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GEOLOGY IN THE NATIONAL PARK SERVICE: AN ADMINISTRATIVE HISTORY

PHASE II REPORT

by
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NATIONAL PARK SERVICE,
DENVER SERVICE CENTER—RESOURCE PLANNING

FEBRUARY, 1999

Explosive Volcanic Eruptions, Hawaii Volcanoes NP

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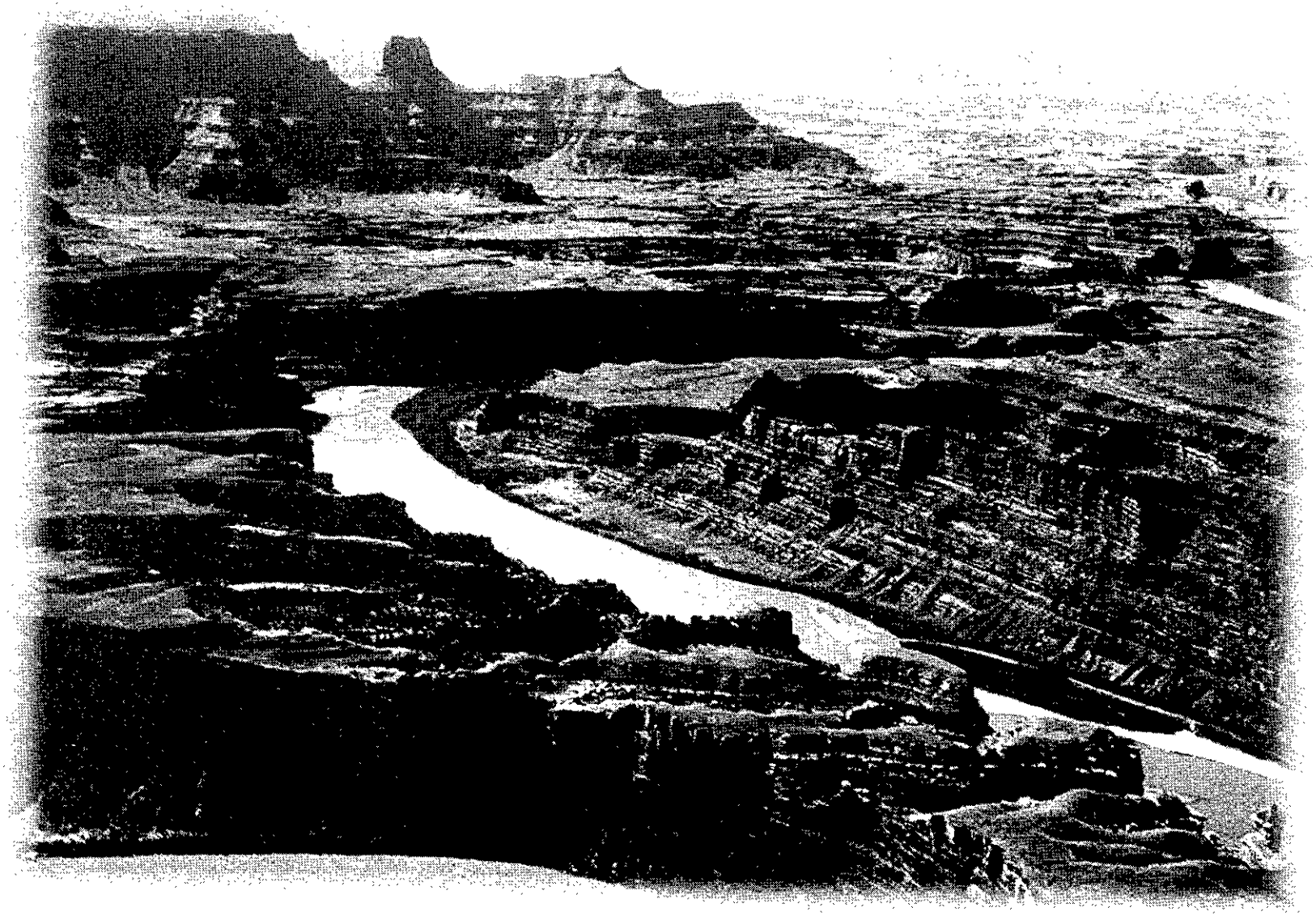
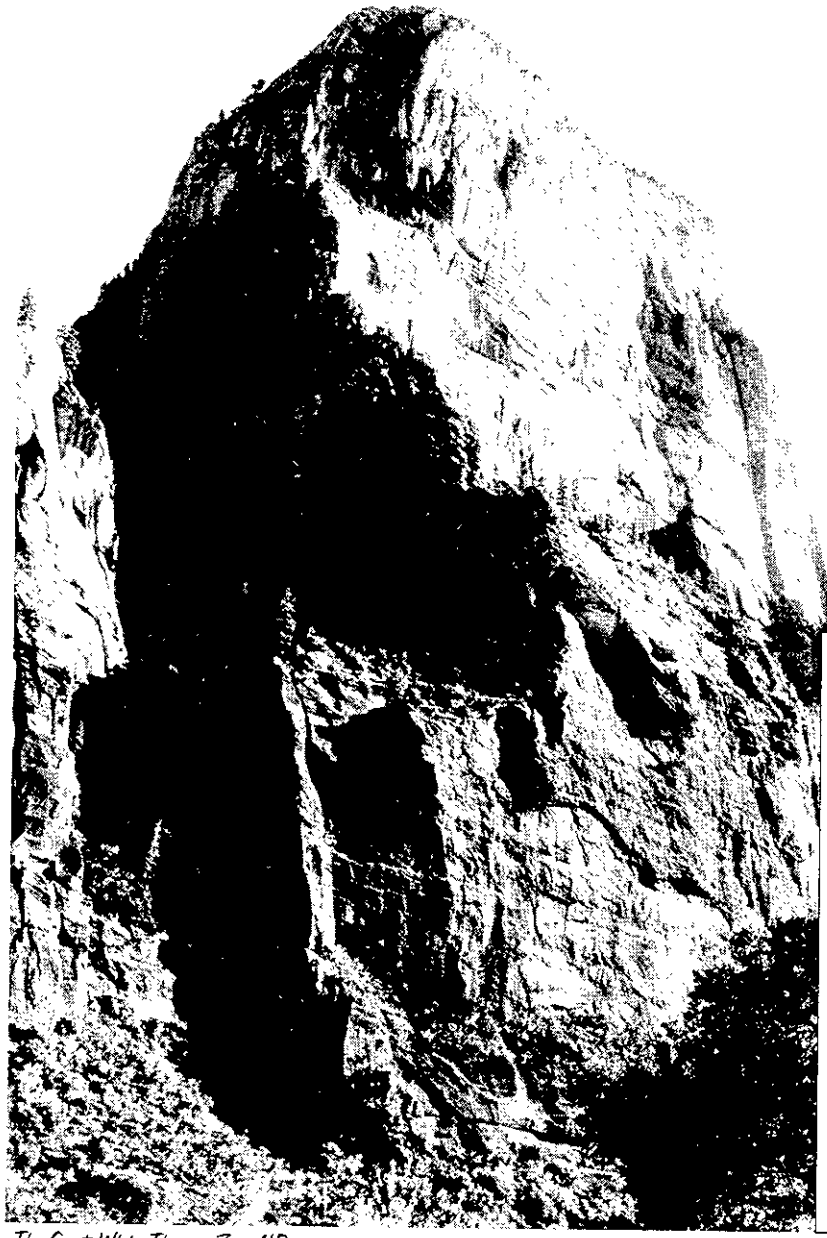
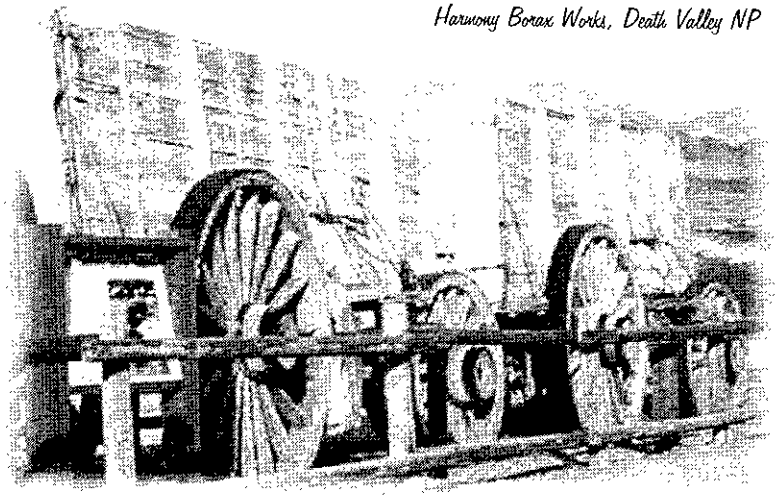


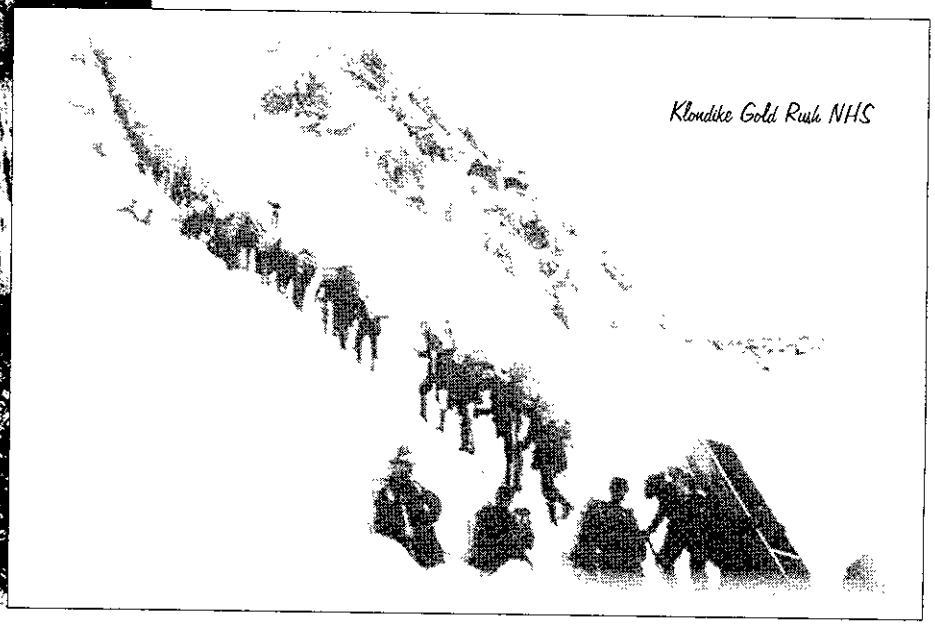
Canyonlands NP



The Great White Throne, Zion NP



Harmony Borax Works, Death Valley NP



Klondike Gold Rush NHS

INTRODUCTION—PHASE II REPORT

This report, entitled *Geology in the National Park Service: An Administrative History; Phase II Report*, has been prepared to satisfy in part the requirements as described in the project agreement for the administrative history study approved by William P. O'Brien, Program Manager, Intermountain Support Office-Denver, Cultural Resources & National Register Program Services, and Robert D. Higgins, Supervisory Geologist, Denver-based WASO, Geological Resources Division, on September 24, 1998.

This Phase II report consists of the following components:

(1) scoping the larger project (i.e., researching and writing the administrative history);

(2) establishing key themes for the administrative history;

(3) identifying key research repositories/resources and persons to interview; and

Marching Men, Arches NP

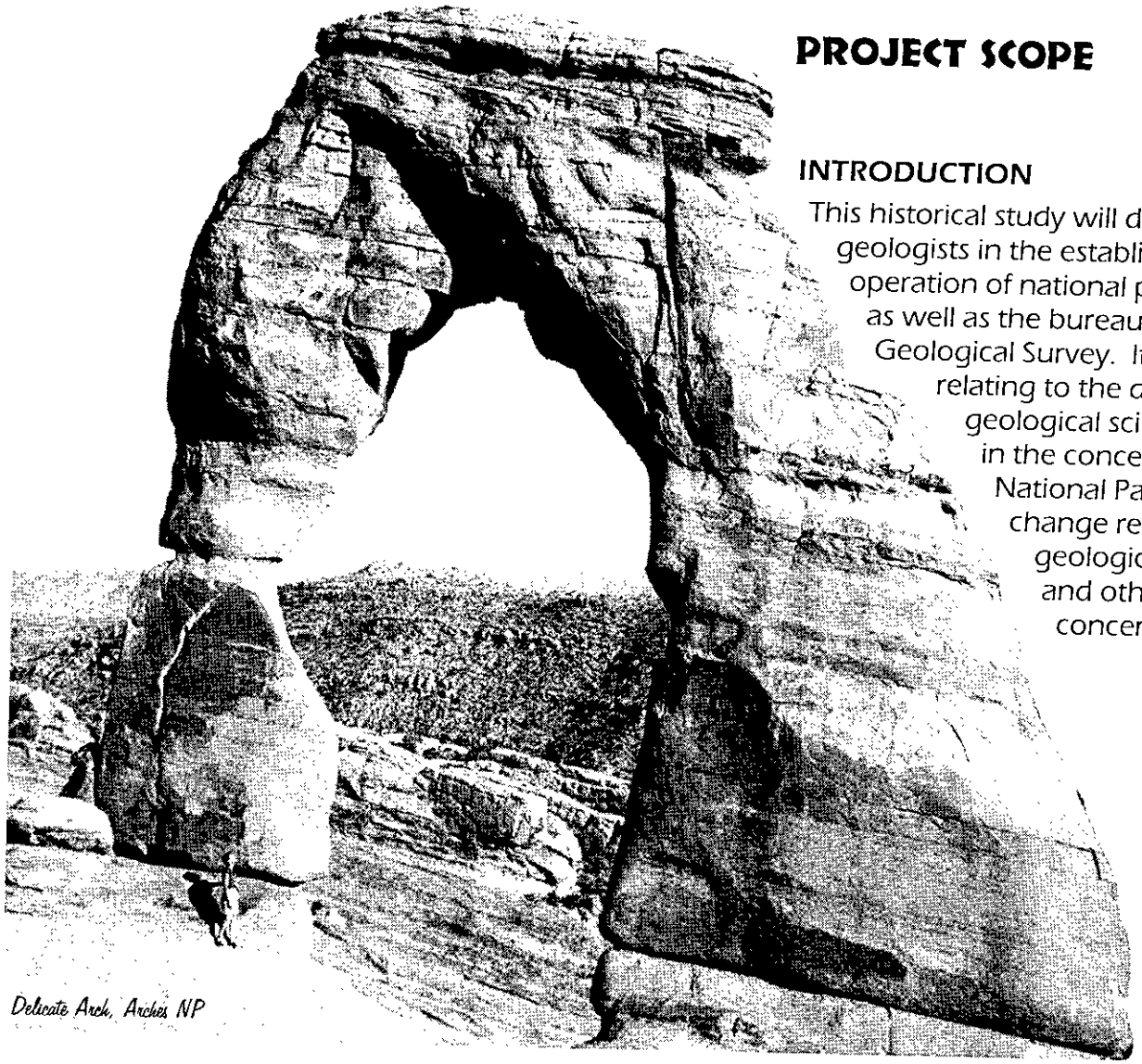
(4) reporting on research findings to date based on preliminary research in Denver metropolitan area repositories and contacts with repositories located outside the Denver area.

This phase of the project also includes preparation of a cost estimate for the subsequent phases of the project. In addition, an abstract for a proposed paper that was to be presented at the George Wright Society's annual conference at Asheville, North Carolina, in March 1999 was prepared.

It is intended that this Phase II report will provide a foundation of information that will serve as a springboard for additional research and completion of the administrative history.

ADMINISTRATIVE HISTORY

PROJECT SCOPE



Delicate Arch, Arches NP

INTRODUCTION

This historical study will document the role of geology and geologists in the establishment, development, and operation of national parks and the National Park Service as well as the bureau's relationship to/with the U.S. Geological Survey. It will emphasize important issues relating to the development and expansion of geological science and the geological profession in the conception and expansion of the National Park System, policy formulation and change relating to management of geological resources in the national parks, and other topics of ongoing management concern.

DEFINITIONS

Geologic Resources

Significant geologic resources are found in more than 160 National Park System units, many of which were established to recognize and protect the nation's outstanding geologic features. Of equal importance to the entire spectrum of park management are all geologic resources in the National Park System, which consist of the materials of the Earth, the processes that act on those materials and the resultant features, the chemistry and composition of its constituent materials, the products formed, and the history of the planet and its life forms since its origin. These resources include minerals, rocks, fossils, cave and karst systems, coastlines, glaciers, volcanoes, faults, landforms, landslides, structures, fluvial systems, sediments, soils, and stratigraphic relations, and the processes forming or altering such geologic features and products.

Geologic Resource Management

The fundamental objectives of National Park Service geologic resource management, as prescribed in policy, are to manage the geologic resources of the National Park System to maintain, restore, and perpetuate their inherent integrity and, when consistent with the foregoing, provide opportunities for visitors to benefit and enjoy geologic environments which are evolving through geologic processes minimally influenced by human activities.

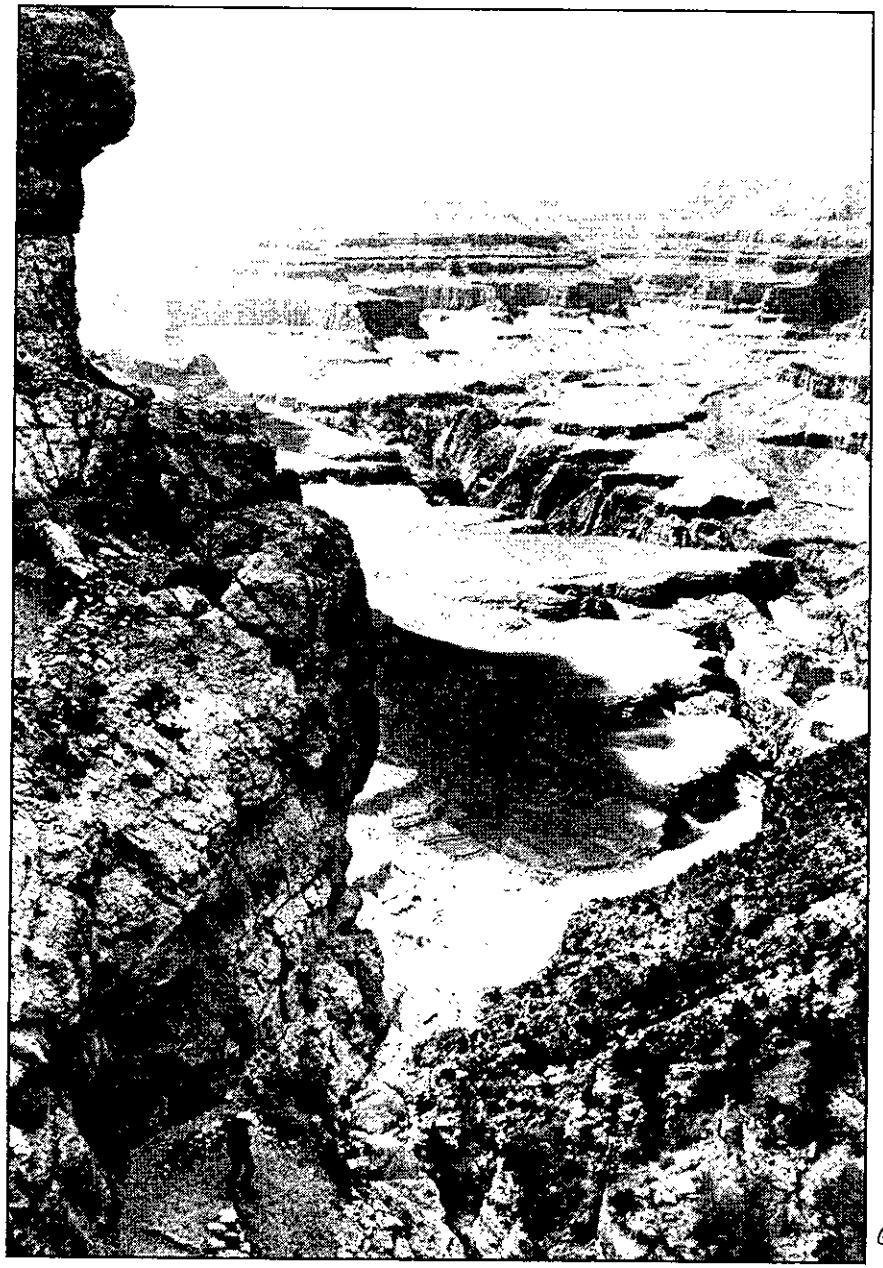
Geologic resource management is the function by which the National Park Service strives to understand geologic features, processes, and human induced effects; minimize and mitigate the potential effects of human activities; undertake restoration activities where previous human activities have impacted geologic features and processes; monitor geologic resources for ongoing or future trends; protect existing geologic features and processes; and interpret these systems and processes to the park visitor.

Geologic resource management can be broken down into six major activity categories. These are:

(1) Research—Investigation aimed at the discovery and interpretation of facts, the revision of accepted theories in light of new facts, or the development of practical applications of such new revised theories.

(2) Inventory and Monitoring—Acquisition, management, and analysis of information on geologic features and processes, and the systematic collection and analysis of resource data to predict or detect natural and human induced changes to provide the basis for appropriate management response.

(3) Mitigation and Restoration—Preservation of the integrity of existing geologic forms and processes for National Park System units consistent with park management objectives in relation to harm or potential harm from human activities within or outside the park, and conversion of geologic resources, altered by human activity, to a more functional or natural state consistent with management objectives.



Grand Canyon NP

As such, restoration encompasses related activities including natural resource reclamation or rehabilitation and remediation.

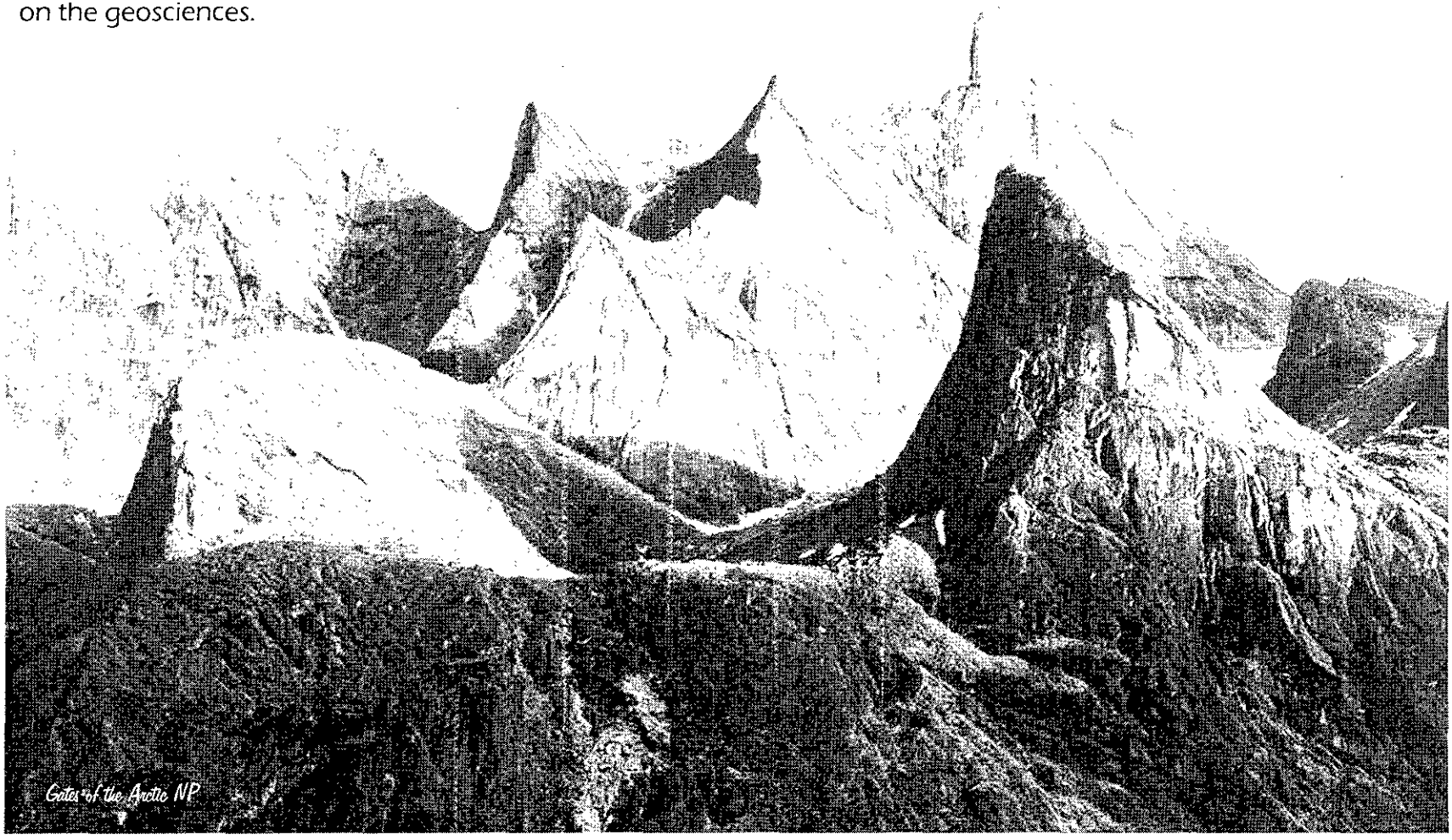
(4) Protection—Prevention of overuse, vandalism, or destruction of geologic resources by man-made causes and enforcement of laws and regulations and implementation of policies affecting geologic resource management.

(5) Interpretation—Communicating to park visitors the nature and significance of park geologic resources and processes not only increases the visitor's enjoyment of the park and park values, but also encourages public involvement in the protection of geologic resources.

(6) Administration—Administration of geologic resource management programs involves planning, priority setting, allocation of funding and staffing resources, contracting, training, and other activities which help support the aforementioned geologic resource management activities.

OUTLINE OF KEY THEMES

Within the purview of each of the key themes (listed below in general chronological order), the following topics will be considered: (1) significant topics in geological history; (2) prominent developments and trends in the history and philosophy of the geosciences; (3) historical events and their interrelationship with national parks and the geosciences; (4) relationship of national parks and the National Park Service with the U.S. Geological Survey; and (5) changes and trends in National Park Service organization and management and the impact of these developments on the geosciences.



A. Introduction — Historical development/status of geological science/geologist profession in pre-Civil War United States

1. Establishment and impact of state geological surveys
2. Impact of western lands acquisition during the Era of Manifest Destiny
3. Establishment of the U.S. Department of the Interior – 1849

B. Historical development/status of geological science/geologist profession in post-Civil War United States

1. Historical development/status of geological science/geologist profession in federal/state governments in post-Civil War United States
2. Significant surveying expeditions in which geologic studies were the main or prominent objects
   a. Geological Exploration of the Fortieth Parallel (Clarence King)
   b. Geological and Geographical Survey of the Territories (F. V. Hayden)
   c. Geographical and Geological Survey of the Rocky Mountain Region (John Wesley Powell)
   d. Geographical Survey West of the One Hundredth Meridian (George M. Wheeler)
3. Establishment and early historical development of the U. S. Geological Survey
4. Scientific geological and paleontologic expeditions sponsored by educational and scientific institutions

C. Role of geological science/geologist profession in establishment of early national parks and national monuments: 1872-1916

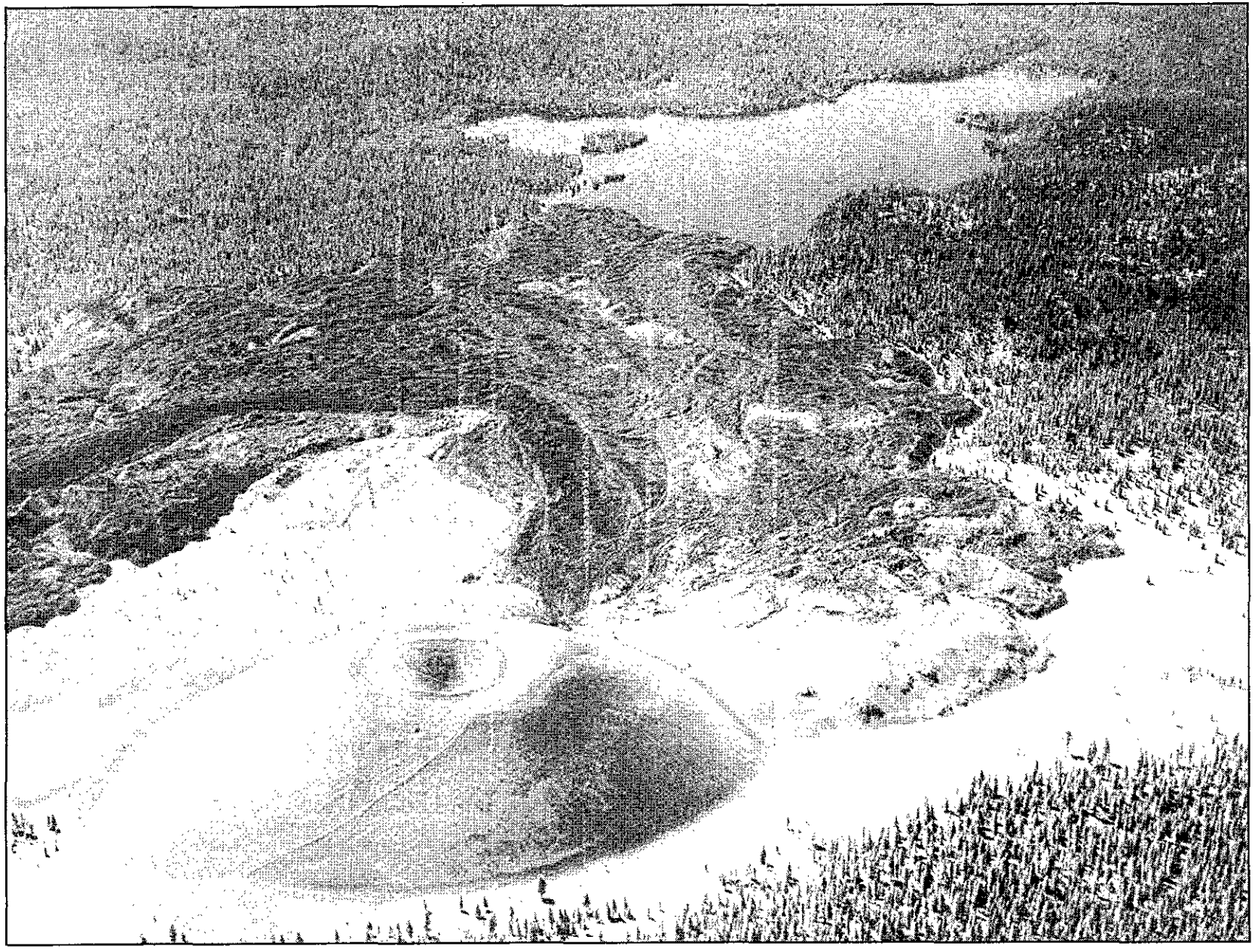
1. National Parks—Yellowstone, Yosemite, Mount Rainier, Crater Lake, Wind Cave, Mesa Verde, Glacier, Rocky Mountrain, Hawaii, Lassen Volcanic, etc.
2. Scientific National Monuments—Devils Tower, Petrified Forest, Natural Bridges, Lewis & Clark Cavern, Mukuntuweap, Shoshone Cavern, Rainbow Bridge, Colorado, Dinosaur, Sieur de Monts, Capulin Mountain, etc.

D. Role of geological science/geologist profession in establishment and early historical development of the National Park Service and expansion of the National Park System: 1916-1933

1. Significant role played by U.S. Geological Survey personnel in establishment and early development of the National Park Service.

Among the more prominent of these personnel were: Robert B. Marshall (first full-time executive detailed to day-to-day park administration prior to establishment of National Park Service); Guy Mitchell (assistant to the director, who participated in the National Parks Conference in 1911); Arthur E. Demaray (who started as a draftsman and would later become Director of the

Cinder Cone, Lassen Volcanic NP



National Park Service); Isabelle F. Story (who would become the National Park Service editor-in-chief); Washington B. (Dusty) Lewis (Yosemite superintentendent); Dewitt L. Reaburn (Mount Rainier superintendent); J. Ross Eakin (Glacier, Grand Canyon, and Great Smoky Mountains superintendent); C.L. Nelson (Mount Rainier superintendent); and Richard Evans (Zion superintendent).

2. Role of geological science/geologist profession in expansion of the National Park System

Among the areas having significant geologic resources that were added to the system during this period were: Mt. McKinley National Park, Katmai National Monument, Grand Canyon National Park, Zion National Park, Hot Springs National Park, Fossil Cycad National Monument, Carlsbad Cave National Monument, Craters of the Moon National Monument, Glacier Bay National Monument, Lava Beds National Monument, Great Smoky Mountains National Park, Shenandoah National Park, Mammoth Cave National Park, Bryce Canyon National Park, Acadia National Park, Grand Teton National Park, Badlands National Monument, Arches National Monument, Carlsbad Caverns National Park, Isle Royale National Park, Great Sand Dunes National Monument, Grand Canyon National Monument, White Sands National Monument, Death Valley National Monument, and Black Canyon of the Gunnison National Monument.

3. Geologic resource management activities (Prominent management activities and trends in National Park System units will be discussed)

   a. Research

   b. Inventory and monitoring

   c. Mitigation and restoration

   d. Protection

   e. Interpretation

   f. Administration

E. Role of geological science/geologist profession in expansion and management of the National Park System: 1933-1940

1. Expansion of the National Park System

   a. Addition of National Monuments having significant geologic resources to the National Park System as a result of the Reorganization of 1933 (Primarily transfer of national monuments from Department of Agriculture established between 1907 and 1933)

   b. Addition of new national parks and national monuments

   c. Addition of new unit genre, such as national seashores, to National Park System

2. Impact of Depression-era funding/manpower programs on geological science/geologist profession in National Park System

3. Geologic resource management activities (Prominent management activities and trends in National Park System units will be discussed)

a. Research

b. Inventory and monitoring

c. Mitigation and restoration

d. Protection

e. Interpretation

f. Administration

F. Role of geological science/geologist profession in expansion and management of National Park System: 1940-1963

1. Expansion of the National Park System

   a. Addition of new national parks and national monuments

   b. Addition of new genre units to system

Quarry Face, Dinosaur NM

Horn Island, Gulf Islands NS

2. Geologic resource management activities (Prominent management activities and trends in National Park System units will be discussed)

   a. Research

   b. Inventory and monitoring

   c. Mitigation and restoration

   d. Protection

   e. Interpretation

   f. Administration

3. Establishment and development of National Natural Landmarks program – 1962

G. Role of geological science/geologist profession in expansion and management of National Park System: 1963-1990s

1. Mission 66 and Parkscape U.S.A.
2. Leopold and National Academy reports
3. Environmental legislation and change
4. Geologic resource management activities (Prominent management activities and trends in National Park System units will be discussed)
   a. Research
   b. Inventory and monitoring
   c. Mitigation and restoration
   d. Protection
   e. Interpretation
   f. Administration
5. Expansion of the National Park System
   a. Addition of new national parks and national monuments
   b. New geological-type area designation—Ice Age National Scientific Reserve
   c. Broadening, strengthening, and implementation of National Natural Landmarks program (and Washington Office National Historic Landmarks program Geology theme study)
   d. Addition of new genre units, such as national lakeshores and national scenic rivers, to the National Park System

Yentna Glacier, Denali NP

H. The National Park System today

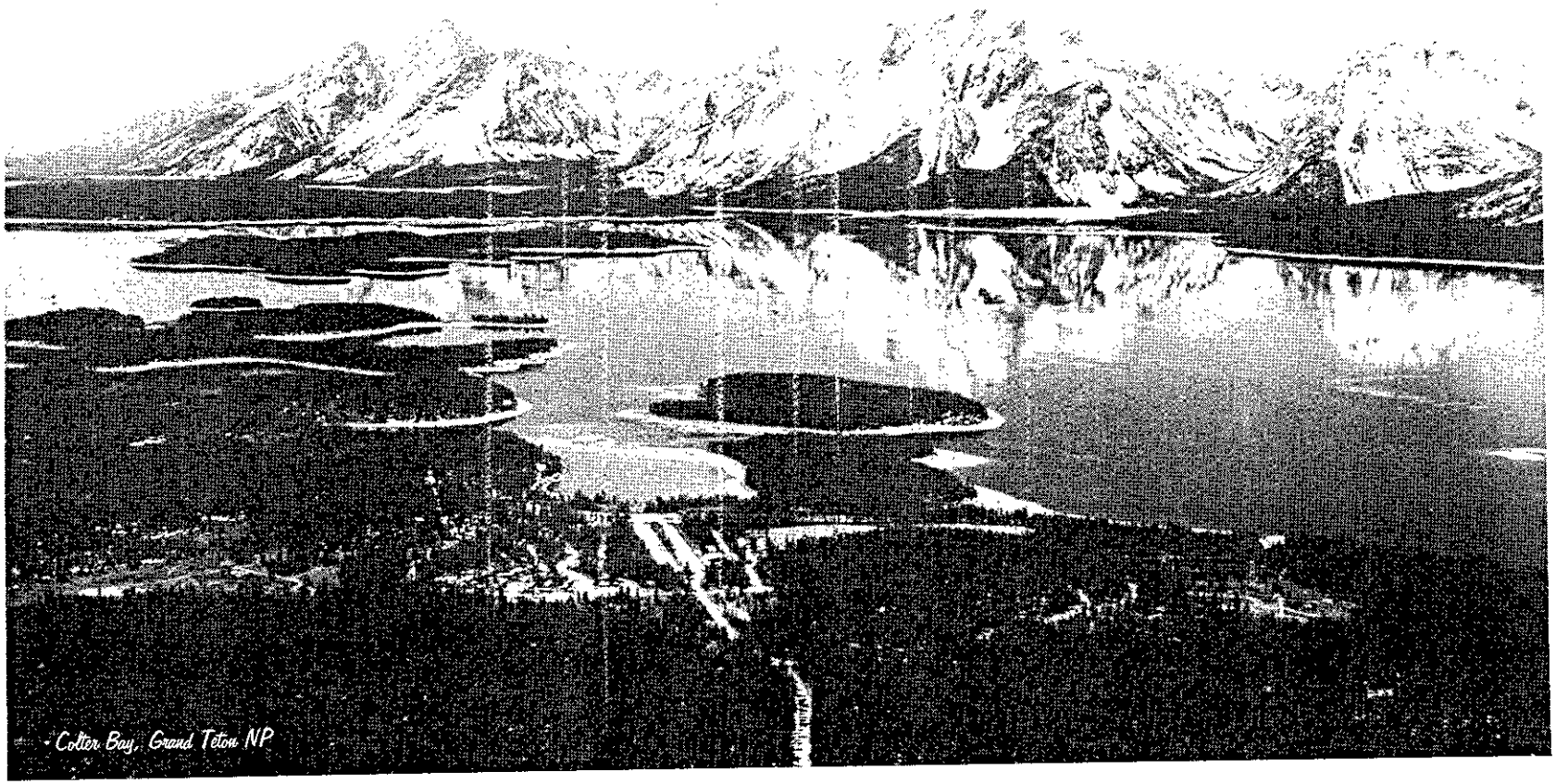
1. Status of geologic resource management
2. Listing of National Park System units having significant geological resources by category, such as shoreline, cave and karst, paleontologic, volcanic, etc.

(Alternatively, listing of National Park System units that contain examples of significant geologic features or processes, such as earthquakes and plate tectonics, igneous rocks, structure and metamorphic rocks, mountain building, weathering and

erosion of rocks, sedimentary rocks, rivers, streams, and underground water, deserts, glaciation, marine system, and stratigraphic concepts and fossils; etc.)

I. Epilogue

1. Vail Agenda
2. Present and future directions
   a. Natural ecosystems management
   b. Geologic issue paper
   c. Partnerships with U.S. Geologic Survey, Geological Society of America, and American Geological Institute



RESEARCH

PRINCIPAL DENVER METROPOLITAN AREA REPOSITORIES

Preliminary research has been conducted in the following Denver metropolitan area repositories to determine the usefulness of their holdings for the preparation of this administrative history. Findings and research assessments include:

Boulder, Colorado. Geological Society of America. (Contact – Kathleen May, Federal Government Liaison).

Library is of little use, primarily containing society's publications. Possesses useful material relating to present and future role of geology in ecosystem management.

Boulder, Colorado. University of Colorado, Jerry Crail Johnson Earth Sciences Library.

Possesses numerous geological studies and maps relating to National Park System units.

Denver, Colorado. Denver Public Library.

Possesses Conservation Library Center.

Golden, Colorado. Colorado School of Mines, Arthur Lakes Library.

Possesses numerous geological studies and maps relating to National Park System units. Also possesses comprehensive collection of U.S. Geological Survey publications.

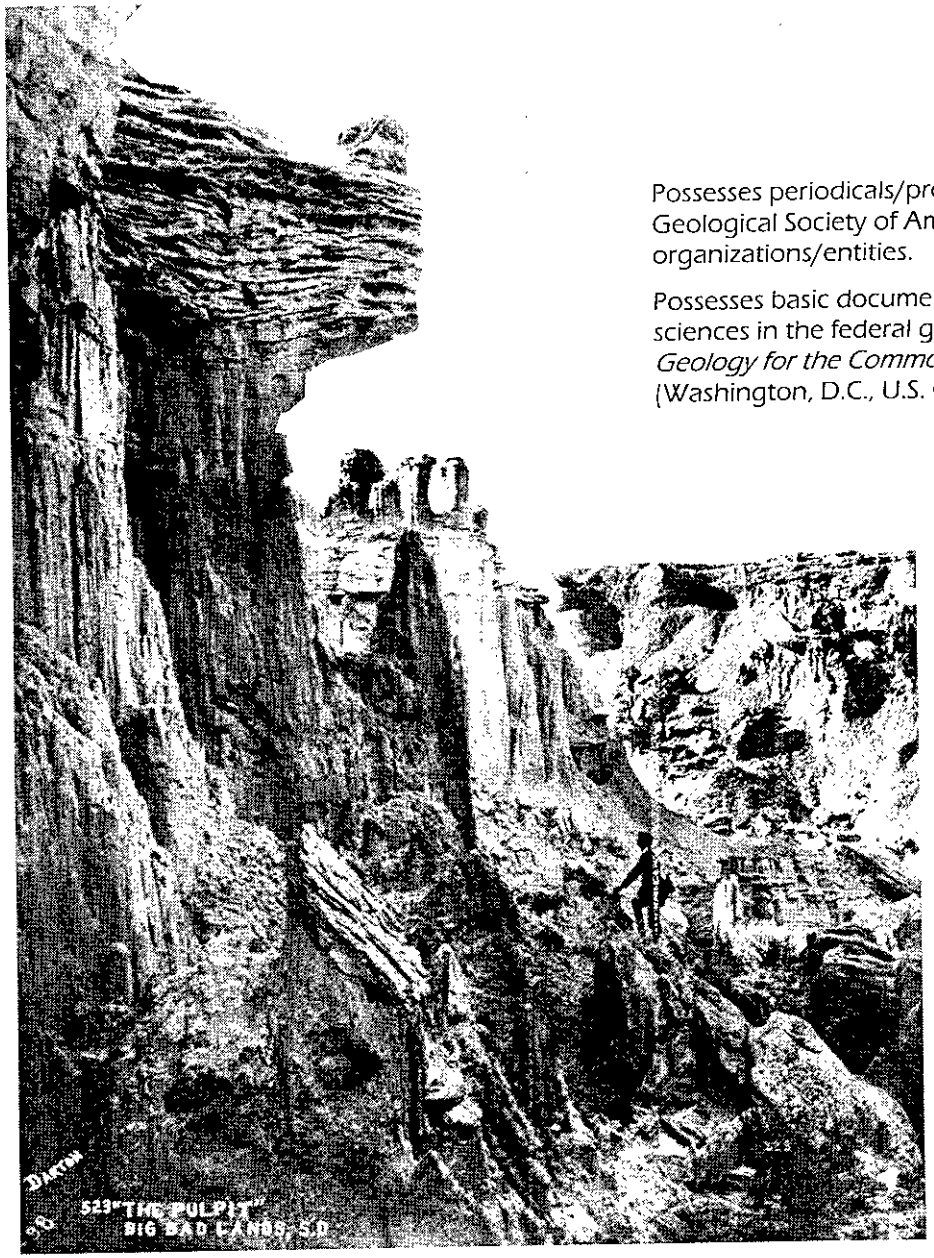
Lakewood, Colorado. National Park Service, Denver Service Center, Technical Information Center.

Possesses Annual Reports of the Director of the National Park Service, 1916-Present and numerous National Park Service geology studies relating to National Park System units dating back to the 1930s.

Lakewood, Colorado. U.S. Geological Survey Library and Special Collections. Denver Federal Center, Building 25. (Contact – Carol A. Edwards, Head, Field Records Library; Joseph McGregor, Head, Photo Library).

Possesses Field Records Library (for Lower 48 States – Alaska Field Records in U.S. Geological Survey Library in Anchorage) – These records consist of field notes prepared by U.S. Geological Survey geologists and comprise materials in U.S. Geological Survey custody from Washington that are not in Record Group 57 at the National Archives (Essentially, the majority of pre-1939 field records have been deposited in Record Group 57).

Possesses Photo Library (Searchable by photographer, geography, and geology).



The Pulpit, Badlands NP

Possesses periodicals/proceedings/publications of Smithsonian Institution, Geological Society of America, U.S. Geological Survey, and other geological organizations/entities.

Possesses basic documentary historical text for study of geology and geological sciences in the federal government: U.S. Geological Survey, *Minerals, Lands, and Geology for the Common Defense and General Welfare*, by Mary C. Rabbitt (Washington, D.C., U.S. Government Printing Office, 1979-86).

Volume 1, Before 1879, A History of Public Lands, Federal Science and Mapping Policy, and Development of Mineral Resources in the United States.

Volume 2, 1879-1904, A History of Geology in Relation to the Development of Public-Land, Federal Science, and Mapping Policies and the Development of Mineral Resources in the United States During the First 25 Years of the U.S. Geological Survey.

Volume 3, 1904-1939, A History of Geology in Relation to the Development of Public-Land, Federal-Science, and Mapping Policies and the Development of Mineral Resources in the United States From the 25th to the 60th Year of the U.S. Geological Survey.

PRINCIPAL RESEARCH REPOSITORIES OUTSIDE DENVER METROPOLITAN AREA

The principal repositories outside the Denver metropolitan area that will be visited and/or contacted for research purposes during the preparation of the administrative history include (in some cases preliminary contacts have been made):

Alexandria, Virginia. American Geological Institute. (Contact – David Applegate, Director of Government Affairs).

Berkeley, California. University of California, The Bancroft Library.

Robert B. Marshall Collection (among others).

Harrison, Nebraska. Agate Fossil Beds National Monument.

Harold Cook Papers (Paleontologist/geologist – Plains, Southwest, and Rocky Mountain geology, including Agate Fossil Beds and Dinosaur National Monuments).

Harpers Ferry, West Virginia. National Park Service, Harpers Ferry Center.

National Park Service History Collection (Contact – David Nathanson, Chief, Office of Library Services).

Bryant, Harold. "Justification for Augmented Conservation Program by the National Park Service," August 30, 1937.

Jesse Nusbaum Papers.

Museum Function in the National Park Service Collection.

National Park Service Conferences Collection.

Russell, Carl P. "The History and Status of Interpretive Work in National Parks," 1939.

Laramie, Wyoming. University of Wyoming, American Heritage Center, International Archive of Economic Geology Collections.

Fritiof Fryxell Collection (Geologist, First Park Naturalist, Grand Teton National Park, and researcher of Hayden Survey materials).

J. Volney Lewis Collection (National Park Service Geologist, 1934-61).

Edwin Dinwiddie Collection (U.S. Geological Survey Geologist who studied Grand Canyon geology from 1927-77).

Philadelphia, Pennsylvania. National Archives, Mid-Atlantic Region.

Record Group 79, Records of the National Park Service.

Records of Regional Offices. Region I (Richmond).

Records Concerning Work in States, 1935-44.

Records of the Regional Geologist, 1935-42.

Reston, Virginia. U.S. Geological Survey Library (Contact – Dr. Clifford M. Nelson, Chief, History Project, U.S. Geological Survey).

General Library Collections.

Historical Map Archives.

National Mapping Division Reference Collection.

San Francisco, California. National Archives, Pacific Sierra Region.

Record Group 79, Records of the National Park Service.

Records of Regional Offices, Region IV (Western Region).

Central Files of the Regional Geologist, 1936-40.

Monthly Activity Reports of Park Naturalists, 1935-53.

Washington, D.C.

Department of the Interior – Law Library and Natural Resources Library.

Library of Congress.

Geography and Map Reading Room.

Main Reading Room.

Manuscript Reading Room.

John C. Merriam Papers.

Newspaper and Current Periodical Reading Room.

Science Reading Room.

National Archives – Archives I (Washington, D.C.), Archives II (College Park, Maryland), and Washington National Records Center, Suitland, Maryland).

Record Group 48, Records of the Office of the Secretary of the Interior.

Records of the Patents and Miscellaneous Division, 1826-1943.

Records of the Lands and Railroads Division, 1849-1907.

General Records of the Office of the Secretary of the Interior, 1907-61.

Special Files of Department Officials, 1918-61.

Record Group 49, Records of the Bureau of Land Management.

General Records of the General Land Office and Bureau of Land Management, 1796-1969.

Records of Operating Divisions of the General Land Office, ca. 1796-1962 [Records of Division "R," [Forestry Division]].

Record Group 57, Records of the U.S. Geological Survey.

General Records, 1879-1986.

Administrative Records.

Program and Policy Records.

Records of the Geologic Division, 1867-1985.

General Records.

Record Group 79, Records of the National Park Service.

Records of the Office of the Secretary of the Interior Relating to National Parks and Monuments, 1872-1916.

Letters Received by the Office of the Secretary of the Interior Relating to National Parks, 1872-1907.

Index to Letters Received by the Patents and Miscellaneous Division Relating to National Parks and Reservations, 1905-07.

Registers of Letters Received by the Patents and Miscellaneous Division Relating to National Parks and Reservations, 1905-07.

Central Files.

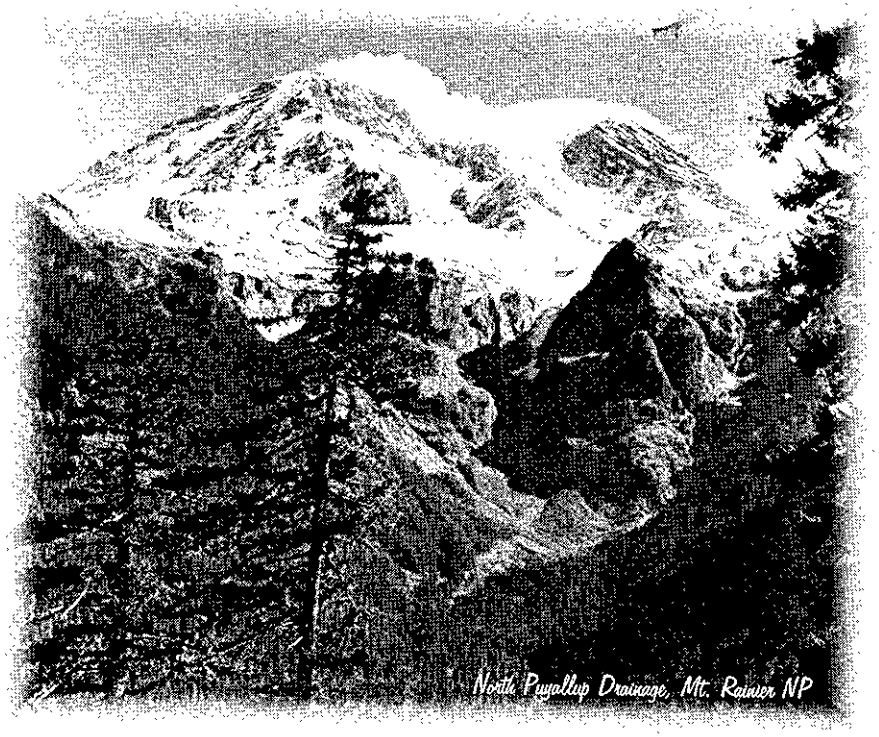
Records of the National Park Service.

General Records.

Central Files, 1907-39.

Central Classified Files, 1907-49.]

Nature Notes, 1927-35.


North Puyallup Drainage, Mt. Rainier NP

Records of Key Officials.

Records of Horace M. Albright, 1927-33.

Records of Arno B. Cammerer, 1922-40.

Records of Newton B. Drury, 1940-51.

Office Files of Conrad L. Wirth, 1946-64.

Records of Roger W. Toll, 1923-36.

Records of the Field Headquarters in San Francisco.

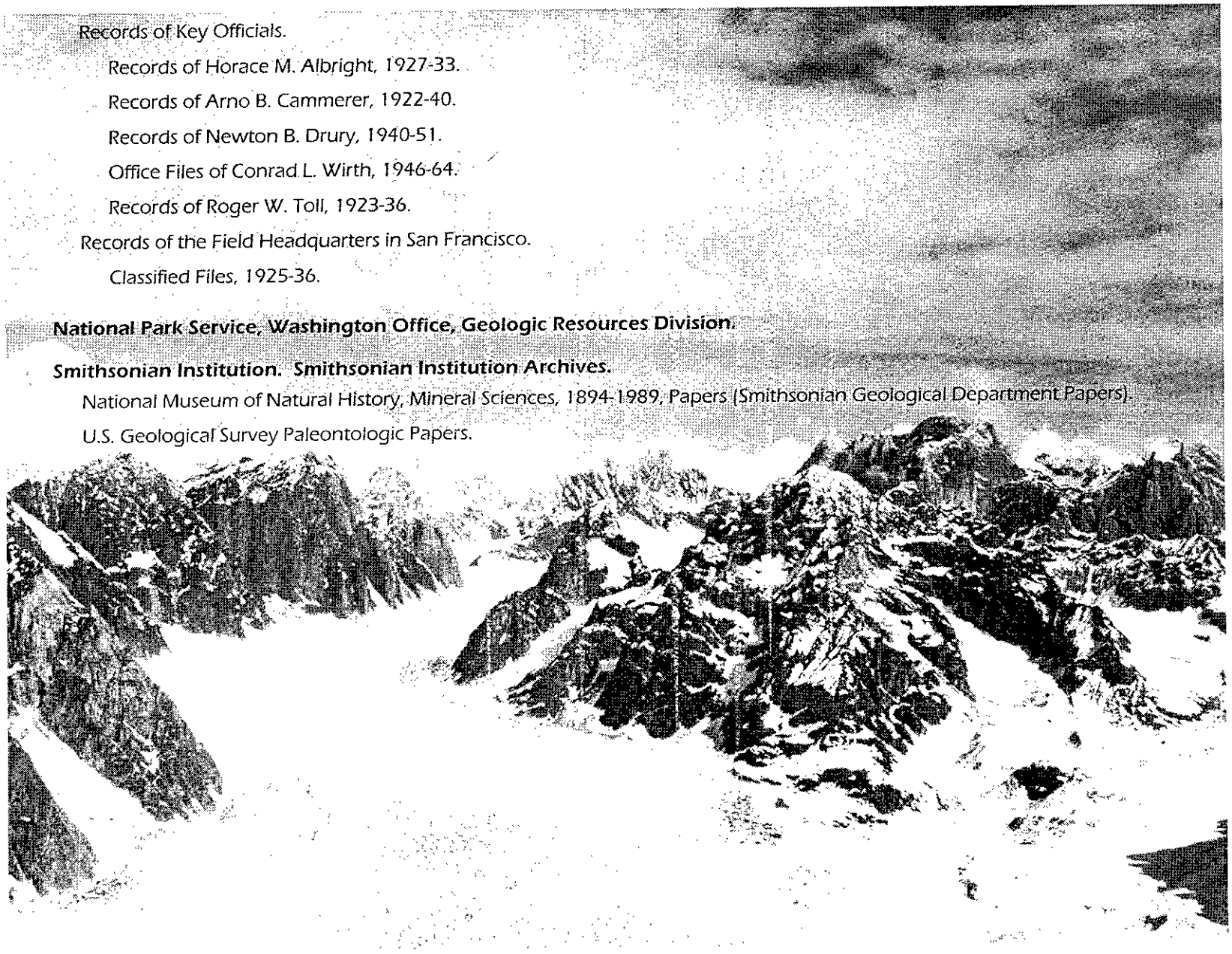
Classified Files, 1925-36.

National Park Service, Washington Office, Geologic Resources Division.

Smithsonian Institution. Smithsonian Institution Archives.

National Museum of Natural History, Mineral Sciences, 1894-1989, Papers (Smithsonian Geological Department Papers).

U.S. Geological Survey Paleontologic Papers.



Ruth Glacier, Denali NP

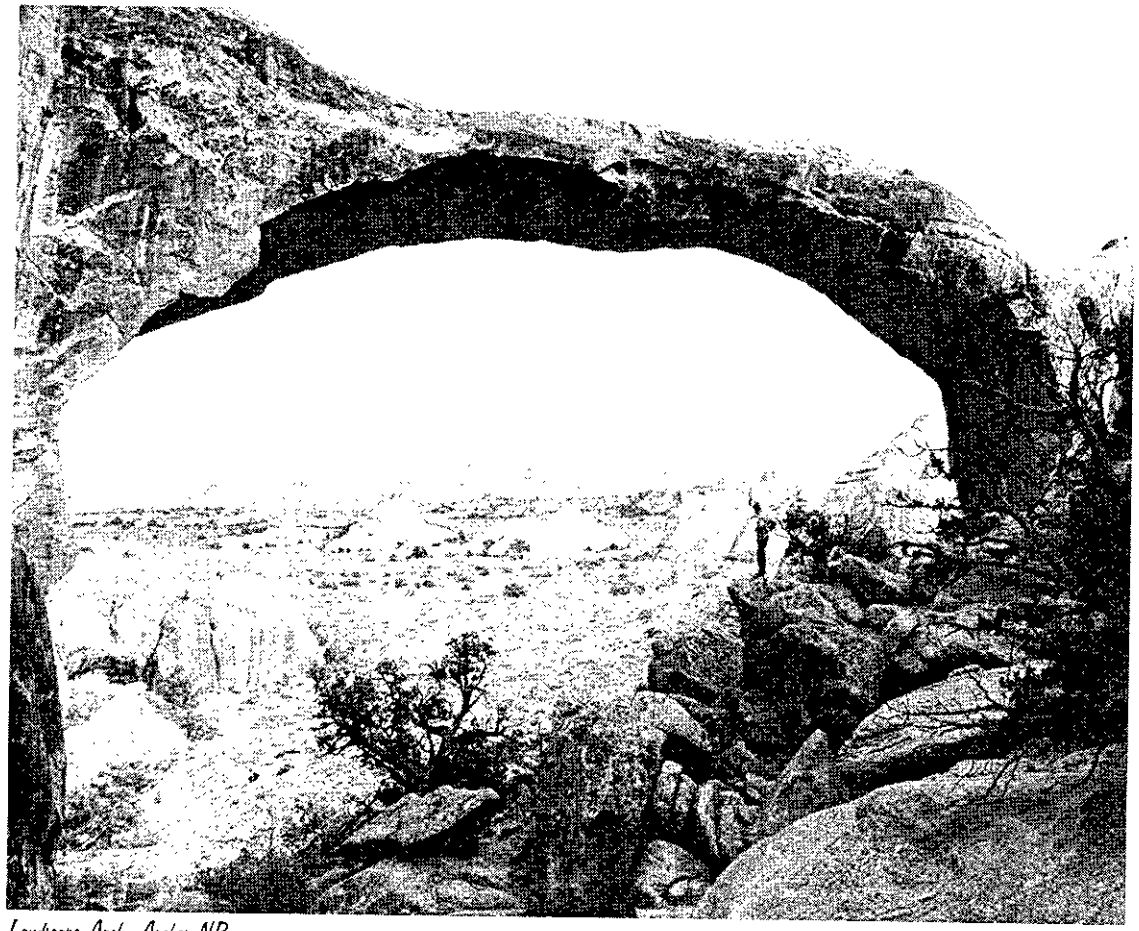
ORAL HISTORY INTERVIEWS

Aside from the contact persons named above, the following persons will be contacted and/or interviewed (in some cases, preliminary contacts have been made):

Ted Fremd, Paleontologist, John Day Fossil Beds National Monument and Department of Geological Sciences, University of Oregon, Eugene.

N. King Huber, Geologist Emeritus, U.S. Geological Survey, Menlo Park, California.

Harry Butowsky, Historian, National Park Service, National Center for Cultural Resource Stewardship and Partnerships.



Landscape Arch, Arches NP

Ruthann Knudson, Superintendent, Agate Fossil Beds National Monument.

Ron Cockrell, Regional Historian, National Park Service, Midwest Regional Office.

Joe Gregson, NPS Inventory and Monitoring Program, Fort Collins, Colorado.

Vincent Santucci, Superintendent, Fossil Butte National Monument.

Lindsey McClelland, National Natural Landmarks Program, National Park Service, Washington Office

Mary C. Rabbitt, Retired U.S. Geological Survey Historian.

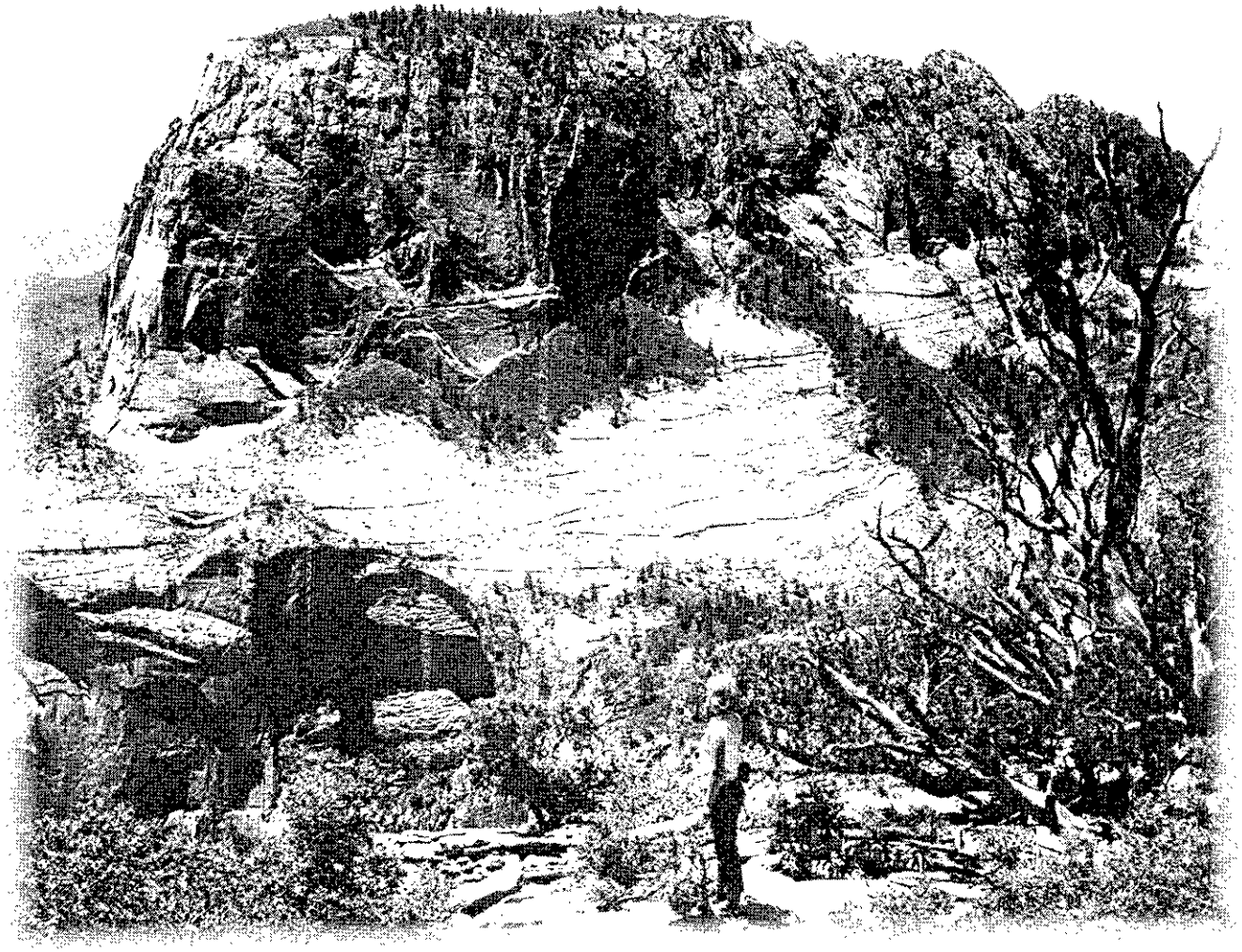
Alfred Runte, Author, *The National Parks: An American Experience.*

Dwight T. Pitcaithley, Chief Historian, National Park Service, National Center for Cultural Resource Stewardship and Partnerships.

Barry Mackintosh, Bureau Historian, National Park Service, National Center for Cultural Resource Stewardship and Partnerships.

Various members of the Geological Resources Division – Denver-based and Washington-based.

Various personnel (present and retired) in National Park System units will be contacted on an as-needed basis.



Kolob Arch, Zion NP