
Alexander, E.	175
Taylor, R.	181
Yellowstone National Park	
Barnosky, C.	189
Laundre', J.	193
Deacon, J.	199
Zion National Park	
Harper, K.	207
RESEARCH BIBLIOGRAPHY FOR JACKSON HOLE BIOLOGICAL RESEARCH STATION AND U.W.-N.P.S. RESEARCH CENTER	217
RESEARCHERS AT THE JACKSON HOLE BIOLOGICAL RESEARCH STATION AND U.W.-N.P.S. RESEARCH CENTER WITH THEIR INSTITUTIONAL AFFILIATIONS	259
SUMMARY OF RESEARCH ACTIVITIES WITHIN NATIONAL PARKS SERVICE AREAS COOPERATING WITH THE U.W.-N.P.S RESEARCH CENTER	267
NATIONAL PARK SERVICE AREAS COOPERATING WITH U.W.-N.P.S. RESEARCH CENTER, Montana and Wyoming	315
NATIONAL PARK SERVICE AREAS COOPERATING WITH U.W.-N.P.S. RESEARCH CENTER, North Dakota and South Dakota	317
NATIONAL PARK SERVICE AREAS COOPERATING WITH U.W.-N.P.S. RESEARCH CENTER, Utah	319

Director's Report

In 1988, of 43 research proposals submitted to the Research Center, 33 (from 23 institutions) were approved (Table 1). Support in the amount of \$294,306 was approved for 23 projects submitted by investigators from 16 institutions. Unfortunately, University of Wyoming funding in support of research projects was reduced to \$27,996 in fiscal 1988-89.

The 1988 field season at the Center was filled with a series of unexpected events. An abnormal level of responsibility was thrust on the Centers staff when I was physically incapacitated for 3/4 of the summer. They deserve recognition for a job well done in the face of very difficult times. The exceptionally dry summer increased the need for very stringent researcher constraints and physical plant operations on the part of the staff. The very dry conditions impacted research projects in a variety of ways never before encountered in the history of the Center. Ultimately, those unusually dry conditions greatly amplified the impact of forest fires in the Greater Yellowstone Ecosystem. For a brief period in August the danger from burning forests shut down research activity at the Center. On two separate occasions, the Center was placed on standby alert for evacuation of all personnel. By early September the fire threats were diminishing and research activity was resumed.

Even with the dry summer season, Center housing was essentially filled to capacity. As in 1987, research activity began as early as May 1 and extended into early November.

Thanks to the persistence of the Grand Teton National Park administration, the reshingling of the Johnson Lodge complex roofs was completed in early June. Another important task was completed by a group of the University of Wyoming's Coe Library staff. The dedicated work of this group in updating the shelf list in preparation for conversion of the Center's library card catalog to micro-fiche and ultimately an on line catalog, as well as updating the holdings of the microfilm and microfiche organization of the 14 library journals, was greatly appreciated! The extremely dry summer prompted considerable wood fuel reduction around several of the Center's buildings. Also, two additional 1-1/2 inch fire hose connections were installed, one at each of the Berol Lodge and the Boise Cascade well rooms.

On this the 40th anniversary of the Research Center, as well as considering my 40 years of various affiliations with the National Park Service and nearly 30 years in various capacities with the Center through the University plus my impending retirement, it seemed some historic and nostalgic reflections about people, places and events were appropriate.

Forty years ago James Simon and the New York Zoological Society informally established a field research facility next to Grand Teton

Table 1. Funding sources, recipient institution and location of research conducted through the U.W.-N.P.S. Research Center, 1988.

<u>University of Wyoming</u>		<u>Funding Source</u>		<u>Other Grants or Non-Grant Support</u>		
Recip. Instit.	Location of Res.	Recip. Instit.	Location of Res.	Recip. Instit.	Fund Source	Location of Res.
Carnegie Museum	YNP	Univ. SD	Badlands Nat'l Park	Univ. GA	Private & Univ. Ga	GTNP
N. Mex. State Univ.	Bighorn Canyon N. Rec. Area	UT State Univ.*	Bryce Canyon Nat'l Park	MT State Univ.	MT State Univ.	GTNP
		UT State Univ.	Bryce Canyon Nat'l Park	Univ. UT	Private & Univ. UT	GTNP
		CO State Univ.*	Canyonlands Nat'l Park	Univ. New Orleans	Private	GTNP
		San Juan College	Capitol Reef Nat'l Park	Univ. NE-Omaha	Univ. NE-Omaha	GTNP
		UT State Univ.	Cedar Breaks Nat'l Mon.	N.P.S. Midwest Arch. Center	U.S. Bur. Reclam.	GTNP
		CO Dept. Nat. Res.	Dinosaur Nat'l Mon.	Sc. Mus. MN	Sc. Mus. MN	GTNP
		Mus. of Northern AZ	Glen Canyon Nat'l Rec Area	IL State Univ.	Priv. & IL State Univ.	GTNP

Northern AZ Univ.	Glen Canyon Nat'l Rec Area	San Francisco State Univ.	Private	GTNP
Univ. UT*	GTNP	ARS (Emeritus)	Private	GTNP & YNP
OR State Univ.	GTNP	Univ. NE-Omaha	U.S. Public Health Serv.	GTNP & YNP
Univ. ND	Knife River Indian Villages Nat'l Hist Site			
CO State Univ.*	Theo. Roosevelt Nat'l Park			
MT State Univ.	Theo. Roosevelt Nat'l Park			
Univ. MN	Wind Cave Nat'l Park			
UT State Univ.	Wind Cave Nat'l Park			
Syracuse Univ.*	YNP			
ID State Univ.	YNP			
Univ. NE	Zion Nat'l Park			
Brigham Yg. Univ.	Zion Nat'l Park			

* Extramural funding by park funds or special NPS funds.

National Park, about a mile east of the town of Moran along the bank of the Snake River. Incorporated into Grand Teton National Park in 1950, that facility in 1957 became the first research establishment in a national park, the Jackson Hole Research Station. In 1953, the University of Wyoming joined the New York Zoological Society as sponsors of the Research Station. Under this new partnership, Dr. L. Floyd Clarke of the University was appointed Director and the University assumed the operation and maintenance of the Research Station. In 1954, the Jackson Hole Research Station name was changed to the Jackson Hole Biological Research Station. At the close of 1972, Dr. Clarke retired and Dr. Oscar Paris was appointed Director, serving in that capacity until mid-1976 when he resigned from the University. It was then that I was appointed to serve as Acting Director of the Station. At this point it is important to note that in 1971 the University of Wyoming and the National Park Service established the Northern Rocky Mountain Cooperative Parks Study Unit program in Laramie, the 2nd such unit in the U.S. Uniquely, the State of Wyoming, through the University, provided state funding for partial support of this multi-state program (Montana, North & South Dakota and Wyoming) for 2 years, until 1973, when Senator Clifford Hansen successfully legislated NPS funding for the cooperative research program. In mid-1977 a new cooperative agreement combined the Northern Rocky Mountain Cooperative Parks Study Unit with the Jackson Hole Biological Research Station becoming the University of Wyoming-National Park Service Research Center. Coincident with approval of this new agreement, I was appointed Director of the Research Center. Also, the University was issued a National Park Service Special Use Permit for new field research facilities at the historic AMK Ranch, north of Leek's Marina, on the east shore of Jackson Lake. By mid-1978 the Center was relocated at these new facilities and the old Station facilities were sold and removed from the park. A new 5-year Cooperative Agreement in 1985 expanded the program to include Utah. Now there are 31 national park areas in 5 states participating in the Center's research program.

While the Research Center is one of 16 Cooperative Park Study Units in the United States, it is unique because:

1. It involves 31 national park areas primarily in the states of Utah, Wyoming, Montana, North Dakota and South Dakota;
2. The fiscal support for the Center's activities is jointly shared by the State of Wyoming and the National Park Service. This was a historic first among CPSU's and has produced a strong, truly cooperative Federal-State natural resources research program; and
3. Cooperating as a seasonal field research facility within Grand Teton National Park, the Research Center has provided a strong academic interface with Park Service personnel and programs, as well as having provided the only housing, laboratory and field facilities solely dedicated to research in both Grand

Teton and Yellowstone National Parks.

Research responsibilities of the Research Center have been defined as follows:

1. Sponsorship and support of substantial and significant research in the biological, physical and social sciences which is particularly relevant to National Park areas of Wyoming, Montana, N. Dakota, S. Dakota and Utah because of the unique features those areas possess;
2. Promotion of an applied and basic research program which will lead to a better understanding, interpretation and management of natural and cultural resources of concern in national park areas;
3. Development of a collaborative research program between concerned agencies and scientists to foster greater application of scientific expertise and perspective to natural and cultural resource problems of national parks in the 5 states; and
4. Provision of opportunities and facilities for conducting limited research symposia, work shops, conferences, etc, which serve to expedite the exchange of scientific information and methodology pertinent to natural and cultural resources in national park areas.

As a Public Service entity the Research Center has sought to provide unbiased scientific expertise and perspective in the evaluation and solution of natural and cultural resource management problems common to the national parks and the areas immediately adjacent to them in the 5 states.

Serving as an academic support unit the center has facilitated intercourse between universities and NPS personnel enhancing the quality of teaching, scientific investigations and the utilization of resource management applications.

Organizationally, the Research Center is governed by a 10-member Steering Committee composed of 5 National Park Service representatives and 5 University of Wyoming representatives. The administration of the program and the research facilities has been carried out by a Director who has been a faculty member in the Zoology and Physiology Department with half time administration and half time teaching responsibilities. In addition, other Research Center personnel have included 1 full-time secretary-accountant, 1 half-time caretaker and maintenance supervisor, and 2 seasonal laborers.

The field research facilities in Grand Teton National Park have generally been open from May 1 through October 30, with the Director in

residence from May 15 to October 1. About 40-45 people, including staff, can be housed in those field facilities. Special arrangements for winter research have been possible.

Historically, numerous individuals and organizations have significantly contributed in various ways to the development and success of the research program. Two hundred fifty two researchers representing 83 academic or research institutions have published 270 scientific articles and reports based on studies conducted at or through the Research Station and its successor the Research Center.

The initiation of the annual cycle of events within the program began with the Director's solicitation of research topics from the park area scientists, natural resource personnel and outside contributors. In an annual September/October meeting of national park resource management and/or scientist representatives, these research topics have been evaluated and ranked for inclusion in the annual request for research proposal packet (RFP). The selected research topics were then incorporated into the RFP packet along with general information material. Generally, research topics have been selected to provide an 80% emphasis on resource management problems and a 20% emphasis on basic science research topics. In early November these Request For Proposal (RFP) packets were sent to 500+ individuals (scientists and University Vice Presidents For Research). Proposals received in response to these RFP packets were assembled in early January for review and evaluation by concerned park personnel, outside peer reviewers (for proposals which are highly technical, controversial, involve other federal or state agencies and/or involve conflicts of interest) and by members of the Research Center's Steering Committee. In late January or early February, after considering all of the reviews and evaluations, the Steering Committee developed a list of ranked, approved proposals from investigators requesting funding and from those not requesting funding. Depending on the availability of funds, a maximum of \$14,000, including 10% overhead, could be awarded to those approved proposals requesting fiscal support. Such support was granted for a 1-year period with renewal, upon request, possible up to 3 years. Each research year began on May 1 and ended on April 30. Research contract requirements and guidelines have been regularly upgraded resulting in a research product with a higher professional quality.

Throughout this entire process, the success of the Center's program has been attributed to the increasing input and participation of National Park Service personnel within each of the park areas and within the Rocky Mountain Regional Office. One measure of this success is that 10 years ago it was difficult to generate a list with 15 acceptable research topics. By 1986 we had a list of 63 topics from 17 park areas for selection of 17 topics for the RFP packet. In addition, the Center's final project reports and professional papers serve to reflect the traditionally high level of research productivity from this program. Provincially, since 1983, Wyoming and 8 of its counties have benefited from over \$1,000,000 of natural resource research within the national

park and adjacent areas within the state. Two thirds of that expenditure has taken place since 1985!

The relocation of the Field Center to the AMK facilities in 1977 and the acquisition of a 15-year Special Use permit for those facilities was a major improvement in the Center's physical plant. Continued fiscal support from both the University and the Wyoming Legislature made possible further improvements in the Center's facilities. Also, a number of other changes served to strengthen and enhance the nature of the program. Some of these improvements were: (1) acquisition of some vital equipment, i.e. 2 4WD trucks, a 4WD station wagon; a \$25,000 research boat and trailer and 2 canoes; 1 micro computer and 2 printers; a Center-wide smoke and heat fire alarm system and a well equipped maintenance shop; (2) creation of a 1,000 volume Field Center Library which is a designated branch of the University's Science Library and has a \$4,900/yr book allotment, plus subscriptions to 14 periodical holdings in microfilm and microfiche and a comprehensive inventory of maps and aerial photographs; (3) development and refinement of a process for soliciting and evaluation of research topics and proposals, as well as updated and refined guidelines for contractual research performance; (4) establishment of a maintenance log for the entire Field Center physical plant, including materials used, dates of work and processes involved and recommended cycles of maintenance; (5) development of science conference facilities capable of accommodating a maximum of 80 participants; (6) adoption and implementation of a standardized, computerized information storage and retrieval system for natural resource bibliographic information accumulated about the participating park areas; and (7) implementation of electronic mail communication with Park facilities via the VAX computer network and/or the FAX telephone transmission system. All of the foregoing were accomplished concurrent with successful efforts to increase the Wyoming fiscal support for research grants 100% by 1985 over that in 1977.

While much change has taken place in the last 9 years, the nature of the Research Center Program is and will continue to be shaped by a diverse collection of forces. Those characteristics which provided the program strength have been:

1. A balanced and integrated emphasis on the life, physical and social sciences;
2. A commitment of 20% of the programs research resources to basic research which serves to maintain long term vigor and broad perspectives in the program;
3. A strong cosmopolitan reserve of research scientists serving as investigators, consultants and proposal reviewers who have provided additional scientific rigor with diversity of perspective and experience;

4. Natural resource problems common to several park areas in the 5-state area can be attacked more efficiently, economically and with a broader perspective than on a provincial, uncoordinated park by park basis;
5. Increased dialogues and exchanges of information are facilitated between park areas and personnel with the active participation of park resource managers and scientists;
6. The resulting interface between University and Park Service professionals and programs serves to not only improve education and training in park natural resource management and research, it also identifies professional challenges, opportunities for members of both organizations at relatively low shared costs;
7. The multi-state administrative structure is very cost effective considering the savings in operational expenses over the costs of supporting a separate Cooperative Parks Study Unit in each of the 5 states. Those saved NPS operational expenses can be used to support new research projects in the national parks of multi-state programs;
8. Researchers in both Yellowstone and Grand Teton National Parks have traditionally had great difficulty with obtaining seasonal housing in competition with the two park's operational seasonal housing needs. National Park Service laboratory facilities are either non-existent or very marginal. Dependable over water transportation via park boats is difficult to obtain because of the already heavy NPS demands on those pieces of equipment. It is here that the Research Center's field facilities in Grand Teton National Park are indispensable;
9. Research projects may be conducted within areas of the national parks or in areas immediately adjacent to the parks. Much of the research has involved natural resources important to the surrounding land management agencies and the concerned state agencies. The information accruing from these studies is then available to all of the above at little or no cost; and
10. Greater flexibility is provided to the National Park Service in the management of their research funds through implementation of irregular cooperative agreement amendments with the University. These arrangements make for sounder research planning and stronger science quality without the last minute constraints of fiscal year fiscal obligations.

Despite these strengths, some weaknesses which have impacted the program are:

1. The traditional National Park Service separation of historical research and funding from the Regional science programs makes it nearly impossible to obtain funding of historical projects, even though many of those problems are of a critical nature.

The problem appears to involve singular historical control from the Washington D.C. National Park Service office and a very inadequate level of funding;

2. Traditionally, archaeology has not been closely integrated with other natural resource research in the National Park Service. Consequently, problems similar to those of history research have developed;
3. Complete natural resource inventories distribution and monitoring information are not available for most parks despite the need for this information in park operations and management. Even though this is baseline information, most upgraded natural resource research cannot proceed until such data are available. This has required the use of a considerable percentage of Research Center research funding for what some have unfortunately and erroneously perceived as being low quality research; and
4. A cutback in GTNP operation funds has resulted in moving the Center's resident park ranger to Colter Bay and terminating snow plowing of the Center's entrance road. This change in the terms of the Center's Special Use Permit limits winter access to the Center to snowmobiles and snowshoes or skis. It also limits protective surveillance and suppression in winter at the Center.

A variety of circumstances which serve as threats are:

1. The University's reduction of the Center's budget (a 50% cut in research funds and a 11% cut in operations funds) threatens what has been a highly productive research program for Wyoming's economically important natural resources. This budget cutback is particularly serious at a time when the University's support for the best possible natural resource science is critical in the aftermath of the Greater Yellowstone Ecosystem forest fires. These reductions in the University's funding of the Center can only result in a decline in the quantity and quality of the research effort and product. More importantly, at a time when Wyoming's economy is depressed, a University cut back in research in the Greater Yellowstone Ecosystem presents the appearance that it is disinterested in those factors that affect the health of tourism, Wyoming's second most productive economic resource;

2. Lack of adequate Federal funding support for Grand Teton National Park to fulfill its obligations under the cooperative agreement could result in inadequate and/or unsafe maintenance of the Field Center; and
3. Cuts in equipment funds which not only severely impact research support capabilities, but sharply decrease the capability to maintain the present quality of the physical plant of the Field Center.

In contrast to these threats, the following opportunities exist:

1. The great potential for markedly fostering and assisting interpark, intrastate and interstate science communication in a coordinated, timely fashion on universally important natural resource matters;
2. Providing large and small parks equal opportunities to utilize scientific natural resource consultation and research expertise easily in a timely fashion and at a relatively low cost, while also fostering useful application in resource management in the areas adjacent to the national parks;
3. Providing national park areas with fiscal support for "seed money" projects which gather baseline information necessary for high priority, large research proposals which exceed normal park and university budgetary allotments;
4. Assisting all park areas, regardless of size, in sustaining the intensity and commitment to a continued qualitative scientific research program, as it affects the natural resources within and around those park areas;
5. Developing an internationally, nationally and regionally significant scientific research program on the seismicity and crustal tectonics in the Greater Yellowstone Ecosystem, one of the most crustally active areas in the world. This would include significantly intensive aquatic research in lake and reservoir areas from Bear Lake in Utah on the south, Hebgen Lake on the West, Yellowtail Reservoir and Buffalo Bill Dam on the East and Fremont Lake on the Southeast.

In these difficult economic times in Wyoming, it is abundantly clear that considerable effort is needed to achieve increased diversification in the state's economy to escape the serious deficiencies of singular dependence on an oil, gas and mineral economy. The potential inroads of fusion and solar energy developments further amplify the critical nature of this diversification. In this regard, tourism, capitalizing on the state's unique natural resources, particularly in Wyoming's national park areas, offers the greatest potential to immediately offset the unstable volatility of an oil, gas and mineral economy. The strong

recent and on-going local, state and national perception of the value of these park natural resources is a matter of record. The need for continued and even intensified research concerned with the nature of, well being and management of these park natural resources could not be more urgent.

There is an obvious positive relation of the robust condition of national, as well as state parks to the well being of Wyoming's tourism economy. Consequently, the University of Wyoming's decision to drastically reduce fiscal support for the U.W.-N.P.S. Research Center has the appearance of an abdication of its responsibilities to the State of Wyoming and an apparent disregard for the worth of a program highly regarded nationally and internationally. Unless the University can commit itself, as Wyoming's major research institution, to not only restore but increase its support of the Center, it is very likely at best to play a minor role or at worst no role in the research critical to the well being of Wyoming's tourism industry and consequently the long term economic health and strength of Wyoming.

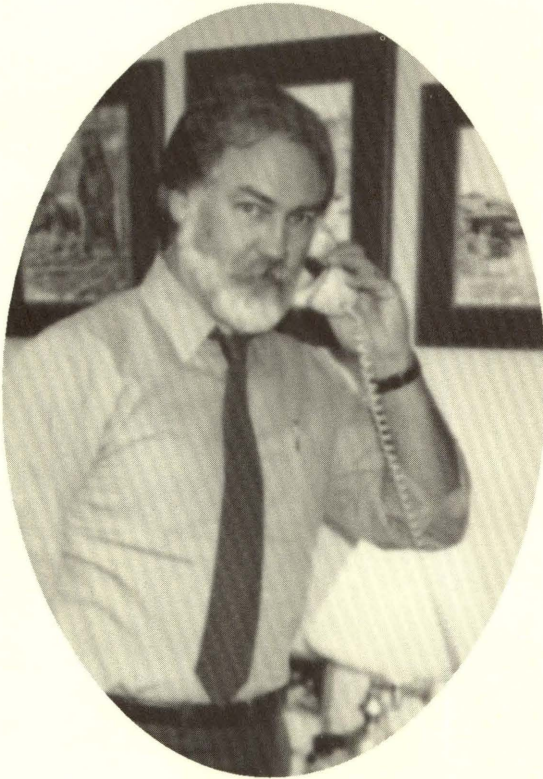
RESEARCH PROJECT REPORTS

The following project reports have been prepared primarily for administrative use. The information reported is of a preliminary nature and may be subject to change as the investigations continue. Consequently, the information presented may not be used without written permission from the author(s).

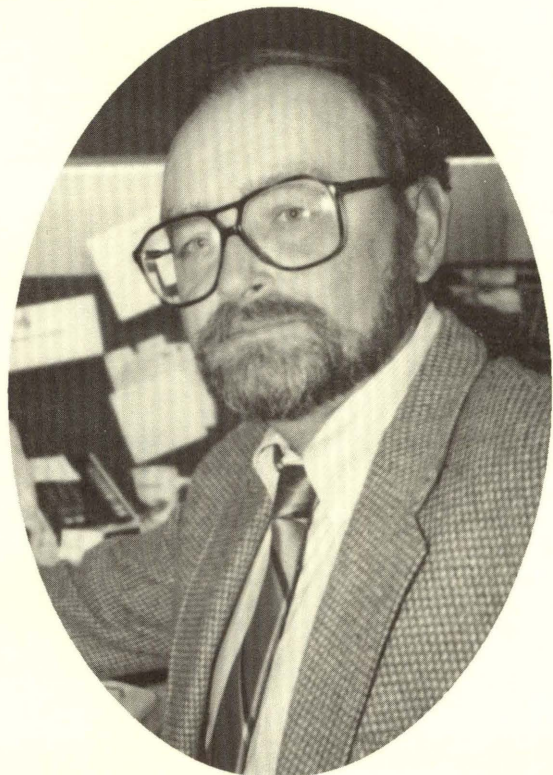
RESEARCH PROJECTS

The following project reports have been prepared primarily for administrative use. The information contained in a preliminary report may be subject to change as the investigation progresses. Accordingly, the information presented may not be used without written permission from the author.

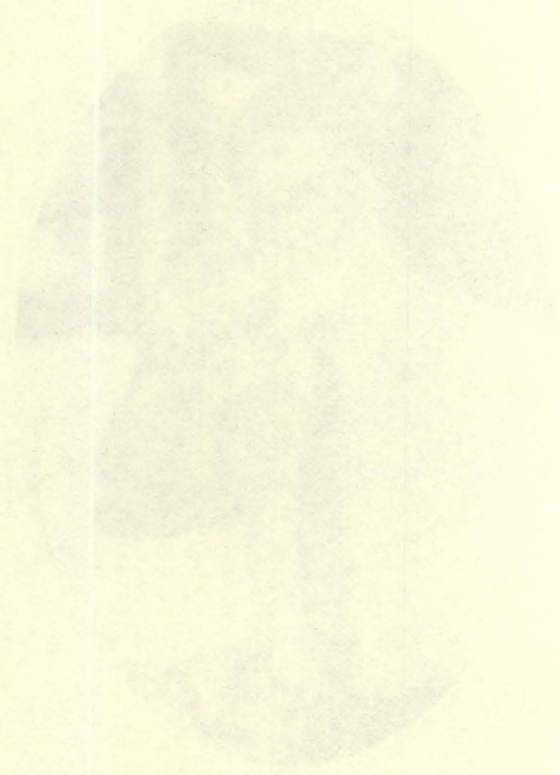
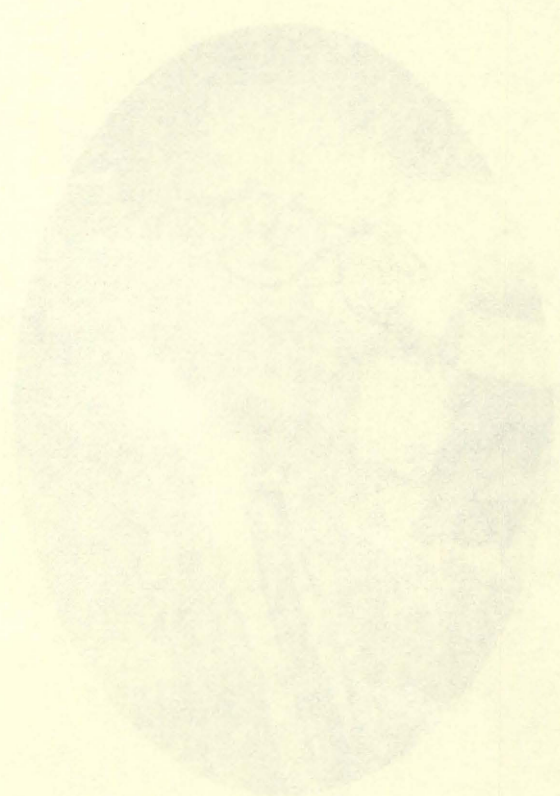
National Park Service
Rocky Mountain Region
Scientists



Dan E. Huff
Chief Regional Scientist
1985-Present



Robert J. Schiller
Assist Chief Regional Scientist
1987-Present



BADLANDS NATIONAL PARK

G. Hoffman

NATIONAL PARK SERVICE AREAS
 COOPERATING WITH
 U.S. GEOLOGICAL SURVEY

YEAR

20.	ALCO NATIONAL PARK Superintendent: Mary Galt Telephone: (801) 773-3355 14,846 Acres Fed-141,461; Mont-4,085,15	20.	ELLEN BEAR NATIONAL MONUMENT P. O. Box 149 Cedar City, UT 84701-0149 Superintendent: Tom Henry Telephone: (801) 846-2851 6,154.00 Acres, Federal
21.	CANYON BLISS NATIONAL PARK Superintendent: Mary Galt Telephone: (801) 433-3871 241,862.49 Acres Fed-211,862.49; Mont-19,088.22	21.	GOLDEN BRIDGE NATIONAL MONUMENT SITE P. O. Box 394 Grand Canyon, UT 81302-1033 Superintendent: Dennis Davis 2,203.20 Acres, Federal
22.	PIPER SPRING NATIONAL MONUMENT P. O. Box 210 Dinosaur, CO 81610 Superintendent: Jerry Holman Telephone: (303) 374-2216 111,021.43 Acres Fed-201,620.17; Mont-7,424.28	22.	LENA CANYON NATIONAL MONUMENT P. O. Box 1807 Piner, AZ 85040-4207 Superintendent: John Finkester Telephone: (602) 644-1871 1,288,880 Acres Fed-1,152,163; Mont-13,717
23.	DINOSAUR NATIONAL MONUMENT P. O. Box 210 Dinosaur, CO 81610 Superintendent: Jerry Holman Telephone: (303) 374-2216 111,021.43 Acres Fed-201,620.17; Mont-7,424.28	23.	CRANFORD BUTTE 446 South Main Street Mont, UT 84032-1382 Superintendent: Harvey Wickham Telephone: (801) 280-7124
24.	BRICK CANYON NATIONAL PARK Bryce Canyon, UT 84717-0001 Superintendent: Robert Reynolds Telephone: (801) 834-2322 32,835.08 Acres Fed-32,835.08; Mont-4,10	24.	SMITH NATIONAL PARK Area Manager: Paul Gandy Telephone: (801) 230-8161 13,170.98 Acres Fed-65,091.59; Mont-8,381.99
25.	NATURAL BRIDGE NATIONAL MONUMENT 1411 Highway 1, Gary, Utah Telephone: (801) 337-1100 1,719.14 Acres, Federal	25.	CANYON AND NATIONAL PARK This Manager: Harvey Wickham Telephone: (801) 230-7124 131,570.43 Acres, Federal

