The Bearer Has Permission

A Brief History of Research Permitting in Yellowstone National Park

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J.R. STACY/COURTESY USGS

Seismic Geyser became active following the 1959 Hebgen Lake earthquake, spurring the interests of researchers.

Introduction

FROM THE PAINTINGS OF THOMAS MORAN to the photographs of Tom Murphy, artists have celebrated Yellowstone's scenic beauty since before its establishment as a national park. Simultaneous with this aesthetic exploration has been scientific exploration, and it is no accident that some of the park's earliest, most notable artists arrived together with some of its earliest, most notable scientists. Today as yesterday, the park is capable of inspiring a multi-faceted human curiosity that seeks its expression through a variety of creative processes. What tends to separate the artist or casual visitor from the scientist, however, is the latter's frequent need to take home more than an image, to do more than just observe and record. And for that, one needs special permission.

At times contentious, the history of research permitting in Yellowstone fits nicely into the larger story of the perpetual negotiation of preservation and use in the National Park Service, and illustrates the evolving debate over appropriate uses of national parks. Figuring out who has been allowed to do what when—as well as which kinds of activities have and have not required permits at different times, reveals both the changing status of science and researchers at the agency level, and the local course of events at the park level. Like other user groups, researchers have encountered unexpected frustrations as well as welcome rewards in their dealings with park administrators, often resulting from shifts in policy and circumstance. Finally, the story parallels the rise and fall of the NPS's own science program, and embedded in this discussion is the question of where science meets management. Determining the role of the scientist in resource management decision making has engendered years of arduous debate. It is a fluid conversation, one that is not likely to find static resolution, and in fact probably should not.

Beginnings

Conducting research within the national parks is complicated by the specific legislative mandates that govern their protection and use. In 1872, in a clause that has been cause for consternation and debate ever since, Congress directed the Secretary of the Interior to make rules to "provide for the preservation, from injury or spoliation, of all timber, mineral deposits, natural curiosities, or wonders within [Yellowstone National Park], and their retention in their natural condition." The 1916 act creating the National Park Service (NPS) specified that "no natural curiosities, wonders, or objects of interest shall be leased, rented, or granted to anyone on such terms as to interfere with free access to them by the public." Both statements left open questions of definition and degree—what constitutes "natural condition?" At what point does an allowed use begin to interfere with free access to a resource? These questions arose almost immediately in Yellowstone, as park managers were asked to balance their preservation mandate against the desires of many visitors engaged in both scientific research and the popular pursuit of natural history, of which specimen collection was a crucial component. By simultaneously allowing and controlling collecting activities, the practice of permitting helped provide a practical response. The 1906 Antiquities Act specifically gave the Secretary of the Interior the power to grant permits to representatives of "properly qualified" institutions for the examination, excavation, and gathering of objects of antiquity on lands under his jurisdiction, and archival evidence indicates that permitting was used in Yellowstone for a variety of purposes at least as early as 1898.

WILLIAM HENRY JACKSON/COURTESY USGS

Ferdinand V. Hayden, who led four park expeditions in the 1870s, was one of Yellowstone's first researchers.

Yellowstone was attracting scientific researchers long before that, however. The U.S. Geological Survey, for instance, sent expeditions to the Yellowstone area in 1871, 1872, 1877, and 1878, under the leadership of Ferdinand V. Hayden.[1] In subsequent years, as the intellectual, the mercenary, and the merely curious descended on the new park, and the U.S. Congress failed to appropriate funds for its administration and operation, it quickly became evident that Yellowstone was in need of a strong regulating body to instill a sense of order upon its human visitors and inhabitants and their activities, scientific or otherwise.[2]

Accordingly, the history of permitting in Yellowstone began with the U.S. Army, which administered the park from 1886–1918. Yellowstone's army superintendents issued permits to people wishing to do all kinds of things in the park—operate concessions, carry firearms, pass through with their hunting parties, hunt predators, bring their dogs inside its borders—even make moving pictures of the park and its wonders. As the army's arrival in Yellowstone had been largely predicated upon the necessity of stopping the rampant vandalism taking place at the hands of souvenir-seekers and entrepreneurs, park administrators recognized early on that conserving the park's resources and regulating their collection went hand-in-hand. Therefore, the park's army administrators required anyone wishing to collect geological, botanical, or other specimens in the park to obtain permission from the superintendent before embarking on the quest.

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This was often done by contacting one's Congressman, who then contacted an official at the Department of the Interior (DOI), who in turn contacted the permit-seeker and sent a letter introducing him or her to the park superintendent. In those days, collectors did not have to possess any special status; private hobbyists, local merchants, and scientific researchers alike were allowed to collect specimens as long as they could produce a collector's permit. People with a scientific interest in collecting comprised a large percentage of those requesting permits, making the collecting permit the effective precursor to today's research permit. Early collecting permits read something like this one, issued in 1908: "The bearer, Professor John W. Wolff, has permission from the DOI to make a collection of such geological specimens as he may desire, for Harvard University; these to be taken in reasonable quantities and in such a manner that the natural beauty of the formations or other objects of interest in the park will not be injured or destroyed."[3]

Lest anyone think these requirements too restrictive, the issuing official at the DOI typically explained, "This limitation is necessary in order that the beauties of the natural formations in the park may not be destroyed or injured, as the granting of a privilege of this character in general terms might soon lead to great abuses."[4] Other restrictions might include that geological specimens not be broken off of features, but rather collected from among those lying on the ground, or that plant collectors not injure or deface larger shrubs or trees, which would obviously impair the park's scenic resources. Letters of permission also instructed collectors to report to the park superintendent upon their arrival in Yellowstone to receive instructions on where to make their collections.

On occasion, reporting to the superintendent prior to beginning one's collection proved a hardship, due to the nature of travel in the park at the time. When Professor Charles Hottes of the University of Illinois wrote to say that his tour itinerary had him entering the park at West Yellowstone, not to reach Mammoth until after he had passed the areas in which he wanted to collect, the superintendent granted him special dispensation that allowed him to make his collection before their meeting in Mammoth.[5]

At the turn of the twentieth century, most permits allowed the bearer to collect igneous rocks and other geological specimens. The superintendent also granted requests to collect butterflies, flowers, algae, petrified wood, and a variety of other plants.

An Influential Permitting Disaster and a Success Story

The practice of issuing collecting permits continued after Horace Albright became Yellowstone's first National Park Service superintendent in 1919. Trouble arose almost immediately. In 1920, NPS Director Stephen Mather issued a collecting permit to the reputable Barton Evermann of the California Academy of Sciences for the collection of four bears—a male, a female, and two cubs—for museum display. The group assembled to do the collecting included Dr. Saxton Pope, a surgeon from San Francisco; his assistant Paul Young; taxidermist Paul Fair; W.J. Compton; Pope's brother; a Michigan judge; a cook; and a local guide, Ned Ward Frost—according to historian James Pritchard, "all a rather dubious selection by the California Academy."[6] Just how dubious became clear after the party collected a total of seven bears by bow-hunting, generating a substantial amount of negative publicity for the park. Afterward, facing the wrath of Mather and Albright, Saxton Pope asked Mather to "give your official pardon to our excess of Zeal, believing that we did it in the interest of science and with no other motive."[7]

YELLOWSTONE ARCHIVES/COURTESY CHUCK YOUNG

Yellowstone's first NPS superintendent, Horace Albright, regretted issuing the permit for this 1920 bear "collection."

Just about a month later, however, an article by Pope titled "Hunting grizzly with the bow: that the age-old implement of the chase still holds its place among modern weapons is conclusively proved by two California sportsmen" appeared in *Forest and Stream/Rod and Gun* magazine. In it, Pope recounted the collecting expedition in the dramatic fashion of a big game hunting narrative, making his pleas of scientific interest to Mather appear less than in earnest. Based on the bad publicity that resulted from the party's exceeding their limit, Albright had already recommended to Mather that "under no circumstances shall the National Park Service grant another permit for killing animals in this park for museum purposes." After the article appeared, according to Pritchard, Albright "regretted issuing the permit in the first place and wished he had detailed park rangers to collect the specimens rather than allowing any outside party to conduct the work."[8]

It seems that Albright was true to his word; the rest of the existing collecting permits and related correspondence in Yellowstone's archives dating from his administration (1919–1929) are absent any permission for people outside the NPS to collect vertebrates in Yellowstone (for scientific purposes—predator control was another matter). In fact, this rule would exist in some form in Yellowstone for some six decades, until the mid-1980s, supported by a 1942 Solicitor's Opinion that prohibited the taking of animal life in national parks by anyone except NPS employees.[9]

> When Albright lent his support, he lent his support.

Albright permitted individuals associated with academic institutions or government agencies to collect geological specimens, however, and in the mid-1920s, lent his support to a project led by Drs. Eugene Thomas Allen and Arthur Lewis Day. Allen and Day were geologists with the Carnegie Institute's Geophysical Laboratory in Washington, D.C. Having recently published two books on the volcanic geology of California's Lassen Peak, Allen and Day proposed to undertake a comprehensive study of the same in Yellowstone. In the

process, they intended to complete the work begun in the late nineteenth century by the U.S. Geological Survey's Dr. Arnold Hague.[10]

When Albright lent his support, he lent his support. He issued Allen and Day a permit "to collect geological specimens of all kinds in Yellowstone Park and also specimens of plant life growing in or near any of the geyser basins or other areas affected by subterranean heat. In fact, they have full authority to take specimens of any kind that have a bearing on their scientific work."[11] In addition to this fairly broad discretion, he granted the duo a number of other provisions enabling them to conveniently conduct their research, including the right to ride in and have their freight hauled by government vehicles, reduced rates for park accommodations, space for a laboratory in the basement of the Mammoth canteen building, and field assistance in the form of a ranger assigned to assist the group full-time. Allen and Day's permit even released them from the common stipulation that all collections be made out of view of the traveling public; instead, it requested that they conform to the requirement when at all possible. In 1927, the park even bought a Dodge sedan from the Blair Motor Company of Livingston, Montana, for use by the researchers; it appears that the Geophysical Laboratory reimbursed the $1,100 purchase price.[12] With the assistance of the amenities provided by the NPS, Allen and Day produced *Hot Springs of the Yellowstone National Park,* published by the Carnegie Institution in 1935—for many decades, the definitive literature on Yellowstone's thermal environment.


HOT SPRINGS

OF THE

YELLOWSTONE NATIONAL PARK

BY

E. T. ALLEN AND ARTHUR L. DAY

CARNEGIE INSTITUTION OF WASHINGTON

Allen and Day wrote their landmark study on Yellowstone's thermal environment while working under a park research permit.

Wartime and Beyond: The Birth of Bureaucracy

Records on Yellowstone's research permitting during the 1930s through World War II are scant, but by 1938, park managers were asking researchers to submit reports on what they had collected, and what had become of the specimens—the precursors to today's Investigators' Annual Reports (IAR).[13] As today, researchers had to conform to regulations governing travel in the park's backcountry areas; in 1941, at the behest of both the NPS's regional director and the park superintendent, a USGS party was prohibited from entering the upper Slough Creek wilderness area with cars and trucks, and instructed to use horses and wagons instead.[14] There is also evidence of Albright's ban on outside collections of vertebrates; in the early 1940s, park rangers filled requests for bear parts, specifically reproductive tracts and brains. They collected the specimens from bears killed in "control actions:" management procedures in which bears that had repeatedly caused injuries to visitors or damage to property were lethally removed from the park's population. They then shipped the parts to researchers, who had to provide the park with suitable shipping materials and preservative solutions.[15] Wartime travel restrictions probably also contributed to this collection-by-proxy.

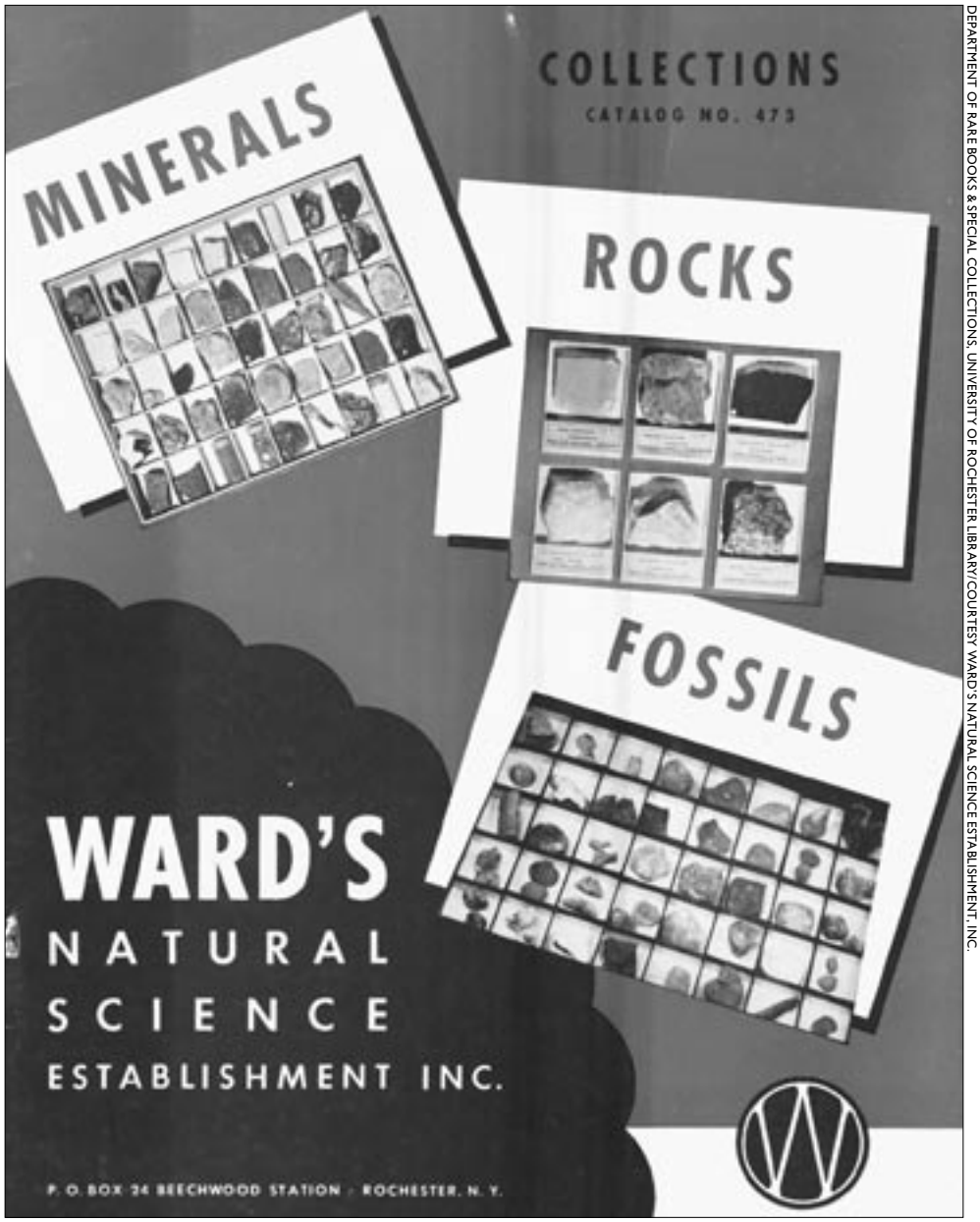
The postwar era saw a process of formalization in research permitting.

During this same period, University of Wyoming professor John Scott obtained permission to study *Diphyllobothrium* tapeworms found in local bears, pelicans, gulls, and fish. Superintendent Edmund Rogers offered any necessary assistance with Scott's collection of tapeworm eggs from the feces of bears and birds, as it was believed at the time that the tapeworms often discovered in the intestinal tracts of park bears made them ravenous, and thus were a major cause of the park's considerable "bear problem," which has since proven not to be the case.

The postwar era saw a process of formalization in research permitting. Now, a park representative, typically the Chief Naturalist, sent a prospective collector an application to be filled out, signed, and returned prior to obtaining a permit. By 1951—possibly as early as 1946—collectors also had to identify themselves as either Class A or Class B applicants.[16] Class A permits allowed the collection only of plants, rocks, or minerals as designated in the permit, and were available to applicants who could establish a connection with a public museum or a scientific or educational institution. A Class A permit did not allow collection of any kind of animal life, with the exception of insects, spiders, and, to some extent, fish. Park regulations permitted researchers, like other park visitors, to collect a certain number of fish. A researcher wanting to collect more than the legal limit of fish had to apply for a Class B

permit.[17] Class B permits, which were less restrictive, were available only to federal employees. They allowed collection of animal life in addition to the items sanctioned by Class A permits, with the caveat that the NPS director had to approve the collection of species identified as "vanishing." Otherwise, the park superintendent issued permits following approval by the regional director.

Non-federal employees who wished to collect animal life had to apply, through a separate process, for "collaborator" status. This was apparently such a cumbersome undertaking that park officials often advised people seeking such permits to try and get their specimens from another researcher already approved with Class B status, or to wait and see if an NPS employee could make the collection for them. The NPS essentially hired those who actually managed to acquire collaborator status as non-salaried federal employees with temporary appointments of between six months and three years.[18] Like other federal employees, they were fingerprinted and required to sign a loyalty oath.



DEPARTMENT OF RARE BOOKS & SPECIAL COLLECTIONS, UNIVERSITY OF ROCHESTER LIBRARY/COURTESY WARD'S NATURAL SCIENCE ESTABLISHMENT, INC.

A 1948 Ward's catalog. Another catalog from that year offered for sale Yellowstone specimens that had been traded to Ward's by the Smithsonian.

Under the new, formalized system, a series of conditions accompanied each permit. Collections had to be gathered out of sight of the public and in such a manner as not to damage the environment. Researchers had to use all specimens they collected for scientific or educational purposes only, and make them available to the public by depositing them in a museum or at a scientific or educational institution after use. Further, the NPS reserved the right to designate the repository. The days of adding to one's private collection with official approval were gone.[19]

Commercial Challenges

A 1948 incident concerning the improper disposition of collected specimens provides an instructive example of the kinds of situations the NPS was trying to avoid with the new permitting process. In its May 1948 sales catalog, Ward's Natural Science Establishment, Inc., offered for sale "an interesting series of the remarkable siliceous sinters (Opal, var. Geyserite) and calcareous sinters (Travertine)…from the Yellowstone National Park, Wyoming…these specimens were collected under a government permit from several of the world famous hot springs and geyser basins."[20] Through correspondence with the company (in the course of which the NPS asked Ward's to cease and desist its advertising and sales of the specimens), NPS officials discovered that the company had procured its collection from the Smithsonian's National Museum of Natural History.

As it turned out, the museum had an abundance of Yellowstone material collected in the 1880s and 1890s by Arnold Hague, and around 1905 by the Smithsonian's secretary, very little of which was ever on display. Space issues and a recent lack of demand from public institutions had led W.F. Foshag, the museum's head curator for geology and mineralogy, to trade some of the Yellowstone collection to Ward's in exchange for mineral specimens that were underrepresented at the Smithsonian.[21] After talking with NPS geologist Dr. Max Bauer, Foshag offered to give the rest of the museum's excess specimens back to the park. Bauer recommended that the NPS back a truck up to the Smithsonian to collect the materials and then dispose of them in any fashion guaranteed to keep them off the market—either by storage or destruction.

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Of course, park officials had not heard the end of private mineralogists' desires for Yellowstone specimens. In 1957, the NPS had to fend off the overtures of the Stansi Scientific Company, which had declared its intent to acquire 200 pounds of Yellowstone obsidian by paying the Gardiner School's science club 25 cents per pound to collect it in the park. When science club advisor V.M. Matross refused to go along with the deal, on grounds that such collecting would be illegal, company representative Harold Callahan wrote to the NPS, saying that Matross must be mistaken, because he personally had seen obsidian for sale outside the park. Thus, he indignantly informed agency officials, "we would like authorization." Needless to say, he did not get it.

In the early 1950s, the NPS moved to quell a different kind of potential exploitation of park resources when it prohibited visitors from using Geiger counters while in the park, as was occasionally happening.[22] Although this sudden phenomenon may have simply stemmed from popular interest about the new science of nuclear technology, and curiosity about its application in the strange environment of Yellowstone, the use of Geiger counters technically constituted uranium prospecting, and was thus specifically forbidden except in the hands of permitted researchers. Superintendent Edmund Rogers asked a University of Wisconsin chemistry professor who proposed to use a Geiger counter for research in Yellowstone to submit, with his permit application, "positive statements to the effect that these counters are being used purely for scientific research and study and not for prospecting purposes…in addition, we will have to be assured by you in writing that the information which you obtain from your research studies will not be made available to any persons desiring to prospect for ore commercially or utilize uranium or any other fissionable material that your study might indicate as being present in Yellowstone National Park."[23] It is still illegal for anyone visiting a national park to possess or use a mineral or metal detector, magnetometer, side scan sonar, other metal detecting device, or subbottom profiler.

Growing Pains

Printed on the back of each collecting permit application was the NPS's mission statement in regard to research: "It is the intention of the National Park Service to further scientific research within the areas administered by it, and to cooperate with technical workers to the fullest extent compatible with its charge to preserve all species of flora and fauna and all geologic material in a natural state, insofar as is possible." In 1960, however, a few researchers applying for collecting permits in Yellowstone began to suspect that research was not really as welcome as the mission statement indicated. Not only was Superintendent Lemuel "Lon" Garrison's staff turning down requests that they provide researchers with small collections of specimens, as had been done in the past, they were also rejecting a lot of applications. Garrison blamed the high

J.R. STACY/COURTESY USGS

Requests for permits rose after the 1959 Hebgen Lake earthquake.

rejection rate on too much interest, telling prospective researcher Charles Thornton that since the Hebgen Lake earthquake of August 1959, the park had been inundated with requests from people wanting to collect geological specimens; that "in just one day last fall [the Chief Naturalist] received and denied 11 requests...If every applicant made a collection in the Park, in a very short time Yellowstone would be depleted of its choice specimens now in place in a natural state. For this reason we have found it necessary to refuse the many requests unless the collecting is done by our personnel and is placed on government loan to an institution or is a part of a systematic research project in cooperation with the National Park Service where scientific knowledge of primary significance on a local or national basis is involved."[24] Faced with unusual local circumstances, it appears that Garrison established an informal set of criteria regarding appropriate and inappropriate research uses of the park.

The disparity between what Garrison told him and what he had read on the back of his permit application was not lost on Thornton, a National Science Foundation grantee from Pennsylvania State University who wanted to collect volcanic rocks in Yellowstone and had encountered no similar resistance during his previous research at Lassen and Crater Lake national parks and Death Valley National Monument. Thornton told this to Pennsylvania Senator Joseph S. Clark, who had offered, in his letter of congratulations to Thornton as an NSF grant recipient, to assist him in any way he could. Garrison soon received a letter from NPS Associate Director Hillory Tolson asking him to explain himself in the Thornton matter. The original permit had been disapproved, Garrison explained, "because of a lack of material to convince us that such collection was scientifically important to the university's world-wide collection of volcanic rocks." After hearing from Senator Clark, however, park officials suddenly recognized the significance of Thornton's work; he received his permit five days later.

Simultaneous with the Thornton affair, Garrison and his staff were in a wrangle over the application of Ross Hutchins, head of Mississippi State University's Zoology and Entomology Department. In the spring of 1960, Dr. Hutchins had applied to make a small collection of insects while in the park photographing ants and caddisflies for *National Geographic* magazine. The chief naturalist (on behalf of the superintendent) denied his permit, "on the basis that a need has not been presented establishing the necessity for a scientific study and collection in Yellowstone National Park which would enhance local knowledge or add to scientific knowledge on a national basis."[25] By late June, Garrison was again hearing from upper management in regard to his office's rejection of a collecting permit. Invoking the Thornton case, Regional Director Howard Baker admonished Garrison that while he recognized that approving or disapproving permits was his prerogative, "we fail to see…how activities of bona fide scientists can damage the natural values which we all value so highly…It would be unfortunate if it became generally believed…that Congressional endorsement [i.e., Clark's support of Thornton] has become a requirement for scientific research work in the National Parks."[26]

Garrison told Baker that in 1959, field personnel had criticized Chief Naturalist Robert McIntyre for being too liberal in granting collecting permits, hence the increased stricture during the present year. He also expressed frustration with the current permitting process, which was conducted wholly by mail. Garrison felt it was crucial to differentiate between persons seeking to conduct legitimate scientific research in the park from professors who just wanted to collect a few souvenirs while on holiday in Yellowstone, and suggested that permits be granted only pending the results of a personal interview conducted upon a potential researcher's arrival in the park.[27] In apparent anticipation of concurrence, Chief Naturalist McIntyre informed his district managers that the personal interview requirement was now park practice.[28] Acting Regional Director Frank Childs soon instructed them to stop, however, explaining that a researcher's signature on a permit application was adequate verification that s/he met the required qualifications, and that it was difficult to refuse a permit to a qualified researcher. Childs declined to endorse Garrison's desire to make permits contingent upon personal interviews.[29]

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A New Era: Research, Institutionalized

The atmosphere toward researchers in Yellowstone seems to have warmed by 1963, when park officials decided to convert the Lamar Buffalo Ranch into a research station, primarily for use by outside researchers studying ungulates in that area of the park. By April of that year, park staff had plans to enlarge the development and use parts of the existing maintenance shed, second ranger residence, and bunkhouse for the research station. The residence was for use by researchers, the shed for storage, and the bunkhouse for laboratory use, following a remodeling project. A 12-unit trailer court was proposed for an area beyond the existing corral, along with a four-unit apartment to house additional research personnel.[30] The NPS's assistant director gave final approval to the project in October

1963. The park's chief naturalist expected the facility and a few trailer sites to be ready by July 1 for use by scientists Kenneth Greer, studying physiological effects following the park's elk reduction program; John Craighead, studying elk migration; Dr. Fichter, conducting antelope behavioral studies, and Kent McKnight, researching the taxonomy and ecology of Yellowstone's fleshy fungi.[31] By August of that year, the bunkhouse had been remodeled as a research center. By the late 1970s, however, managers decided that the park would be better served by converting the facility to its current use as the home of the Yellowstone Association Institute, as the researchers for whom it had been created had generally proven reluctant to base their operations there.[32]

The amount of paperwork associated with research permitting had begun to proliferate in the late 1950s, when each year, the NPS's Washington Office required each park to submit a "priority list" for its research program. All active and proposed research projects were to be listed, regardless of whether federal employees or outside researchers were conducting them, and whether or not they received federal funds (Table 1). The chief naturalist assigned both a number and a priority ranking to each project; each priority number had to be supported with a project report sheet filled out by its researcher. The paperwork load appears to have reached its apex in 1964, with the advent of the Resource Studies Program (RSP), based out of Washington, D.C.

- Aging of travertines found from Terrace Mountain to Gardner River (Harmon Craig, Univ. of Chicago)
- Ants of high altitudes (Gerald Scherba)
- Bighorn sheep distribution (Helmut Buechner)
- Boiling reactions of superheated pools to various metals (Ralph Scorah & David Love, University of Missouri)
- Clovers of Wyoming (Carl Gilbert, Wyoming Agricultural Experimental Station)
- Condition and trend of winter range for Firehole and Hayden Valley bison herds (Walt Kittams, NPS biologist)
- Development of life forms using primitive algae from thermal waters (J.R. Vallentyne, Queens University, Canada)
- Development of Yellowstone mammal and bird collection (park staff)
- Ecological study of animal life forms associated with hot springs and travertine areas at Mammoth (Joseph Murphy, University of Nebraska)
- Effects of DDT used for spruce budworm control upon terrestrial and aquatic insects (Kittams)
- Factors affecting aspen reproduction on northern Yellowstone range (Kittams)
- Fossil flora studies (Erling Dorf)
- Grasses of Wyoming (Alan Beetle, University of Wyoming)
- Grebe Lake fisheries studies (USFWS)
- Hydrogen isotopes in thermal waters (F. Begemann, Institute for Nuclear Studies, University of Chicago)
- Insects of Yellowstone (Fred Hartig, American Museum of Natural History)
- Movements of northern Yellowstone elk as shown by tagging and recoveries (Kittams)
- Paleontological and stratigraphic study of the Madison formation (USGS)
- Physical changes occurring on the Mammoth Hot Spring terraces (Clarence Allenson & park staff)
- Plants of Yellowstone National Park (W.B. McDougal & Mrs. Herma Baggley)
- River fisheries studies (USFWS)
- Sheepeater Indians (Ake Hullkrantz, Sweden)
- Social behavior of marmots (Kenneth Armitage)
- Studies of thermophilic bacteria (Cal Georgi & Associates)
- Study of feces of Yellowstone mammals (John Moore, L.A. Polytechnic Institute)
- Study of high temperature algae (A.H. Hansgen, University of Texas)
- Study of Norris Geyser Basin and preparation of a publication and map of the area (park staff)
- Study of protozoans found in thermal waters (Austin Phelps, University of Texas)
- Survival of northern Yellowstone elk (Kittams)
- Topographic mapping of Yellowstone (USGS)
- Trend in thermal activity in Firehole River Geyser Basins (park staff)
- Trend of Gallatin winter range (Kittams)
- Trend of northern Yellowstone winter range (Kittams)
- Volcanoes of Sunlight Basin (USGS)
- Yellowstone Lake fisheries studies (USFWS)
- Yellowstone herbarium development (Ray Davis, University of Idaho & park staff)

Proposed (awaiting funding and personnel):

- Antelope food study
- Antelope seasonal distribution and factors influencing herd vigor
- Black bear distribution and habits
- Detailed mapping of thermal areas
- Functional behavior of geysers in geyser basins along Firehole River
- Grizzly bear population and habit study
- Rocky Mountain bighorn study

Table 1. Compendium of research projects underway as of April 16, 1956.

The new program required the responsible park employee to submit a Resource Study Proposal for each study occurring in or proposed to occur in the park during each fiscal year, and to place each of those studies on a Priority List, as had been the case in the past. The accompanying instructions on how to prepare Resource Study Proposals and Priority Lists comprised seven pages of text, with an additional two pages explaining how to prepare the status report required for all research projects.[33] Soon after distributing the new instructions, the Washington office put out a call for an immediate accounting of all personnel directly or peripherally involved in Resource Studies activities, followed by another seven-page memo explaining the purposes and objectives of the Resource Studies Program—"to carry out studies which will aid in solving [a] multitude of problems and help to clear the obstructions in the way of Mission accomplishment"—and the five phases of a Resource Studies Project, also illustrated in a handy flow chart (Figure 1).[34] The regional director had to approve projects proposed by agency employees; projects undertaken by external researchers did not need approval at that level, but still had to be documented on an RSP form.

Of course, the Resource Studies Program was much more than an exercise in paperwork generation. Its institution coincided with a reinvigoration of the NPS's own science program, which had experienced halcyon days during the 1930s, but seen its support dwindle with the onset of World War II and the postwar concentration on facilities improvements (i.e., the Mission 66 program). In 1964, Congress increased the NPS's research budget from $29,000 to $80,000. This increase came on the heels of two commissioned reports released in 1963—the Robbins Report, compiled by the National Academy of Sciences, and the Leopold Report, compiled by the Secretary's Advisory Board on Wildlife Management, both of which strongly advocated that the NPS amplify research conducted in the parks, both internal and external, to facilitate sound, scientifically-based decision and policy making. Because the NPS's mandate of preservation and use generates unique resource management questions and situations relative to those of other agencies and institutions, the Robbins Report also recommended that the NPS develop a program of

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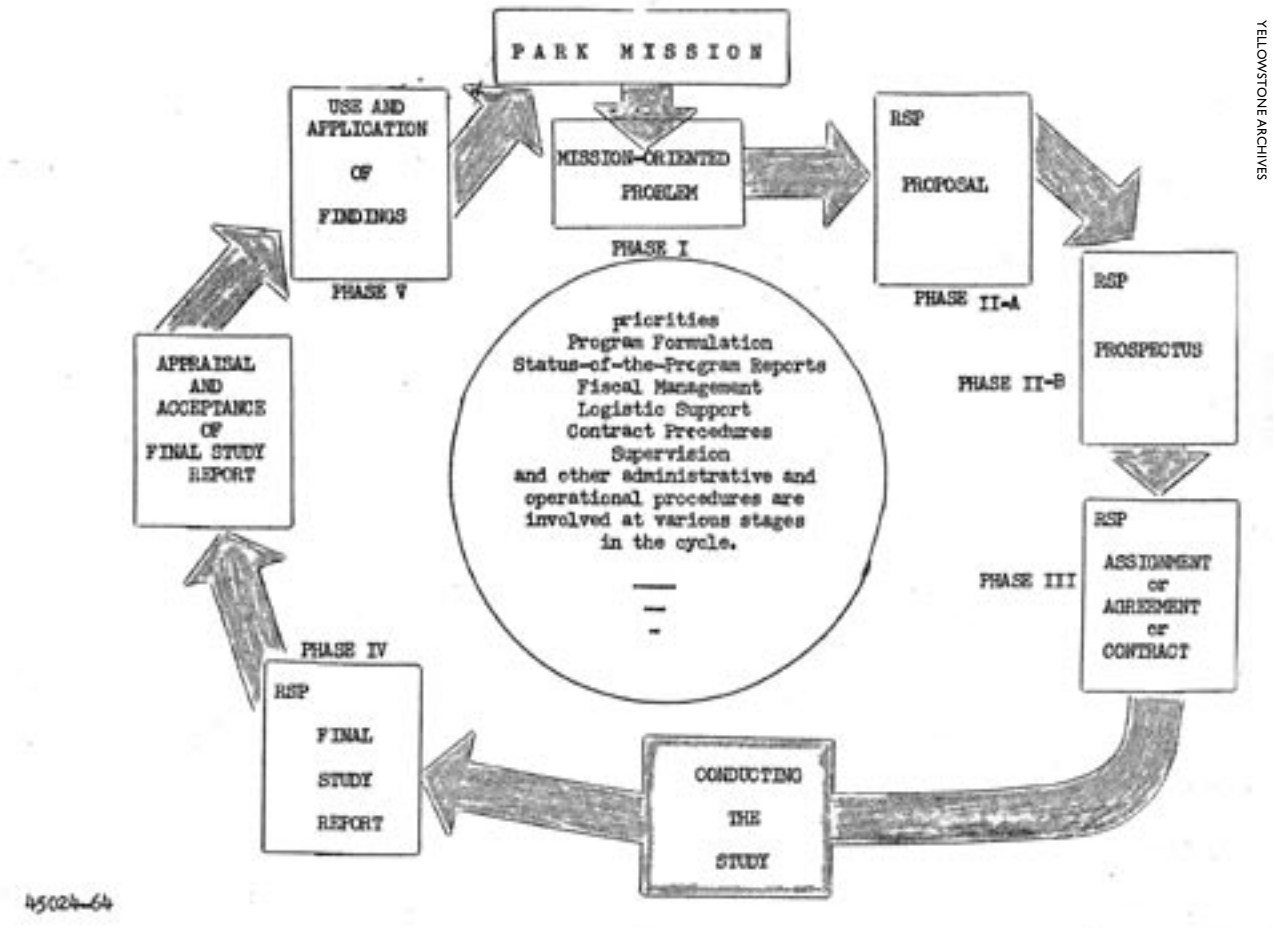

Figure 1. Flow chart of the five phases of a Resource Studies Project, 1964.

"mission-oriented research—" research specifically designed to address park-related issues, and geared toward improving management and interpretation of park values.[35] The report simultaneously encouraged the NPS to benefit from the specialized knowledge of external scientists and admonished the agency against relying solely on outsiders to provide research useful for management purposes. It left open, however, the question of exactly what role the opinions and findings of independent scientists should play in agency decision making—a point that would soon become pivotal in Yellowstone. Following the new appropriation, the NPS introduced the Resource Studies Program, as well as programs to study threatened species and the feasibility of species reintroduction, and revived the NPS *Fauna* series initiated in the 1930s by Wildlife Division founder and chief George Wright.[36]

In 1965, on the occasion of the Resource Studies Program's first anniversary, NPS Director George Hartzog sent a blanket memo recounting the program's first year and explaining that the mountain of paperwork generated in 1964 was the result of efforts to get the program off the ground; in the future, he promised, the load would be lightened (although each park still had to submit 14 copies of each Resource Study Proposal to its regional Resource Studies Advisor for distribution that year).[37] Now that the program was up and running, he argued, the NPS could start reaping the benefits of an organized and orderly system that would allow parks to identify research needs by pinpointing major issues and problem areas. "It is here that you, as a manager, can make a major contribution," Hartzog wrote. "Be alert to the requirements for studies that arise out of your management and your development programs. Are you developing a new area in the park, for example? Are you sure the development site is not of such scientific value as to justify your proposing a different location? What will the development do to the ecology of the surroundings?"[38] Questions like these prefigured those that compliance with the National Environmental Policy Act would require in the coming years; as such, the creation of the Resource Studies Program came at a time when research was increasing in its importance to federal agency management. In addition, a new item was added to the Resource Study Proposal form: "Anticipated Benefit to Service." Along with addressing a resource-related problem, in other words, proposed research had to pose a benefit to the NPS to be approved. Those benefits often proved enormous; in Yellowstone, this rich period for research included the revolutionary grizzly bear studies of John and Frank Craighead, as well as the groundbreaking discoveries of Thomas Brock, to be discussed later.

Turf Wars and their Residual Effects

When Superintendent Jack Anderson arrived in Yellowstone from Grand Teton National Park in 1967, he brought Glen F. Cole with him to be the park's supervisory biologist. Together, Anderson and Cole had a mission in Yellowstone: to implement the recommendations set forth in the Leopold and Robbins reports.[39] By 1969, they were engaged in a tussle with grizzly bear researchers John and Frank Craighead over the terms of the Craigheads' Memorandum of Understanding (MOU), which addressed important aspects of their research permit. The Craigheads had begun their now-famous grizzly studies in 1959, through a partnership with the park that was spearheaded by park naturalist David de L. Condon and then-Superintendent Garrison. Under the terms of their MOU, and to the minds of Condon and Garrison, all parties would benefit from the arrangement—the Craigheads could use the park to conduct their research, and the park could gain much-needed scientific information on the grizzly, as well as recommendations on how best to manage it.

The Robbins Report simultaneously encouraged the NPS to benefit from the specialized knowledge of external scientists and admonished the agency against relying solely on outsiders to provide research useful for management purposes.

By the time those recommendations were made in 1967, however, the park had a new superintendent (Anderson) and a new set of management policies that made Anderson and Cole reluctant to implement what they saw as the brothers' "unnatural" management methods; namely, actively attempting to centralize grizzly populations around managed garbage dump sites as a means of maintaining grizzly habitat and minimizing human–bear interactions, in conjunction with a series of other suggestions designed to maximize the conservation of individual bears.[40] In light of the new resource management

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The 1959–71 grizzly bear research by John and Frank Craighead produced invaluable data as well as long-term controversy.

policies then taking hold in the parks (sometimes described as "natural regulation"), NPS Chief Scientist Robert Linn chided the Craigheads: "management recommendations must reflect the policies that have been established…Recommendations… offered to an agency should fall within the parameters set by policies, because if they do not fall within such parameters, the administrators of the organization will find it difficult to accept the recommendations."[41]

With the recent adoption of mission-oriented research as a primary NPS goal, park managers sometimes felt free to suggest that researchers adjust their project proposals accordingly. Permit applications instructed aspiring researchers to provide the park with a detailed prospectus of their project, describing their field operation, type of equipment to be used, type of areas to be researched, type of access needed, disturbance that might be caused to natural features, and any other information on the physical activities used in carrying out the research, as well as the purpose and disposition of the resulting research report.[42] In response, it was not unusual for researchers to get letters back from park officials containing such statements as, "In presenting your current proposal we note the incorporation of some of our thinking. We appreciate this and are encouraged to suggest an additional idea," or "The data you propose to gather in Yellowstone appears to have value for us in meeting our goals."[43]

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In 1969, Superintendent Anderson sent John Craighead a letter accompanying his MOU renewal asking that the researchers begin to remove conspicuous markings from their study animals to the greatest extent possible, so that the park might optimize its natural appearance in time for its 1972 centennial.[44] For the Craigheads, this was problematic; they had pioneered the use of telemetry collars and used identifying ear tags, and these markings were paramount to the efficient execution of their research. They weren't alone; Anderson and Cole told other researchers during this period that they could not mark animals as part of their study, and sometimes approved permits in part because their applicants did not intend to mark animals. Even the park's own biologists were restricted from conspicuously marking animals, though there is evidence that they may not have been inclined to do so, anyway.[45] The Craigheads were also unhappy with park managers' disinclination to implement most of their scientific recommendations, and made their feelings widely-known through the national media. After a couple more years of research, the Craigheads declined to sign a subsequent MOU renewal agreement, arguing that the NPS had become too controlling, and concluded their work in the park.

The disagreements between Yellowstone's managers and the Craigheads were so well-publicized in the news media that after their departure a widespread, enduring mythology developed that the NPS had "thrown the Craigheads out of the park," and was generally anti-research, especially when it came to outside researchers. Whether these claims were true, or the park's research program was simply suffering from the once-bitten, twice-shy effects of a bad break-up, or whether there is some other explanation, it does appear that the number of research projects in progress was comparatively low in the years following the brothers' 1971 departure. In 1970, there had been 84 research projects ongoing in the park, 64 of them by outside researchers; according to NPS Chief Naturalist William Dunmire, this meant that Yellowstone had one of the most vigorous agency and academic research programs existing in the NPS at that time.[46] In 1973, the total was down to around 50, with 33 conducted by outside researchers.[47] It would rise from there, however; in 1975, there were 60 projects based out of 31 different institutions—in 1978, 67 projects.

Centralized Directives

Permits of the early 1970s required that research not only be carried on out of public view, but also, in the spirit of "natural regulation," be as non-manipulative as possible, with nothing done "that would preclude an ecological system from ultimately returning to a natural state."[48] The regulations permitted only representatives of large universities and public museums to collect and, as had been the case since early on, park managers asked researchers to check in with park representatives at Mammoth Hot Springs upon their arrival in the park.

By 1978, the restrictions had been liberalized a bit. In that year, collecting permits were issued not only to Knud Aunstrup, a manager for Denmark's Novo Industries, who revealed only that his desired samples of mud and hot springs would be used for "scientific investigations," but also to a man wishing to bring 18 high school students to the park to collect plant samples. At the same time, research biologist Dr. Mary Meagher frequently directed would-be rock collectors to roadside pull-outs outside park boundaries—where, Meagher advised, they were likely to find the specimens they needed without having to take them from inside the park. All of this was in accordance with the servicewide *NPS Management Policies 1978,* which specified that park officials should issue or deny permits on the basis of the scientific validity of the proposal, rather than on the credentials of the people applying for them, and allow a limited amount of collecting by students

in science classes at all educational levels. The management policies also stipulated that research projects must not have lasting or significant physical impacts on park resources, and that researchers should use parks only for studies that could not be performed outside them.[49]

To some degree, the 1978 management policies simplified the permitting rules; for example, they appeared to have relieved NPS administrators of the Class A and B permitting system, used to differentiate federal employees from independent researchers.[50] Permit records show, however, that the Class A and B system was used in Yellowstone at least through 1982.[51] Sometime between 1983 and 1987, park administrators ceased this practice—long bemoaned by NPS officials and prospective researchers alike as cumbersome, confusing, and somewhat arbitrary—probably as part of a more general reform of the Code of Federal Regulations that occurred during that time. It is worth noting that the number of Category A permits issued had fallen to single digits during the late 1970s and early 1980s, perhaps reflecting what has been described elsewhere as a dark period for research funding in Yellowstone.[52] In addition, enforcement of the Class A and Class B conditions had dissipated since their institution, but especially in recent years.[53]

In 1984, within the Ranger Division, Yellowstone National Park created the Division of Research, under which it was proposed that three new positions be created: a research biologist, specifically to deal with ungulate issues; a research geologist, specifically to deal with water rights issues; and a clerk-typist, because "currently five researchers are supported by one secretary, who despite best efforts, cannot keep up with the workload. The addition of two more professionals will make this workload intolerable."[54] The park superintendent also suggested that three existing positions be re-classified: supervisory research biologist to research biologist, to focus on bison, bighorn, and the park's ecological history; physical science coordinator to supervisory research geologist; and geologist to research geologist (geothermal). Serendipitously, this action accorded with the *NPS Management Policies 1988,* which called for NPS natural and social science programs to produce applied research necessary for making sound management and planning decisions. In that document, scientists, rather than being permitted to "use parks for studies that cannot be performed outside the parks" (as in the 1978 management policies), were "encouraged to use the parks for scientific studies," albeit still encouraged to "direct their research toward park management objectives."

Five years later, in March 1993, Yellowstone's managers reorganized the park's research and resource functions to create the Yellowstone Center for Resources (YCR), the initial goal of which was to put park scientists under the direction of university-based Cooperative Park Studies Units (CPSUs). There were several reasons for this. Removing scientists from the supervision of government managers, who might potentially be influenced by politics, would help to ensure that the NPS produced science independent of management's possible desires—a longstanding point with NPS critics.[55] The change was also designed to improve scientific output by ensuring that researchers could concentrate on scientific projects, rather than being drawn into park-related bureaucratic work such as consulting and planning projects.[56]

Today, each research permit application is subject to at least three, and as many as five levels of review.

The Yellowstone CPSU was to be based at Montana State University (MSU) in Bozeman. Back at the park, the YCR would encompass a new, professionalized resource management function. Later that year, however, Secretary of the Interior Bruce Babbitt reassigned all DOI scientists to create the National Biological Survey (NBS). As a result, Yellowstone lost 11 scientists who were to populate the MSU CPSU, along with the $1.7 million earmarked to support them. To fill the gap, YCR officials looked to hire resource managers with advanced degrees who could fill a scientific role while performing the majority of their work within the realm of resource management, rather than research. The NBS was short-lived, and was soon absorbed into the U.S. Geological Survey's Biological Resources Division.[57]

Initial YCR branches included natural resources, cultural resources, advanced resource technology (today's spatial analysis center), professional support, and planning and compliance (since removed from the YCR organizational structure and currently divided between the Superintendent's Office and a new Division of Planning, Compliance, and Landscape Architecture). In 1997, following an extensive, interdisciplinary review of the research permitting process, YCR added a "research support" function, whose purpose is to issue and track research permits and provide support to permitted researchers in the park. The review committee also established a formalized, standardized process for research permit review and issuance. In part, this was a response to a balloon in the number of research permits issued annually in the 1980s, when the count shot from 81 to 298 in a span of just six years (numbers are approximate—see Figure 2).

Today's Procedures and Challenges

Today, each research permit application is subject to at least three, and as many as five levels of review. The Research Permit Office (RPO) staff receives applications, checks them for completeness, including peer reviews, and prepares a summary of the proposal for submission to the Research Review Interdisciplinary Team, consisting of representatives from the divisions of Maintenance, Planning, Interpretation, Visitor

Protection and Resource Management, and the Yellowstone Center for Resources. The team's purpose is to determine whether the proposed research could result in adverse effects on park resources, park operations, or visitor experiences. If the team has concerns about the terms of the proposal, RPO staff go back to the researcher to see if methodologies and other details can be negotiated to make them acceptable. If the team recommends approval of the proposal, it is forwarded to the director of the Yellowstone Center for Resources (YCR), who holds a delegated authority from the park superintendent to sign research permits. In cases where research has the potential to be disruptive, sensitive, or controversial, the YCR director may seek additional guidance from the park's Resource Council, an interdisciplinary team of division chiefs whose purpose is to determine whether proposed projects qualify for Categorical Exclusions under the National Environmental Policy Act (NEPA), or would require an Environmental Assessment or other NEPA action. Permit proposals deliberated and recommended for approval by the Resource Council are then sent back to the YCR director for signature, with the appropriate NEPA documentation signed by the park's superintendent.[58] The research permitting process is governed by legislation including but not limited to NEPA, the Wilderness Act, the National Parks Omnibus Management Act of 1998, NPS Director's Order 77, and the U.S. Code of Federal Regulations. Regulations require all permitted researchers to submit an IAR at the end of each year.

Estimated Number of Permitted Research Projects in YNP, 1954–2003

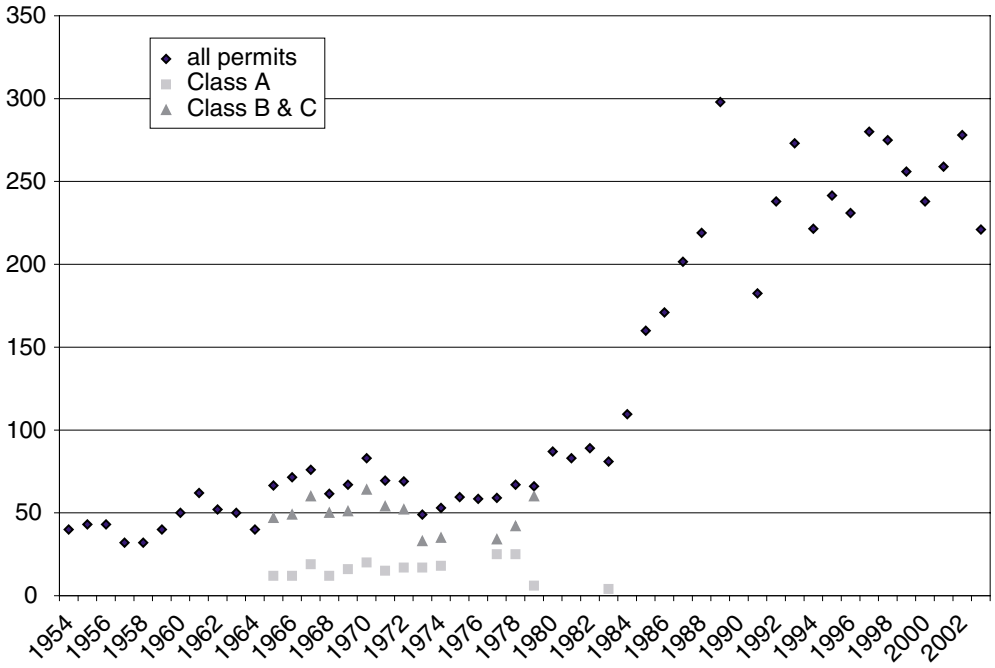

Figure 2. Graph showing the number of research permits issued each year as reflected by the Superintendent's Annual Research Reports and Investigators' Annual Reports. Although the graph provides a general idea about trends in research permit numbers, it is important to note that fluctuations may result from many factors, including changing ideas and policies defining what kind of research requires a permit. In previous decades, for example, permits were issued to people conducting historical research in the park's library and archives; this kind of research no longer warrants a permit. On the other hand, non-reportage on the part of researchers may result in artificially deflated numbers. Because this data was compiled from several sources, it should again be emphasized that these are estimated numbers designed to give an overall impression.

Under the NPS's Resource Studies Program (RSP), research projects were reported as being either Class A, Class B, or Class C. Class A projects were those conducted by NPS or other federal agency personnel that had been identified as park priorities and awarded Resource Studies support. Class B and C projects were conducted by independent researchers. Class B projects were also identified as park priorities and awarded Resource Studies support; Class C projects were not reported through the RSP. As is evident here, the number of permitted research projects conducted by independent researchers consistently outnumbered those conducted by agency personnel during the contentious years of the RSP, with the total number of projects reaching a low of 50 in 1973.

At the turn of the twenty-first century, awash in paperwork, YCR managers decided to investigate a computer-automated permitting system. Under a contract with the park, researchers at the Idaho National Engineering and Environmental Laboratory developed an operating system that was subsequently adopted as the servicewide Research Permit and Reporting System. Park research coordinators can use the system to receive and organize electronic permit applications, proposals, and peer-reviews from applicants; post and maintain the type of research the park is most interested in attracting; post and maintain park-specific conditions applicable to every permit issued by the park; post an information bulletin used to notify investigators of special conditions or events that could impact planned fieldwork (road closures, area

closures, safety-related notices, etc.); process and track permits and denied applications; manage the park IAR database; search the servicewide IAR database; search the servicewide permit database to confirm currently active permits and previously-approved studies conducted at other parks; and report annual accomplishments by investigators through IARs.

Members of the public can access a special section of the system to review permit application requirements and procedures; review general conditions applicable to all scientific research and collecting permits issued by NPS; review park-specific conditions applicable to research and collecting permits; review park information bulletins containing notices that may impact planned fieldwork; search the type of research parks are most interested in attracting; search the IAR database to review previous research accomplishments before planning a new study; complete an application for permission to conduct a study in a specific park; submit electronic copies of study proposals and existing peer-reviews; and look up the name, phone, email, FAX, and mailing address of the research coordinator at a park.[59]

In recent years, park managers have encountered a research permitting situation that is both highly sensitive and highly controversial, as some believe it raises questions that strike at the heart of the NPS mission and the reason for the park's founding. At issue is the question of "bioprospecting," sometimes defined as scientific research that looks for a useful application, process, or product in nature.[60] The issue has its roots in 1966, when researcher Thomas Brock discovered *Thermus aquaticus,* a microorganism capable of surviving in temperatures extreme enough to kill most other living organisms, in a Yellowstone hot spring. After learning to grow *Thermus aquaticus* in the laboratory, Dr. Brock donated a living sample to the American Type Culture Collection (ATCC), a global nonprofit bioresource center that provides biological products, technical services, and educational programs to private industry, government, and academic organizations around the world.

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In 1985, the Cetus Corporation obtained a sample of *Thermus aquaticus* from the ATCC for use in developing the Polymerase Chain Reaction (PCR) process that would prove instrumental in the evolution of DNA sequencing. Cetus employee Kary Mullis developed the Polymerase Chain Reaction (PCR) in the 1980s as a novel technique for rapidly amplifying DNA. Rapidly amplifying, or replicating, a particular strand of DNA to a billion exact copies overnight gives a scientist enough of the material to seriously study; the innovation brought Mullis a Nobel Prize, and the field of biology a revolution.[61] The breakthrough ingredient was a new substance Mullins named *Taq* polymerase, after *Thermus aquaticus.* The PCR method depends on alternating high temperatures and low temperatures, and *Taq* polymerase was the only substance Mullins could find that did not break down at high temperatures. The high temperature cycle separates the DNA strands, and the low temperature cycle allows primers—specially-designed, dyed molecules that attach to targeted sections of DNA—to bind to the separated strands. DNA polymerase then begins the replication process. After several other steps, the genetic codes of different alleles from the original DNA are then known.[62] Today, DNA sequencing, developed with the aid of a resource originating in Yellowstone National Park, is a multibillion dollar business.


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Today, 25% of research permits relate to microbiology.

The park, however, has seen no financial benefit from that enterprise—a fact that has led to calls for "benefits-

sharing" agreements to be established between national parks and any future researchers whose in-park discoveries might prove similarly profitable. Such agreements ensure that a park receives benefits when the results of research conducted in that park lead to the development of a commercially valuable product. In 1995, park managers concluded that Cooperative Research and Development Agreements (CRADAs), authorized under the Federal Technology Transfer Act, would be one of several legal and appropriate ways to implement benefits-sharing agreements.

The National Parks Omnibus Management Act of 1998 authorizes the NPS to negotiate benefits-sharing agreements with researchers, and in 1999, as part of a CRADA, employees of the Diversa Corporation, a biotechnology company that develops new technologies to discover and modify genes from many environmental sources, including Yellowstone National Park, used DNA analysis to develop a pedigree for Yellowstone's restored wolves. Under the terms of the agreement, the park did not pay for this service, which it could not have otherwise afforded. Today, the DNA pedigree helps park managers better understand the dynamics of the Yellowstone wolf population in many ways.[63] For instance, it allows them to definitively identify which genetic lines of wolves are most successful, to know if new wolves found in the Greater Yellowstone Area (GYA) were descended from Yellowstone's restored population, and to know if wolves found outside the GYA dispersed from that population.

In 1998, however, the Edmonds Institute, joined by the Alliance for the Wild Rockies and the International Center for Technology Assessment, filed a lawsuit in federal court challenging the Yellowstone/Diversa CRADA. Concerned that the NPS was "participating in the commercialization and privatization of life," and believing that any kind of contract negotiations between the NPS and private institutions should be transparent to the public, the plaintiffs alleged that the CRADA violated the Federal Technology Transfer Act, the NPS Organic Act, the Yellowstone National Park Organic Act, and the National Environmental Policy Act.[64] The case was ultimately dismissed with prejudice; the NPS is currently in the process of writing a servicewide Environmental Impact Statement on benefits-sharing. This document is expected to be released to the public in draft form sometime in 2004, whereupon the next chapter in the history of research permitting in Yellowstone will be written.

Conclusion

In many ways, the history of research permitting in Yellowstone has paralleled the history of the park's management—and sometimes the nation—in general. In the park's early days, standards were fairly loose; permitting was more of a tool used by the army to impose order on a state of chaos than a rigorous process of application and approval. In effect, however, it functioned as a means of resource protection. During his seminal administration, Superintendent Horace Albright set the tone and precedent for the future of NPS permitting policy—as he did for so many other NPS practices—based on his experiences and values. The postwar federal bureaucracy boom drove the evolution of research permitting starting in the 1950s; in the coming decades, progressive ideas about management possibilities combined with staunch adherence to bureaucratic implementation to create a kind of progressive conservatism within the context of science and resource management. This resulted in hard times for the NPS during an era when challenges to authority—especially government authority—were widespread throughout the nation. Policy in more recent decades has been marked by a breakdown of traditional internal–external divisions—a state of affairs partially fueled by budgetary realities leading park managers to encourage research that the NPS cannot afford to perform but from which it can benefit. And today, as in all aspects of life, technology presents the permitting process with heretofore unseen challenges to be examined through interdisciplinary agency and public forums.

At its core, research permitting is always about controlling other-than-ordinary access to park resources, with the goal of ensuring—and ultimately, improving—their conservation.

At its core, research permitting is always about controlling other-than-ordinary access to park resources, with the goal of ensuring—and ultimately, improving—their conservation. The types of benefits to be gleaned from research in the parks, from information about what visitors are thinking to data on the movements and habits of grizzly bears to the development of technologies that may improve the lives of people worldwide, make it clear that conducting and permitting research are central to the NPS mission of providing benefit and enjoyment to the people while ensuring the conservation of park resources. Research contributes to both those aspects, making it a responsibility rather than a luxury. That does not mean that every project must be approved; employing deliberation, discretion, and thoughtful decision making about the control over special resource access is the mirror of that responsibility. Over the past century, park managers have been routinely criticized either for guarding their resources too closely in regard to research, or giving researchers too much latitude; this is to be expected. Permission constitutes a leap of faith, and the line between domination and negligence can prove narrow for those charged with walking it.

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