

UNIVERSITY OF WYOMING®  
NATIONAL PARK SERVICE RESEARCH CENTER

---



**30<sup>th</sup> ANNUAL REPORT**  
**2006 - 2007**

COVER PHOTO COURTESY: WYOMING DIVISION OF TOURISM  
GRAND TETON NATIONAL PARK + JACKSON LAKE + WYOMING

LAYOUT AND DESIGN: UW GRAPHIC ARTS SERVICE

# UNIVERSITY OF WYOMING

## NATIONAL PARK SERVICE RESEARCH CENTER



30th ANNUAL REPORT 2006 & 2007

EDITED BY

**HENRY J. HARLOW**

PROFESSOR

DEPARTMENT OF ZOOLOGY AND PHYSIOLOGY

UNIVERSITY OF WYOMING

DIRECTOR UW-NPS RESEARCH CENTER

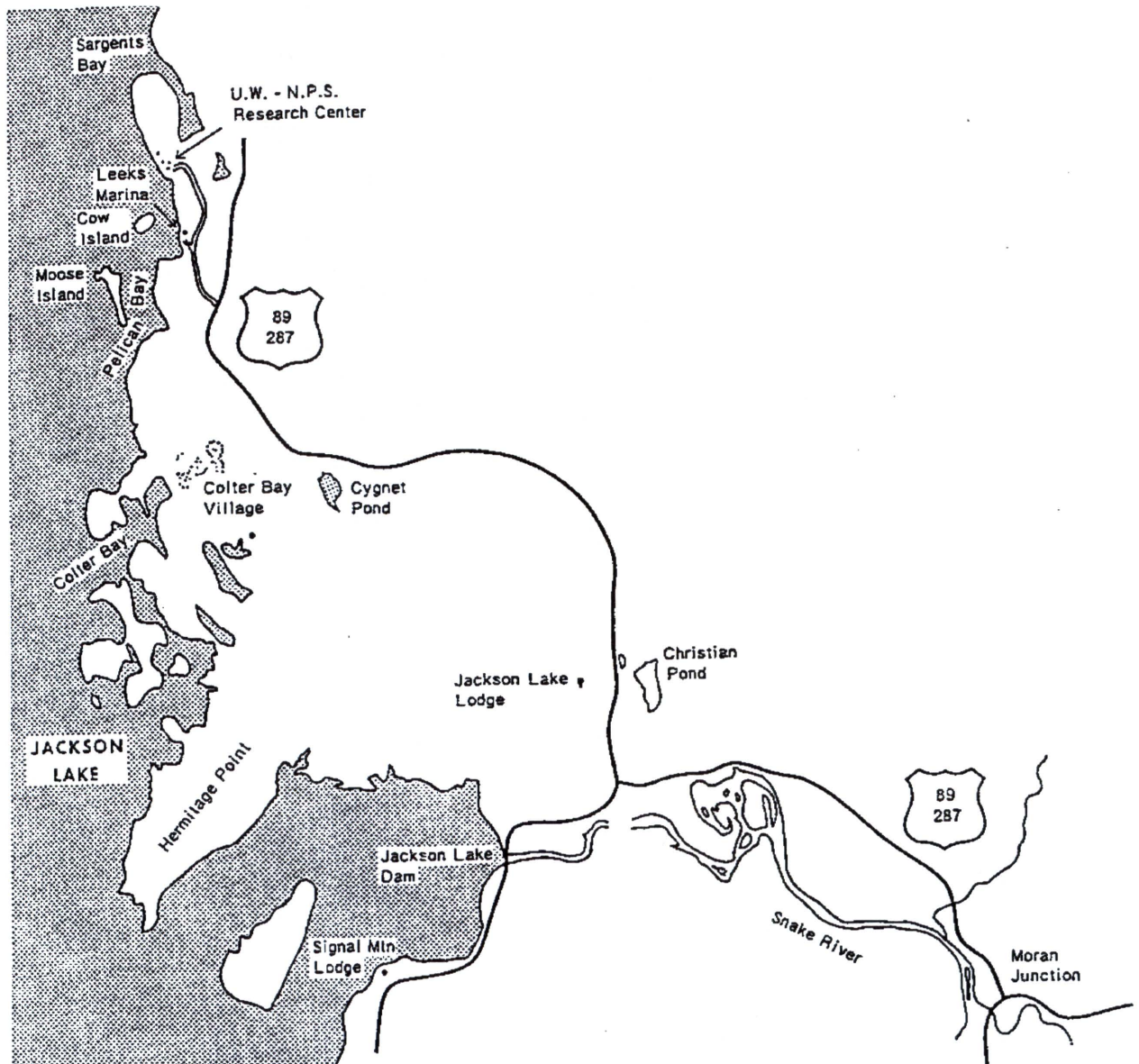
**MARYANNE HARLOW**

REFERENCE LIBRARIAN

UNIVERSITY OF WYOMING LIBRARIES

UNIVERSITY OF WYOMING





UW-NPS Research Center  
Dept. 3166  
1000 University Ave.  
Laramie, Wyoming 82071  
Telephone: (307) 766-4227

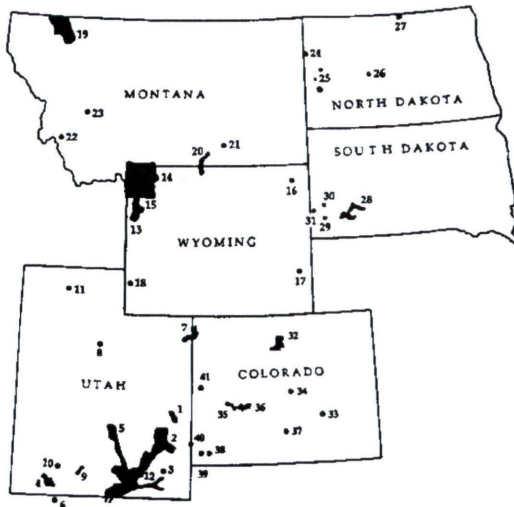
Director,  
Summer Address  
PO Box 170  
Moran, Wyoming 83013  
Telephone: (307) 543-2463



# UNIVERSITY OF WYOMING

## NATIONAL PARK SERVICE RESEARCH CENTER

30th ANNUAL REPORT 2006 & 2007



### ◆ WYOMING

- 13. Grand Teton National Park
- 14. Yellowstone National Park
- 15. John D. Rockefeller, Jr. Memorial Parkway
- 16. Devils Tower National Monument
- 17. Fort Laramie National Historic Site
- 18. Fossil Butte National Monument

### ◆ MONTANA

- 19. Glacier National Park
- 20. Bighorn Canyon National Recreation Area
- 21. Little Bighorn Battlefield National Monument
- 22. Big Hole National Battlefield
- 23. Grant-Kohrs Ranch National Historic Site

### ◆ NORTH DAKOTA

- 24. Fort Union Trading Post National Historic Site
- 25. Theodore Roosevelt National Park
- 26. Knife River Indian Villages National Historic Site
- 27. International Peace Garden

### ◆ SOUTH DAKOTA

- 28. Badlands National Park
- 29. Wind Cave National Park
- 30. Mount Rushmore National Memorial
- 31. Jewel Cave National Monument

### ◆ UTAH

- 1. Arches National Park
- 2. Canyonlands National Park
- 3. Natural Bridges National Monument
- 4. Zion National Park
- 5. Capitol Reef National Park
- 6. Pipe Spring National Park
- 7. Dinosaur National Monument
- 8. Timpanogos Cave National Monument
- 9. Bryce Canyon National Park
- 10. Cedar Breaks National Monument
- 11. Golden Spike National Historic Site
- 12. Glen Canyon National Recreation Area

### ◆ COLORADO

- 32. Rocky Mountain National Park
- 33. Bent's Old Fort National Historic Site
- 34. Florissant Fossil Beds National Monument
- 35. Black Canyon of the Gunnison National Monument
- 36. Curecanti National Recreation Area
- 37. Great Sand Dunes National Monument
- 38. Mesa Verde National Park
- 39. Yucca House National Monument
- 40. Hovenweep National Monument
- 41. Colorado National Monument



# TABLE OF CONTENTS

	PAGE
STEERING COMMITTEE.....	ix
INTRODUCTION.....	xi
FEATURE ARTICLE.....	1
<p style="text-align: center;">“Linking exotic snails to carbon cycling in Kelly Warms Springs, Grand Teton National Park” Erin R. Hotchkiss and Robert O. Hall, Jr. <span style="float: right;">3</span></p>	
RESEARCH PROJECT REPORTS	
Grand Teton National Park	
K. A. Barrick.....	19
M. Cody.....	30
S. O. Erwin & J.C. Schmidt.....	37
M.A. Harlow & L.O.Schmidt.....	42
C.B. Marlow & S.Summerfield.....	46
H. Van Miegroet.....	51
Yellowstone National Park	
M. Ben-David & J. R. Crait.....	59
D. K. Kashian et al. ....	65
L. M. Tronstead & R. O. Hall Jr. ....	68
Greater Yellowstone Ecosystem	
B. Bedrosian & D. Craighead.....	77
N. Bockino & D. B. Tinker.....	83
J.C. Caruthers & D. Debinski.....	85
D. Debinski.....	97
R. Hartman & D. Scott.....	100
A.C. Krist.....	105
R. Kovach & L. Eby.....	110
J.C. Caruthers & D. Debinski.....	114
G. Luikart et. al.....	119
G. Montopoli et al. ....	123
G. Montopoli et al. ....	136
A. J. Pinter.....	142
L. A. Riley & M. F. Dybdahl.....	144
M. Rhuemann & S. Wolff.....	149
M. Simard et al. ....	153
L. Tranel & J. Spotila.....	158



## UW-NPS RESEARCH CENTER PERSONNEL



HENRY J. HARLOW ♦ DIRECTOR  
CELESTE I. HAVENER ♦ OFFICE ASSOCIATE  
RICHARD P. VIOLA ♦ CARETAKER

### 2006 STEERING COMMITTEE

RONALD BEISWENGER  
GEOGRAPHY & RECREATION ♦ UNIVERSITY OF WYOMING

FRED LINDZEY  
ZOOLOGY & PHYSIOLOGY ♦ UNIVERSITY OF WYOMING

NICK FUZESSERY  
ZOOLOGY & PHYSIOLOGY ♦ UNIVERSITY OF WYOMING

HENRY HARLOW  
DIRECTOR ♦ UW-NPS RESEARCH CENTER

RONALD W. MARRS  
GEOLOGY & GEOPHYSICS ♦ UNIVERSITY OF WYOMING

SUE CONSOLO-MURPHY  
RESOURCE BIOLOGIST ♦ GRAND TETON NATIONAL PARK

GLENN PLUMB  
WILDLIFE BIOLOGIST ♦ YELLOWSTONE NATIONAL PARK

### 2007 STEERING COMMITTEE

RONALD BEISWENGER  
GEOGRAPHY & RECREATION ♦ UNIVERSITY OF WYOMING

STEVE BUSKIRK  
ZOOLOGY & PHYSIOLOGY ♦ UNIVERSITY OF WYOMING

NICK FUZESSERY  
ZOOLOGY & PHYSIOLOGY ♦ UNIVERSITY OF WYOMING

HENRY HARLOW  
DIRECTOR ♦ UW-NPS RESEARCH CENTER

SUE CONSOLO-MURPHY  
RESOURCE BIOLOGIST ♦ GRAND TETON NATIONAL PARK

GLENN PLUMB  
WILDLIFE BIOLOGIST ♦ YELLOWSTONE NATIONAL PARK



# INTRODUCTION

## 2006 & 2007 ANNUAL REPORT

---



---

### DIRECTOR'S COLUMN

During the period of this report the University of Wyoming-National Park Service (UW-NPS) Research Center supported and administered research in the biological, physical and social sciences performed in national parks, monuments, and recreation areas in Wyoming and neighboring states. The UW-NPS Research Center solicited research proposals from university faculty or full-time governmental research scientists throughout North America via a request for proposals. Research proposals addressed topics of interest to National Park Service scientists, resource managers, and administrators as well as the academic community. Studies conducted through the Center dealt with questions of direct management importance as well as those of a basic scientific nature.

The Research Center continues to consider unsolicited proposals addressing applied and basic scientific questions related to park management. Research proposals are distributed to nationally-recognized scientists for peer review and are also reviewed and evaluated by the Research Center's steering committee. This committee is composed

of University faculty and National Park Service representatives and is chaired by the Director of the UW-NPS Research Center. Research Contracts are usually awarded by the middle to end of March to early April.

The UW-NPS Research Center also operates a NPS-owned field research station in Grand Teton National Park. The research station provides researchers in the biological, physical and social sciences an enhanced opportunity to work in the diverse aquatic and terrestrial environments of Grand Teton National Park and the surrounding Greater Yellowstone Ecosystem. Station facilities include housing for up to 58 researchers, wet and dry laboratories, a library, herbarium, boats, and shop accommodations. The research station is available to researchers working in the Greater Yellowstone Ecosystem regardless of funding source, although priority is given to individuals whose projects are funded by the Research Center.

Special acknowledgement is extended to Ms. Celeste Havener, Office Associate, for her skills and dedication to the Research Center which were a vital contribution to this publication.

### RESEARCH PROJECT REPORTS

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



## FEATURE ARTICLE







