

SUMMARY OF RESEARCH ACTIVITIES WITHIN THE NATIONAL PARK SERVICE AREAS COOPERATING WITH THE U.W.-N.P.S. RESEARCH CENTER, 1982.

Badlands National Monument

- II. Studies Supported With National Park Service Funds.
  - A. Prairie dog dispersal and habitat preference in Badlands National Park.  
Richard M. Hansen, Colorado State University, Fort Collins and Daniel W. Uresk, U.S. Forest Service, Rapid City, SD.  
Additional Source of Support: U.S. Forest Service.  
Initiated 1981.  
Completion 1984.

Fossil Butte National Monument

- II. Studies Supported With National Park Service Funds.
  - A. Paleoenvironments and paleoecology of the Eocene Green River Formation.  
Paul Buchheim, Loma Linda University, Loma Linda, CA.  
Additional Source of Support: University of Wyoming.  
Initiated 1981.  
Completion 1983.

Glacier National Park

- I. Studies Conducted By Park Personnel.
  - A. Genetic characteristics of Bull Trout in Cracker Lake and the Isabel Lakes.  
Leo F. Marnell.  
Initiated 1981.  
Completion 1982.
  - B. Glacier National Park landsat based resource information system.  
Carl H. Key.  
Initiated 1981.  
Ongoing.
  - C. Local and long-range movements of Bald Eagles from the autumn concentration in Glacier National Park, Montana.  
B. R. McClelland.  
Initiated 1981.  
Completion 1982.

- II. Studies Supported By National Park Service Funds.
- A. Grizzly bear population studies.  
Cliff Martinka  
Initiated 1967.  
Ongoing.
  - B. Aquatic ecosystem inventory.  
Leo F. Marnell.  
Initiated 1979.  
Ongoing.
  - C. Cutthroat trout genetics studies.  
Leo F. Marnell.  
Initiated 1977.  
Ongoing.
  - D. Behavior of grizzly bears in relation to people.  
Kathy McArthur.  
Initiated 1979.  
Completion 1982.
  - E. River recreation research, Flathead River Basin.  
William McLaughlin and Ed Krumpe, University of Idaho, Moscow.  
Additional Source of Support: U.S. Forest Service and  
MacIntyre-Stennis Funds.  
Initiated 1981.  
Completion 1982.
  - F. Bear repellents and deterrents.  
Charles Jonkel and Bart O'Gara, University of Montana, Missoula.  
Initiated 1981.  
Completion 1983.
- III. Studies Supported By University And Allied Funding Sources.
- A. Evaluation and prediction of plant reestablishment following  
prescribed burning.  
William Smith, University of Wyoming, Laramie.  
Initiated 1980.  
Completion 1982.
  - B. Development of a park resources management information system  
using microprocessing hardware.  
Michael Magee, University of Wyoming, Laramie.  
Source of Support: University of Wyoming.  
Initiated 1981.  
Completion 1982.
  - C. Ecology and distribution of White-tailed Ptarmigan in Montana.  
M. Douglas Scott.  
Source of Support: ?.

Initiated 1980.  
Completion 1982.

- D. Geology and paleoecology of the belt supergroup, Glacier National Park.  
Robert J. Horodyski.  
Source of Support: ?.  
Initiated 1969.  
Ongoing (Was 75% complete as of 1979).
- E. High elevation and common fungi of Glacier National Park.  
Orson Miller, Jr.  
Source of Support: ?.  
Initiated 1966.  
Completion 1982.
- F. Impact of kokanee salmon and man on the chemistry and bacteriology of McDonald Creek.  
G. Thomas Foggin.  
Source of Support: ?.  
Initiated 1979.  
Completion 1982.
- G. Snow algae.  
Ronald Hoham, Colgate University, Hamilton, NY.  
Source of Support: ?.  
Initiated 1980.  
Completion ?.

IV. Studies Supported By Funds From Other Sources.

- A. Wolf ecology.  
Robert Ream.  
Source of Support: ?.  
Initiated 1978.  
Ongoing.
- B. Breeding bird survey.  
Steve Gniadek.  
Source of Support: ?.  
Initiated 1980.  
Ongoing.
- C. Butterflies of Montana.  
Steve Kohler.  
Source of Support: ?.  
Initiated 1971.  
Completion ? (75% complete in 1980).
- D. Flathead River Basin study.  
Joe Huston.

- Source of Support: ?.  
Initiated 1976.  
Completion ? (15% complete in 1980).
- E. Geology of Glacier National Park.  
Robert Earhart.  
Source of Support: ?.  
Initiated 1979.  
Ongoing.
- F. Benthic invertebrates in natural and regulated waters.  
Sue Appert.  
Source of Support: ?.  
Initiated 1979.  
Completion (50% complete in 1980).
- G. High altitude entomology of Glacier National Park.  
J. Gordon Edwards.  
Source of Support: ?.  
Initiated 1947.  
Ongoing.
- H. Ecology of western redcedar groves in the Northern Rocky Mountains.  
Frederic Johnson.  
Source of Support: ?.  
Initiated 1979.  
Completion 1982.
- L. Glaciologic investigations of Sperry Glacier.  
Charles Dalby.  
Source of Support: ?.  
Initiated 1974.  
Ongoing.
- J. Border Staion water chemistry.  
Jack Stanford, Yellow Bay Biological Station, Kalispell, MT.  
Source of Support: ?.  
Initiated ?  
Ongoing.

Grand Teton National Park

- I. Studies Conducted By Park Personnel.
- A. Ecological effects and biotic succession following the 1974 Waterfalls Canyon fire.  
William J. Barmore, Jr.  
Initiated 1974.  
Ongoing.

- B. Snake River cutthroat trout investigations.  
Pete Hayden.  
Initiated 1964.  
Ongoing.
- II. Studies Supported With National Park Service Funds.
- A. Contemporary tectonics and seismicity of the Teton and Southern Yellowstone fault systems.  
Robert Smith, University of Utah, Salt Lake City, UT.  
Additional funding from: The University of Wyoming.  
Initiated 1980.  
Completion 1982.
- III. Studies Supported By Universities And Allied Funding Sources.
- A. Parasites of ungulates in the Jackson Hole area: scarabaeoid beetles acting on lungworm, Dictyocaulus hadweni, larvae in feces.  
Robert C. Bergstrom, University of Wyoming, Laramie.  
Source of Support: University of Wyoming.  
Initiated 1976.  
Completion 1984.
  - B. Bird population in a cottonwood community.  
Kenneth L. Diem, University of Wyoming, Laramie.  
Source of Support: University of Wyoming.  
Initiated 1980.  
Ongoing.
- IV. Studies Supported By Funds From Other Sources.
- A. Differential pairing and mating in the primitive insect Cyphoderris strepitans (Orthoptera: Haglidae).  
Glenn Morris, University of Toronto, Toronto, Ontario, Canada.  
Source of Support: Canadian National Research Council.  
Initiated 1982.  
Completion 1982.
  - B. Seasonal changes in brown adipose tissue of Microtus montanus from a natural population.  
Aelita Pinter, University of New Orleans, New Orleans, LA.  
Source of Support: Personal funding.  
Initiated 1981.  
Completion 1982.
  - C. Effects of environmental variables on some physiological responses in Microtus montanus under natural conditions.  
Aelita Pinter, University of New Orleans LA.  
Initiated 1969.  
Ongoing.

- D. Biostratigraphic and biogeographic implications of Miocene mammals from Jackson Hole, Wyoming.  
Anthony Barnosky, University of Washington, Seattle.  
Source of Support: National Science Foundation.  
Initiated 1980.  
Completion 1982.
- E. Quantity and quality of elk winter range and minimal wintering requirements of elk.  
Russell Robbins, U.S. Fish and Wildlife Service, Wildlife Research Center, Denver, CO.  
Source of Support: U.S. Fish and Wildlife Service.  
Initiated 1977-78.  
Ongoing.
- F. Winter ecology and migration of the Gros Ventre Buttes mule deer herd, Jackson Hole, Wyoming  
T. Campbell, Biota Research and Consulting, Inc., and T. Clark, Idaho State University, Pocatello.  
Source of Support: Boone and Crockett Club, Idaho State University, Spring Creek Ranch, and Biota Research and Consulting, Inc.  
Initiated 1979.  
Ongoing.
- G. Social ecology of free-ranging coyotes.  
M. Bekoff and M. Wells, University of Colorado, Boulder.  
Source of Support: National Science Foundation.  
Initiated 1980.  
Completion 1983.

V. Publications.

Wind Cave National Park

- I. Studies Conducted By Park Personnel
  - A. Natural mortality of elk and bison in Wind Cave National Park.  
Park Research Biologist and other members of Park staff.  
Initiated 1977.  
Ongoing.
  - B. The effect of ungulates on abundance and distribution of trees and shrubs.  
Park Research Biologist and other members of Park staff.  
Initiated 1977.  
Ongoing.
  - C. The effect of grazing by bison and elk on prairie plant communities.

- Park Research Biologist.  
Initiated 1981.  
Completion 1983-84.
- D. Predator activities on black-tailed prairie dog towns.  
Park Research Biologist.  
Initiated 1981.  
Ongoing.
- E. Mineral balance in elk and bison.  
Park Research Biologist and Dr. Hazel Shave, South Dakota State University, Brookings.  
Initiated 1981.  
Completion 1982.
- II. Studies Supported With National Park Service Funds.
- A. Prairie dog dispersal activities.  
Monte Garrett, Iowa State University, Ames, IA  
Initiated 1979.  
Completion 1982.
- B. The effect of fire on bird and small mammal communities in the grasslands of Wind Cave National Park.  
Douglas Shown, Michigan Tech. University, Houghton.  
Initiated 1980.  
Completion 1983.
- III. Studies Supported By Universities And Allied Funding Sources.
- A. Social behavior of prairie dogs.  
John Hoogland, Princeton University, Princeton, NJ.  
Source of Support: National Science Foundation.  
Initiated 1979.  
Completion 1982-83.
- B. The role of natural herbivores in selection of grazing adapted plants.  
Beth Painter, Colorado State University, Fort Collins.  
Source of Support: National Science Foundation.  
Initiated 1981.  
Completion 1982-83.
- C. Distribution and ecology of C<sub>3</sub> and C<sub>4</sub> grasses in Wind Cave National Park.  
Steve Archer, Colorado State University, Fort Collins.  
Source of Support: National Science Foundation.  
Initiated 1981.  
Completion 1982-83.

- IV. Studies Supported By Funds From Other Sources.
- A. Food habits and predator-prey relationships of the bobcat in the Southern Black Hills.  
Dave Nomson, South Dakota State University, Brookings.  
Source of Support: State of South Dakota.  
Initiated 1979.  
Completion 1982.
- B. Social behavior and reproductive strategies of the black-billed magpie.  
Debbie Buitron, University of Minnesota, Minneapolis.  
Source of Support: Personal and Bell Museum, University of Minnesota.  
Initiated 1979.  
Completion 1982.

V. Publications.

Yellowstone National Park

- I. Studies Conducted By Park Personnel.
- A. Plant ecology studies.  
Don G. Despain.  
Initiated 1968.  
Ongoing.
- B. Bison ecology studies.  
Mary Meagher.  
Initiated 1969.  
Ongoing.
- C. Animal ecology studies.  
Mary Meagher.  
Initiated 1980.  
Ongoing.
- D. Study of thermal features in Yellowstone National Park.  
Roderick A. Hutchinson.  
Initiated 1974.  
Ongoing.
- II. Studies Supported With National Park Service Funds.
- A. Characterization of soil in Yellowstone National Park.  
Lindo Bartelli, Michigan Tech. University, Houghton.  
Initiated 1980.  
Completion 1982.
- B. Quantitative assessment of thermal features of the southwest

portion of Yellowstone National Park.  
David S. Chapman, University of Utah, Salt Lake City.  
Initiated 1981.  
Completion 1982.

- C. Pleistocene events in the Yellowstone area.  
John M. Good, National Park Service.  
Initiated 1981.  
Completion 1983.

### III. Studies Supported By Universities And Allied Funding Sources.

- A. Beetle infestation: cycling and succession in lodgepole pine forest.  
William H. Romme, Eastern Kentucky University, Richmond and  
Dennis H. Knight, University of Wyoming, Laramie.  
Source of Support: University of Wyoming.  
Initiated 1981.  
Completion 1982.
- B. White pelican reproduction in the Molly Islands breeding colony,  
Yellowstone National Park.  
Kenneth L. Diem, University of Wyoming, Laramie.  
Source of Support: University of Wyoming.  
Initiated 1978.  
Ongoing.
- C. Dendrochronology in Yellowstone fossil forest.  
Michael Arct and Arthur Chadwick, Loma Linda University, Loma  
Linda, CA.  
Source of Support: Geoscience Research Institute, Loma Linda  
University.  
Initiated 1981.  
Completion 1982.
- D. Ecological studies on parasites of the Gibbon elk herd.  
David E. Worley, Montana State University, Bozeman.  
Source of Support: Montana State University.  
Initiated 1978.  
Ongoing.
- E. Parasites of ungulates in the Jackson Hole area: scarabaeoid  
beetles acting on lungworm, *Dictyocaulus hadweni*, larvae in feces.  
Robert C. Bergstrom, University of Wyoming, Laramie.  
Source of Support: University of Wyoming.  
Initiated 1976.  
Completion 1984.
- F. Biology of thermal spring systems in western North America.  
Samuel D. Rushforth and Jack D. Brotherson, Brigham Young  
University, Provo, UT.  
Source of Support: Brigham Young University.

Initiated 1981.  
Completion 1986.

- G. Study of Yellowstone and Lost Creek tuffs.  
Tammy Wolcott, University of Calgary, Alberta, Canada.  
Source of Support: University of Calgary.  
Initiated 1981.  
Ongoing.
- H. Microbial ecology of anaerobic decomposition in hot spring algal-bacterial mats.  
David M. Ward, Niels P. Revsbech and Tim Tayne, Montana State University, Bozeman.  
Source of Support: National Science Foundation.  
Initiated 1977.  
Completion 1982.
- I. Competition and reproduction in American bison cows.  
Allen T. Rutberg, University of Washington, Seattle.  
Source of Support: American Museum of Natural History.  
Initiated 1981.  
Completion 1982.
- J. Fall lotic algal communities of north central Yellowstone National Park.  
Scott E. Belanger, Bowling Green State University, Bowling Green, OH.  
Source of Support: Bowling Green State University.  
Initiated 1981.  
Completion 1982.
- K. The Miridae (Insecta: Hemiptera) associated with coniferous trees (with special emphasis on Pinus contorta).  
John D. Lattin, Oregon State University, Corvallis.  
Source of Support: Oregon State University and National Science Foundation.  
Initiated 1978.  
Completion 1983.
- L. Fall planktonic rotifers of north central Yellowstone National Park.  
John R. Lauth, Bowling Green State University, Bowling Green, OH.  
Source of Support: Bowling Green State University and personal funds.  
Initiated 1981.  
Completion 1982.
- M. Alpha activity and background radiation of the natural environment of Yellowstone National Park.  
Robert K. Lewis, University of Wyoming, Laramie.  
Source of Support: University of Wyoming and Wyoming Game and Fish Department.

Initiated 1981.  
Completion 1982.

- N. Biochemical variation and hybridization in Myotis lucifugus and M. yumanensis.  
Aida Parkinson, University of New Mexico, Albuquerque.  
Source of Support: University of New Mexico and American Museum Natural History.  
Initiated 1981.  
Completion 1982.
- O. Research of fluoride effects in wildlife and vegetation.  
James L. Shupe, H. B. Peterson and A. E. Olson, Utah State University, Logan.  
Source of Support: Utah Agriculture Experiment Station, U.S. Department of Energy and private industry.  
Initiated 1956.  
Completion 1986.

IV. Studies Supported By Funds From Other Sources.

- A. Petrology of the Yellowstone Plateau volcanic field.  
R. L. Christiansen, U.S. Geological Survey, Menlo Park, CA.  
Source of Support: United States Geological Survey.  
Initiated 1974.  
Ongoing.
- B. Remote monitoring of geothermal features.  
Irving Friedman and Daniel Norton, U.S. Geological Survey, Denver, CO.  
Source of Support: United States Geological Survey.  
Initiated 1980.  
Completion 1991.
- C. Rocky Mountain acidification study.  
James H. Gibson and Robert Johnson, Colorado State University, Fort Collins, James N. Galloway, University of Virginia, Charlottesville, Carl Shofield, Cornell University, Cornell, NY. William McFee, Purdue University, Lafayette, IN.  
Source of Support: U.S. Fish and Wildlife Service.  
Initiated 1981.  
Completion 1982.
- D. Multiphase fluid flow in geothermal systems.  
Susan Werner Kieffer, U.S. Geological Survey, Flagstaff, AZ.  
Source of Support: U.S. Geological Survey.  
Initiated 1976.  
Completion ?.
- E. A theory for volcanic action in certain Absaroka volcanoes.  
G. A. Miller.

Source of Support: Private funds.  
Initiated 1979.  
Completion 1983.

- F. Seismograph sensing.  
Andrew M. Pitt, U.S. Geological Survey, Menlo Park, CA.  
Source of Support: U.S. Geological Survey.  
Initiated 1978.  
Ongoing.
- G. Biology of trout in thermally enriched environment - Firehole River.  
Samuel Luoma, U.S. Geological Service.  
Source of Support: U.S. Geological Service.  
Initiated 1975.  
Ongoing.
- H. Isolation and characterization of fermentative anaerobes from thermal areas.  
Thomas Ng and Michael E. Himme, Solar Energy Research Institute.  
Source of Support: U.S. Department of Energy.  
Initiated 1980.  
Ongoing.
- I. Impact of forest fire on the nutrient influx into Heart Lake, Yellowstone National Park.  
J. Robert Stottlemeyer and Riley Burdett, Michigan Technological University, Houghton.  
Source of Support: U.S. Man and Biosphere.  
Initiated 1980.  
Completion 1982.
- J. The Nature Conservancy Wyoming Natural Heritage.  
Mark R. Stromberg and Robert Lichvar, The Nature Conservancy, Cheyenne, WY.  
Source of Support: Wyoming Natural Heritage Program.  
Initiated 1979.  
Ongoing.
- K. Ecology of Gallatin elk and range relationships.  
Graham Taylor, Montana Department of Fish, Wildlife and Parks.  
Source of Support: Montana Department of Fish, Wildlife and Parks.  
Initiated 1959.  
Ongoing.
- L. Basic stream and lake inventory-all waters of Yellowstone National Park.  
U.S. Fish and Wildlife Service, Yellowstone National Park.  
Source of Support: U.S. Fish and Wildlife Service.  
Initiated 1965.  
Ongoing.

- M. Elk distribution and movements in relation to multiple uses in the north Absaroka mountain range.  
William Rudd, University of Wyoming, Laramie.  
Source of Support: U.S. Forest Service and Wyoming Game and Fish Department.  
Initiated 1979.  
Completion 1982.
- N. Classifying butterflies of Yellowstone.  
Jeffrey R. Saffle, University of Utah, Salt Lake City.  
Source of Support: ?.  
Initiated ?.  
Completion ?.
- O. Relative digestibility of Artemesia tridentata subspecies and Artemesia nova by elk, deer and domestic sheep and preference by elk and deer on Gardiner hunting district.  
Karl Striby, Montana State University, Bozeman.  
Source of Support: ?.  
Initiated ?.  
Completion ?.
- P. Ecology of thermal dragonfly populations.  
R. G. Wiegert and A. G. Chalmers, University of Georgia, Athens.  
Source of Support: ?.  
Initiated 1979.  
Completion 1983.
- Q. Population, status, and ecology of grizzly bears in Yellowstone National Park and vicinity.  
R. R. Knight, Interagency Grizzly Bear Study, Montana State University, Bozeman.  
Source of Support: Multi-agency.  
Initiated 1973.  
Ongoing.
- R. Mushrooms of Grand Teton and Yellowstone National Parks.  
Kent McKnight, Mycology Laboratory, U.S. Department of Agriculture, Beltsville, MD.  
Source of Support: U.S. Department of Agriculture and University of Wyoming.  
Initiated 1980.  
Ongoing.
- S. Bryophytes of selected regions of Yellowstone National Park.  
D. H. Norris and David Nakamura, Humboldt State University, Arcata, CA.  
Source of Support: ?.  
Initiated 1980.  
Completion ?.

- T. Effects of hiker and horse trampling on tree growth in Northern Rockies.  
DeAna Lynn Nasseth, Baylor University, Waco, TX.  
Source of Support: ?.  
Initiated 1980.  
Completion ?.
- U. Study of clays representing ore forming environments.  
Mike Palin, New Mexico Tech. University, Socorro.  
Source of Support: U.S. Office of Surface Mining.  
Initiated 1981.  
Ongoing.
- V. Evaluation of lithospheric structure, seismicity, crustal deformation and possible magma sources at Yellowstone.  
Robert B. Smith, University of Utah, Salt Lake City.  
Source of Support: U.S. Geological Survey.  
Initiated 1960.  
Ongoing.
- W. Rock-water interaction.  
J. M. Thompson and R. O. Fournier, U.S. Geological Survey, Menlo Park, CA.  
Source of Support: U.S. Geological Survey.  
Initiated 1960.  
Ongoing.
- X. Study of water and steam from hot springs and vents.  
Alfred Truesdell, and Richard Makdisi, U.S. Geological Survey, Menlo Park, CA.  
Source of Support: U.S. Geological Survey.  
Initiated 1981.  
Ongoing.
- Y. Ecology and population abundance of cutthroat trout in the Yellowstone River, Yellowstone National Park.  
Jack Griffith and Daniel J. Shill, Idaho State University, Pocatello.  
Source of Support: U.S. Fish and Wildlife Service.  
Initiated 1981.  
Ongoing.
- Z. Bacterial content of soil from abandoned dumpsites.  
Ray Poulin, University of Maine, Orono.  
Source of Support: Personal funds.  
Initiated 1981.  
Completion 1983.
- A<sup>1</sup> Study of native undisturbed vegetation in Cooke City area.  
Ray W. Brown.  
Source of Support: Intermountain Forest and Range Experiment Station, U.S. Forest Service.

- Initiated ?.  
Completion ?.
- B<sup>1</sup> Thermophillic bacteria for conversion of biomass to ethyl alcohol.  
E. B. Christiansen and Paul S. Nichols, University of Utah, Salt Lake City.  
Source of Support: ?.  
Initiated 1980.  
Completion 1982.
- C<sup>1</sup> Hybridization and genetic deformity of high altitude vascular flora.  
William J. Humphrey, Plant Taxonomy Division, Project Blue-snow.  
Source of Support: ?.  
Initiated ?.  
Completion ?.
- D<sup>1</sup> Stable isotopic composition of bacteria and algae that inhabit thermal areas.  
Marilyn F. Estep, Carnegie Institution, Washington, D.C.  
Source of Support: Carnegie Institution.  
Initiated 1981.  
Completion 1983.
- E<sup>1</sup> Geochemical study of Calcite Springs, Yellowstone National Park, WY (to be used as a possible geothermal model).  
Homestake Mining Company, Gardiner, MT.  
Initiated 1981.  
Completion 1982.
- F<sup>1</sup> Obtain waters low in natural tritium for purposes of ground-water dating of oil shale related waters from Utah.  
McDonald Wrenn, university of Utah, Salt Lake City.  
Source of Support: ?.  
Initiated 1981.  
Completion ?.
- G<sup>1</sup> Thermal measurements and chemical analysis of water within Black Sand, Norris, and Mud Volcano Geyser Basins.  
Donald Wumek and Thomas Gill, Oakland Community College, Auburn Heights, MI.  
Source of Support: ?.  
Initiated 1979.  
Completion 1983.
- H<sup>1</sup> Depositional environments of Yellowstone fossil forests at Specimen Ridge.  
Richard F. Uretich, University of Massachusetts, Amherst.  
Source of Support: ?.  
Initiated 1981.  
Ongoing.