

# YELLOWSTONE SCIENCE

volume 16 • number 3 • 2008



## Yellowstone Beavers

The Language of Heaven and Hell

Changing Values at Fishing Bridge



NPS PHOTOS

*Clockwise from top left: A beaver just under the bank in Soda Butte Creek. Abyss Pool, a hot spring in the West Thumb Geyser Basin. Fishing Bridge in its current fish-watching state.*

# Something in the Water

ONE WEEKEND THIS SUMMER, I watched my two young children lie on their bellies on a small bridge, watching for fish swimming below them. They would get so excited when they spotted one, determinedly pointing it out and describing to the rest of us just where it was, wanting to be sure we saw it too. There is something mysterious and magical about water and the things that live in it. In Yellowstone, water enhances scenic vistas, provides habitat for many species, and shapes the park's geothermal wonders. We peer out and down into it, hoping for a glimpse of something that connects us to another world, if only for a moment.

In this issue, we are pleased to have had Doug Smith and Dan Tyers document beaver surveys in Yellowstone and a U.S. Forest Service reintroduction effort that took place north of the park in the Absaroka-Beartooth Wilderness. Beavers dispersing from newly established colonies there are finding some areas on the park's northern range where willow have recently grown taller, offering enough food and building materials for beavers to settle.

In "Between Heaven and Hell," Michael Barton explores the use of religious language in early descriptions of Yellowstone National Park. Naturally, early visitors to the area used words and experiences from their own culture to express their feelings about the park, which ranged from fear and disgust to amazement and delight. Many place names still reference religious terminology, such as Abyss Pool above. An abyss is a deep or bottomless place. In biblical literature, the word abyss generally refers to a pit, the underworld, the deepest ocean floor, or to hell.

Paul Schullery's article describes the changes at Fishing Bridge as it went from a place of "hog-heaven" fishing to one with a new tradition of fish watching. This example showcases how National Park Service management has responded over time to changing values. Judging by the large number of people who use Fishing Bridge for fish watching today, it is not just children who take joy in spying something in the water.

We hope you enjoy the issue.

*J. Bluff*



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on the cover:  
*One of the beavers reintroduced to the  
Absaroka-Beartooth Wilderness.*  
USFS/Dan Tyers photo.



NPS/JIM PEACO

A beaver in Yellowstone at Soda Butte Creek near its confluence with the Lamar River, January 2005.

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Surveys from the 1920s to the present show that beaver numbers in Yellowstone have fluctuated and colonies have shifted locations. Beavers dispersing out of newly established colonies from a 1986–99 beaver reintroduction north of the park are finding areas on the park's northern range where they can settle.

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The use of religious terminology to describe Yellowstone was common during the Romantic movement of the nineteenth century.

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Fishing Bridge provides a case study in how the National Park Service has responded to changing scientific knowledge and public interests.

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# NEWS & NOTES

## **Volunteer Ralph Taylor Receives Hartzog Award**

On July 18, 2008, Linda Young, Yellowstone's Chief of Interpretation, presented the George B. Hartzog, Jr., Award for the National Park Service (NPS) Intermountain Region to Mr. Ralph Taylor at the Old Faithful Visitor Center.

One of the most prestigious awards given by the NPS, this award recognizes outstanding contributions to the NPS by individuals, organized groups, or park volunteer programs. The intent of the award is to distinguish those individuals who give of their skills, talents, and time beyond the normal call of duty.

For 21 years, Ralph Taylor has volunteered in Yellowstone each summer, focusing on protecting the park's geothermal features. Ralph works in the Old Faithful area, observing and studying geysers and hot springs, educating visitors, and promoting visitor enjoyment and understanding of the geothermal features in six geyser basins.

Ralph arrived in Yellowstone as a visitor in 1966. He was enthralled by the park's geothermal features and became an avid "geyser gazer." After he retired from a position as an electrical engineer with Cincinnati Milacron Company, Ralph became a summer VIP (Volunteers-in-Parks) in Yellowstone beginning in 1986. His primary task has been to clean litter from more than 80 geothermal features and scrub out graffiti from the bacterial mats in the Upper, Midway, and Lower geyser basins. He uses "a very long pole with a slotted kitchen spoon" to remove coins and other debris. Ralph and others are concerned about the best way to pass on the skills of safe and effective cleaning of these very fragile features.

Ralph is responsible for documenting geyser activity for 35 geothermal features by deploying and maintaining scientific data loggers, then downloading and analyzing the data. Staff at the Old Faithful Visitor Center use Ralph's analyses to predict eruptions of certain geysers, explain eruption patterns to visitors, and incorporate possible geyser eruptions into daily interpretive walks and talks. This data has also shown the effects of earthquakes thousands of miles away. The sensors in Yellowstone reflected activity within one to two hours from occurrence after the 2002 earthquake in Denali National Park, Alaska. In the winter months, data is recorded and sent to Ralph to analyze and prepare for his next summer trip to Yellowstone.

## **Awards Presented at IGBC 25<sup>th</sup> Anniversary Celebration**

On June 21, 2008, the Interagency Grizzly Bear Committee (IGBC) recognized many people for their contributions to the grizzly bear recovery effort. Awards were presented at the IGBC 25<sup>th</sup> Anniversary Celebration held near Seeley Lake, Montana.

The IGBC consists of representatives from the USDA Forest Service, the National Park Service (NPS), the U.S. Fish and Wildlife Service (USFWS), the Bureau of Land Management, and representatives of the state wildlife agencies of Idaho, Montana, Washington, and Wyoming. In the interest of international coordination and cooperation, the Canadian Wildlife Service is also represented. The IGBC was formed in 1983 to help ensure the recovery of viable grizzly bear populations and their habitat in the lower 48 states. Prior to its establishment, decisions about grizzly bear recovery were



Volunteer Ralph Taylor received the George B. Hartzog, Jr., Award in July for his outstanding contributions to the National Park Service. He helps protect the park's geothermal features.

often problematic when they conflicted with jurisdictional boundaries between federal and state agencies. The inclusion of high-level administrative staff with agency decision-making authority and funding support to IGBC was a significant turning point for grizzly bear recovery.

Award recipients included authors and editors of the previous issue of *Yellowstone Science*, 16(2), which focused on Yellowstone grizzly bears: U.S. Geological Survey wildlife biologists Chuck Schwartz and Mark Haroldson of the Interagency Grizzly Bear Management Team, for Scientific Leadership; NPS wildlife biologist Kerry Gunther, for On-the-Ground Leadership; NPS naturalist Paul Schullery, for Communications Leadership; and Chris Servheen, USFWS Grizzly Bear Recovery Coordinator, for Significant Accomplishment. For a list of other award recipients, visit the IGBC website at <http://www.igbc.org/IGBC25FinalProgram.pdf>.



## Centennial Challenge Provides \$700,000 to Yellowstone

The Yellowstone Park Foundation has raised more than \$700,000 in private funding for four 2008 National Park Service Centennial Challenge projects. As a result of the Yellowstone Park Foundation's fundraising efforts, Yellowstone has been awarded matching federal funds to be used toward these projects.

The purpose of the NPS Centennial Challenge is to improve, through federal investment and private charitable contributions, the value and natural beauty of America's national parks in anticipation of the 100<sup>th</sup> anniversary of the National Park System in 2016. In response to the President's Centennial Challenge, Congress appropriated \$24.6 million this year to be matched by donations for programs and projects that will further NPS centennial goals and help prepare parks for another century of preservation, conservation, and enjoyment.

Yellowstone's 4 projects are among 110 at 76 national parks that are receiving matching grants this year. The projects, designed to help American youth, national park visitors, researchers, and scientists understand and protect Yellowstone, include:

- *The Greater Yellowstone Science Learning Center* (<http://www.greateryellowstonescience.org>). This website is designed to integrate the work of the park, academic, and scientific communities in collaborative efforts to gather and use information to better protect and manage places like Yellowstone. A grant from Canon U.S.A. to the Yellowstone Park Foundation is being matched by \$115,000 in federal funds.
- *The protection and preservation of more than 40,000 priceless artifacts in Yellowstone's Heritage and Research Center*. A grant from Canon U.S.A. to the Yellowstone Park Foundation is being matched by \$79,528 in federal funds.



Long-time Yellowstone park ranger Dale Nuss.

- *A scientific study on Yellowstone Lake's microbial biodiversity*. This groundbreaking research will be aimed at documenting environmental relationships between many identified and previously unidentified microbial species, including those living in the depths of Yellowstone Lake. A grant from the Gordon and Betty Moore Foundation to the Yellowstone Park Foundation is being matched by \$459,000 in federal funds.
- *The "Inspiring Future Yellowstone Stewards: No Child Left Inside" initiative*. This initiative is designed to help better connect school-age children with the natural world by giving them first-hand experiences with the outdoors. It includes special programs for visiting school groups and underserved youth in the Yellowstone region, and enhances the park's Junior Ranger and Young Scientist programs. A grant from the Toyota U.S.A. Foundation to the Yellowstone Park Foundation is being matched by \$80,230 in federal funds.

The Yellowstone Park Foundation (<http://www.ypf.org>) has been Yellowstone National Park's official fundraising partner organization since 1996. The Foundation has raised \$50 million in contributions from individuals, foundations, and corporations to support more than 150 park projects.

### Passing of Dale Nuss

On June 20, long-time Yellowstone park ranger Dale Nuss passed away at the Montana Veterans Home in Columbia Falls, Montana, where he

had been a resident since 2004.

Dale Hudson Nuss was born in Kansas City, Missouri, on August 31, 1925. His father worked at Pahaska Teepee near the East Entrance to Yellowstone National Park. He spent his childhood summers there and often traveled into the park with Camp Trails, the boys' summer camp his father operated.

Dale served with the U.S. Army Air Corps in Europe during World War II, flying numerous missions over Germany. After the war, Dale attended Colorado State University and worked as a seasonal fire control aid and park ranger in Yellowstone from 1947 to 1952. He met Bunny, his wife and life companion in Yellowstone in 1952. After working at Shenandoah National Park, he returned to Yellowstone as a permanent employee in 1953, and remained there until his retirement in 1980.

During his long career in Yellowstone, Dale served as district ranger at West, South, and North districts, as assistant chief ranger, and as a specialist in forestry, fire, and bear management. He was involved in most aspects of park management, including the elk and bison programs, which he supervised. He developed and designed A-frame cabins that replaced tent-frames and log patrol cabins. Four A-frame cabins still stand as a continuing monument to Dale's innovation.

He loved his family, his wife, and his friends more than he could show and his love of animals and nature were immeasurable. Through his sometimes gruff exterior, there was probably not one request that he did not honor.

YS

# The Beavers of Yellowstone

Douglas W. Smith and Daniel B. Tyers

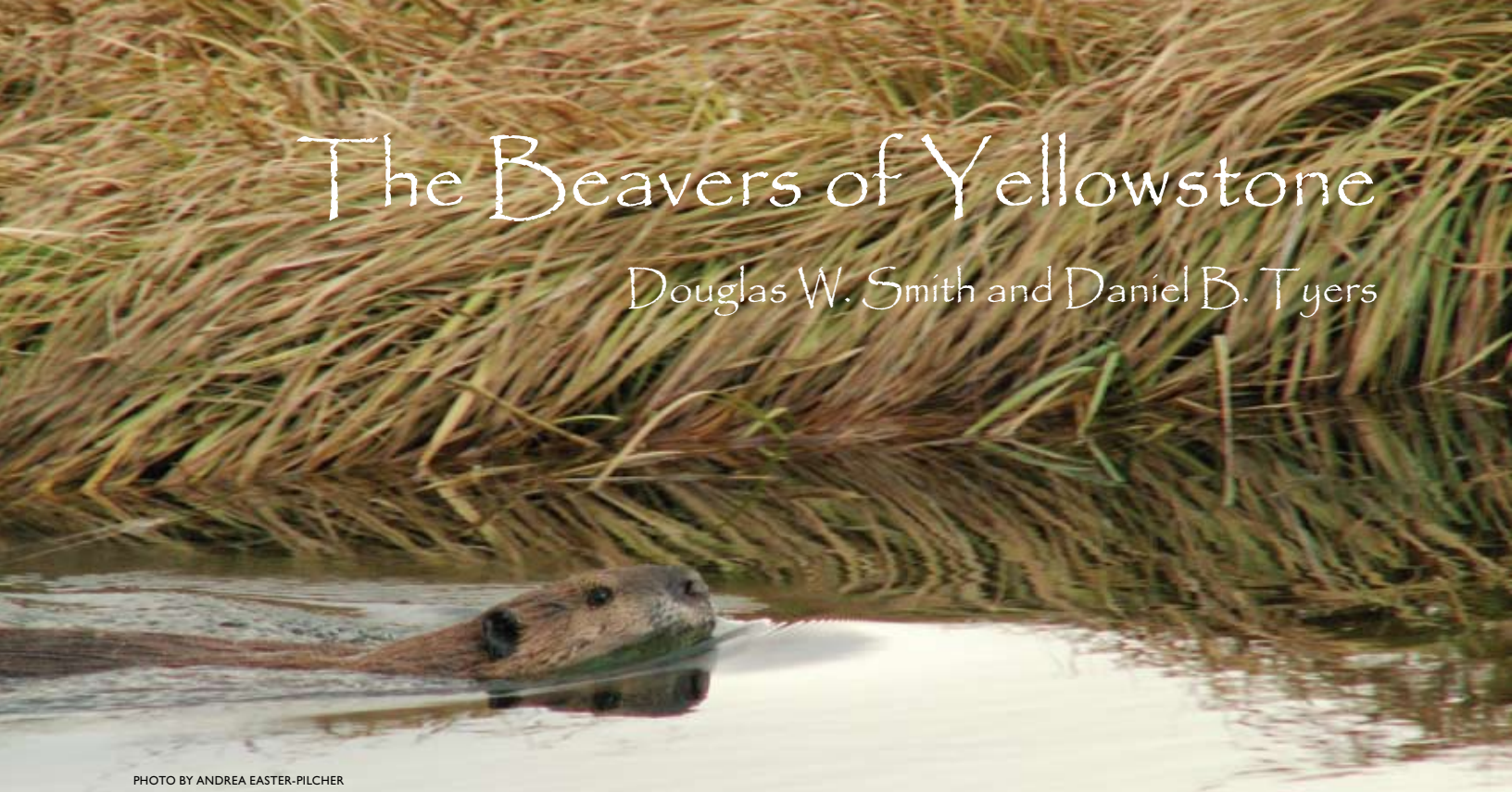


PHOTO BY ANDREA EASTER-PILCHER

**L**ITTLE HAS BEEN PUBLISHED about beavers in Yellowstone National Park (YNP) despite their central importance in Euro-American exploration of the West. Beaver fur was the most sought-after pelt during the fur trade and fueled most North American exploration. The hunt for new trapping grounds led parties through what is now YNP. Further, the quirky and interesting life history of the beaver, its engineering skill (second only to humans), and its effects on biodiversity make the lack of scientific study in YNP a notable omission. The fur trade reduced beaver populations across the West and likely in the Yellowstone area by the time the park was established in 1872, but the park was never considered prime beaver habitat due to the lack of extensive aspen stands, a key beaver food. No reliable pre-park population estimates exist, but journals from the late 1800s indicate beavers were present in places where they are not currently found: Pelican Creek, the upper Lamar, and Gardner's Hole. Ernest Thompson Seton observed a beaver colony in Yancey's Hole in 1897 and the present meadows there were probably created as beaver meadows (old beaver ponds that drained and grew into a lush grassland), but there is no sign of beavers there today.

In 1921 and 1923, Edward Warren surveyed portions of the northern range for beavers and produced the first published account of beavers in the park (Warren 1926). What Warren found might be called the beaver heyday for the northern range. Beavers were common and they were cutting aspen, which was much more abundant on the northern range in the 1920s than it is now. The objective of this short beaver history is to take you through the few and sporadic surveys conducted between Warren and the present, when population counts are

done every other fall. But before we get into the Yellowstone story, some background on beavers is necessary.

## Beaver Biology

Beavers are choosy generalists; they can eat many different foods but prefer only a few. Aspen is their most preferred food and beavers go to great trouble to cut and eat it. After aspen, beavers prefer willow and cottonwood. Beavers produce more young and have higher population densities when these foods are abundant, and there is some data to support the idea that they do slightly better when aspen is plentiful, but this is far from settled. Next in beaver preference is a long list of deciduous tree species such as birch, oak, and maple, and shrubs such as dogwood, mountain maple, and beaked hazel. Last on the list are conifers; their sappy, resinous bark is not sought after by beavers except when nothing else is available. Harlequin Lake near Madison Junction is a good example of a place where beavers use lodgepole pine. Alder is widespread and grows along many YNP stream courses and is commonly cut by beavers, but how much alder they eat is not well understood. Beavers commonly cut it for building material, but there is some debate over whether they are cutting it for food as well. Research in western Montana found that beavers used small alder stems during the late fall when they were storing ("caching") food for winter, suggesting some alder consumption (A. Easter-Pilcher, personal communication, University of Montana–Western) even though it is loaded with tannins that reduce its palatability. But some researchers have found that beavers actually use the less edible alder to cap their food cache, as the top portion





This beaver lodge in Harlequin Lake near Madison Junction shows use of lodgepole pine (green) in the food cache.

is frozen in ice and unusable. Regardless, it is well known that beavers construct dams and lodges out of alder, but they often use it with the bark on, whereas other woody vegetation is used after the bark is consumed.

During the growing season beavers shift from eating bark (the cambium layer) to eating primarily the herbaceous, succulent vegetation on shore, including willow and aspen leaves. They tend to cut wood and eat the bark before herbaceous plants come up in the spring and after they die off in the fall. They store wood in a food cache in the water near their burrows or lodges, as beavers do not hibernate and are active all winter. Existence below the ice in this totally dark environment (called subnivean living) is fascinating but beyond the scope of this article. Aquatic vegetation is another key food for beavers. Water lilies, which are rich in starch, are available all winter because they have a tuberous root that grows in the bottom mud of ponds. Harlequin and Heart lakes and some ponds in the Bechler area that are used by beavers have abundant water lilies.

It is an odd sight seeing a beaver graze on shore. Designed for swimming, with their haunches above their forelimbs, beavers do not seem like they should be able to walk. Running is even more difficult for them. They appear to gallop but look like they are about to roll over at any moment. They would clearly rather amble along and not have to run anywhere. Their clumsiness on land makes them vulnerable to terrestrial predators because their only defense is to escape into the water; that is why they dig extensive canal systems around their habitations. Some good examples of these canals can be found in the Willow Park area. The water around their dwelling serves as a moat, protecting them from nearly all predators. Their lodges are so sturdy that bears have a hard time digging through them; several attempts have been seen in the park, none successful. Nocturnal and crepuscular (primarily active at twilight), beavers have a keen sense of smell and acute hearing but poor eyesight. Wolves patrol some beaver ponds nightly, waiting for a beaver to forage too far from the water. When a beaver detects



A typical beaver food cache in Yellowstone, with canals that allow water access to willow stands.

danger while swimming, it slaps its tail on the water to warn any beavers on land, who then flee to the water. Colony members can identify each other by tail slaps, and the tail slaps of kits (young beavers), who are inexperienced at assessing danger, are often ignored. This tail slapping is often the first thing you hear when you approach a beaver pond, unless the beavers are habituated to humans.

The term “busy as a beaver” comes from their obsession with damming flowing water and creating ponds. For example, a beaver that was being held overnight in Doug Smith’s basement dug at the corner of its cage when a toilet was flushed upstairs and water ran through the pipes. When the water stopped, the beaver did too. They can be so zealous at damming that they flood trees they could use as food.

## Life History and Population Ecology

Called cooperative breeders, beavers, wolves, and other mammals that live in family groups represent less than 2% of all mammalian species. Beavers are territorial and colonies typically start when two dispersing beavers of the opposite sex find a vacant location upon which to build a lodge. They will readily settle old, unoccupied colony sites, and may prefer them because much of the major structural work has already been completed, but the forage in previously occupied sites is often poor. If the current is too strong they may live in burrows or bank dens without making any dams.

Beavers typically breed monogamously each year (there are some exceptions), producing a litter of one to nine kits (averaging two to four). Their colonies can grow quickly, sometimes reaching 14 beavers, but in North America the average size is about six, which usually includes one or two young from the current year and one or two from the previous year (yearlings). Many beavers disperse at two years, but this depends on the availability of nearby vacant territories. Some beavers live 10–15 years in the wild, making them a fairly long-lived rodent. They also grow to be North America’s largest rodent (the

capybara in South America is the only larger rodent in the world). Their life history strategy, combined with their lodge building and food storage, has made them adaptable and resilient, and enabled them to settle most of North America, from the southeast United States to above the Arctic Circle. Their range is limited only by their need for adequate water and enough woody vegetation for their structures and winter food storage. They sometimes use sagebrush for construction in Yellowstone (see the colony along Glen Creek and near Golden Gate); beaver use of corn stalks has been reported in the Midwest.

Given their preference for aspen and its positive influence on their productivity, beaver populations can exhibit a boom-bust cycle. Aspen, a sun-loving, early successional species, comes in after disturbances and can grow into lush forests, but once cut it takes time to regenerate. Beavers move along waterways into aspen stands and cut them for winter food almost exclusively until the only remaining trees are beyond safe reach of the water. Their boom-bust population ecology has been especially evident in Michigan, Minnesota, and Wisconsin, where beavers expanded in record numbers when vast tracts of aspen came in after the extensive pine forests were clear-cut. The 210 square miles of land in Minnesota that became Voyageurs National Park after having been logged by Boise-Cascade had abundant aspen growing in it and more than 500 beaver colonies in 1986. (YNP, with about 3,600 square miles, had only 127 colonies in 2007.) At Apostle Islands National Lakeshore in Wisconsin, where beavers have no predators, Smith

has seen them travel more than 300 meters on land to cut an aspen tree. On Isle Royale National Park in Lake Superior, where wolves are abundant and beavers make up a significant part of their diet, beavers cut every aspen tree within about 40 meters of the water, then switch to birch until it is gone, then the colony goes extinct. Most of the aspen cut by beavers there did not regrow due to heavy moose browsing, so aspen stands along streams converted to white spruce, a tree moose do not eat, nor do beavers. At some sites the aspen trees grow back and the cycle repeats itself, causing the boom-bust swings.

Beavers subsisting on willow may not exhibit this boom-bust cycle because they are less capable of suppressing its growth (Boyce 1974). This may be due to the hardness of willow, which withstands beaver cutting well, but it is also probably partly due to the lower beaver densities in colonies subsisting on willow than on aspen. This aspect of beaver ecology has important ramifications for beavers in Yellowstone. While Warren found beavers commonly using aspen on the northern range, recent parkwide surveys seldom find an aspen cut by beavers (Fullerton 1980, Smith et al. 1997). Virtually all of the beavers living in Yellowstone today subsist on willow (Figure 1); some use aquatic plants, others use lodgepole pine, but aspen is not used because there is very little available. Aspen accessible to beavers was cut and has not re-grown. Cottonwood is occasionally cut, but it is not a significant food source for beavers in YNP.

## Virtually all of the beavers living in Yellowstone today subsist on willow...

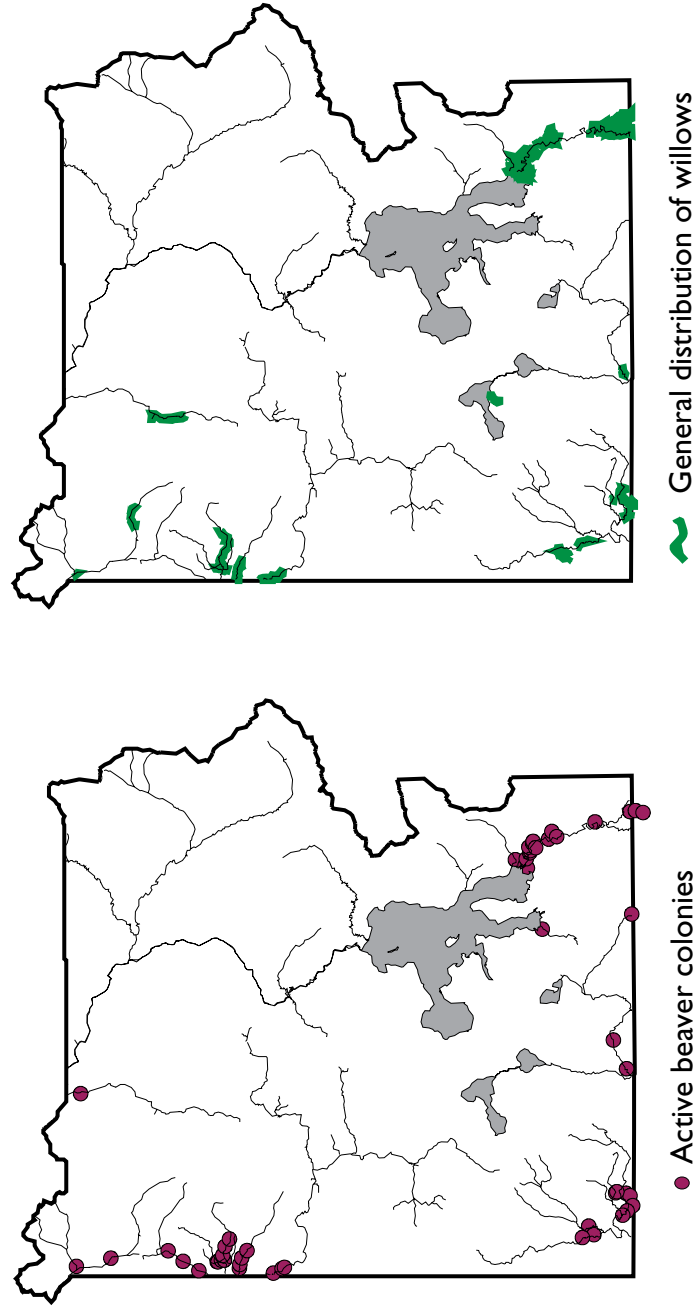


Figure 1. Locations of active beaver colonies and general distribution of willows, 1996. Willow data from the Yellowstone Spatial Analysis Center.



## YNP Beaver Surveys, 1921–2007

**Warren.** When Warren surveyed parts of the northern range for beavers in 1921 and 1923 (Warren 1926), he found 25 and 9 colonies, respectively (Figure 2). As he walked and rode horseback, he photographed and wrote detailed accounts of many of these colonies, most of which were cutting and using aspen. One large colony existed within view just south of the main road at a point just east of the Lava Creek bridge; another was next to the highway near the Yellowstone River bridge just east of Tower. Today it is virtually impossible to tell that beaver colonies with abundant aspen ever existed at these locations.

**Jonas.** In 1953 a graduate student at Montana State University, Robert Jonas, repeated the Warren survey, extended it to other areas of the park, and included beaver sightings by other people in his report (Jonas 1955). Like Warren, Jonas did a ground survey, walking or riding stream courses. Jonas, who found no beavers where Warren had found them, cited three reasons for the decline: (1) lack of preferred food (e.g., aspen), (2) poor water conditions, and (3) silting in of the beaver ponds. He considered the primary factor to be “lack of preferred food,” meaning that aspen had declined significantly.

He found northern range beaver sites that had not been documented by Warren (Figure 2), but he concluded that beavers had declined overall, aspen had declined, and that elk browsing prevented aspen regeneration, reducing the possibility of beaver recolonization. Jonas also located beaver sites elsewhere in the park that had not been previously recorded, including the southeast arm of Yellowstone Lake along the Yellowstone River Delta, Hayden Valley, and the Snake, Gibbon, Firehole, and Madison rivers.

**Consolo Murphy.** In 1988 and 1989, park biologist Sue Consolo Murphy conducted surveys to document the presence and distribution of beavers in the park. Beavers were surveyed during two August overflights and on the ground mainly from August to October (Consolo Murphy and Hanson 1993). This survey improved the park’s reporting system so that more information on beaver sightings and sign was recorded. Consolo Murphy found 71 active lodges parkwide, which she considered a conservative estimate (Figure 2). She suggested that many northern range colonies were “ephemeral,” with some locations supporting just one colony that moved around over a period of years. She hypothesized that “beavers may move between the Gardner River and nearby ponds and lakes (such as Slide Lake).” She classified at least 13 streams or stream



Fig. 2 (5226). The Cooke City road and ravine near Yellowstone River Bridge, as seen from the slope of Junction Butte. Beaver works and dead aspens on right of road; aspen groves on left and at head of ravine. Aug. 26, 1921.



Fig. 3 (5225). Closer view of the Yellowstone Bridge beaver colony, showing ravine denuded of aspens by the beavers. Alders growing along run in foreground; dry sagebrush slope at right. Aug. 26, 1921.

FROM WARREN, E. R. 1926. A STUDY OF THE BEAVERS IN THE YANCHEY REGION OF YNP.

These 1921 photos from Warren’s report show the Yellowstone Bridge beaver colony’s use of aspen. Jonas found no beaver and little evidence of aspen here in 1953. Today, it is virtually impossible to tell that beaver and aspen ever existed here.

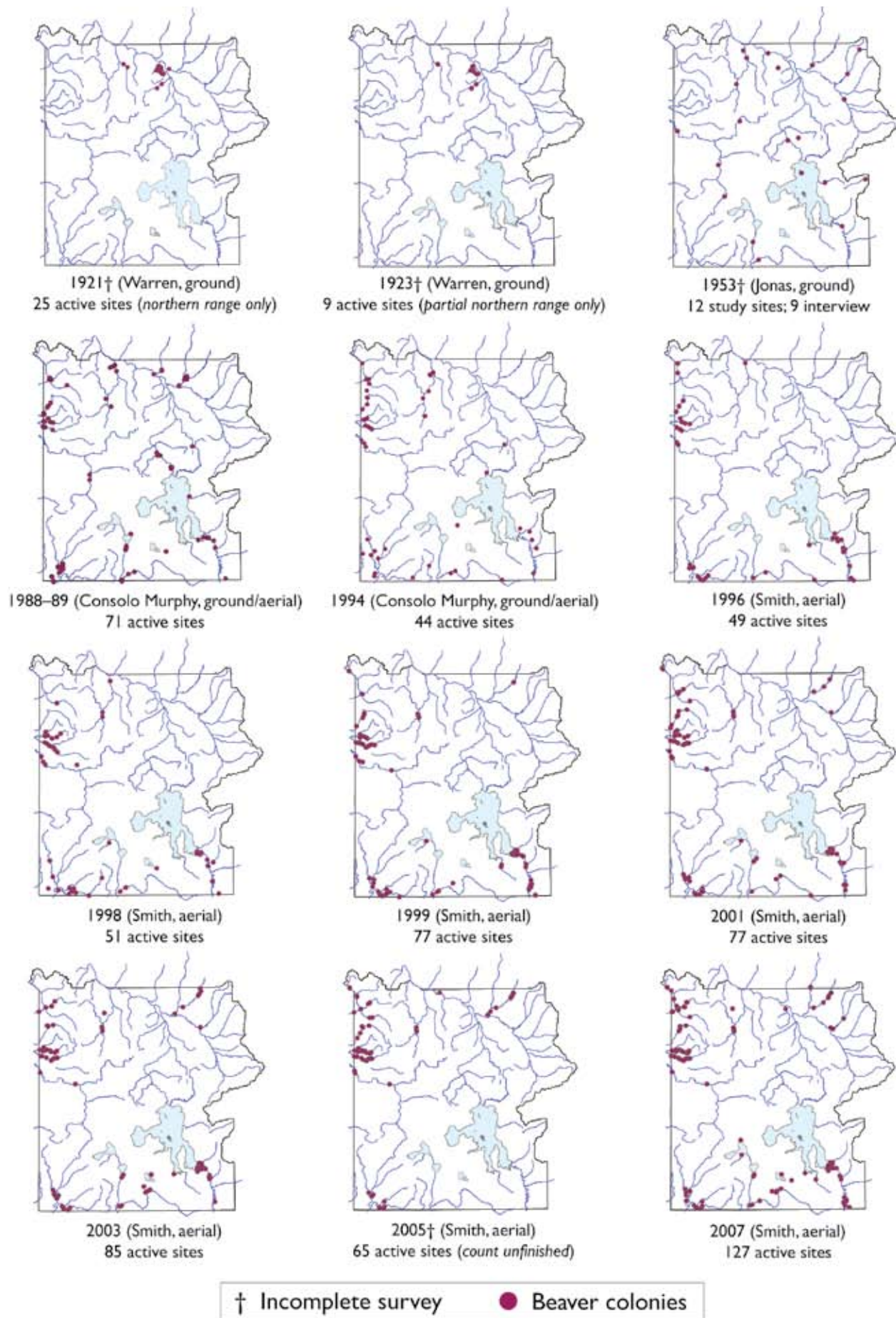


Figure 2. Maps of Yellowstone beaver surveys, 1921–2007. Note: data from these surveys are not precisely comparable because of the different census techniques and objectives used in each study.



segments in the northwest, southwest, and southeast portions of the park as high quality beaver habitat. Colonies with persistent activity were usually associated with either willow or aspen, and at some sites with aquatic vegetation.

In 1994, Consolo Murphy conducted a follow-up sampling survey. She looked for beavers during a September 9 overflight and during ground surveys that mainly took place from August 15 to November 15 (Consolo Murphy and Tatum 1995). The results were similar to and reaffirmed those of the previous survey; 44 lodges were classified as active.

**Smith.** In 1996, Smith began the first of seven parkwide aerial surveys conducted during the fall. In the summer beavers may wander alone and leave sign over a wide area, sometimes overlapping with beavers from a nearby colony or dispersing to a new territory. In the fall they begin centralizing their activity around a lodge and building a food cache. Counts made in the fall when the beavers are more settled in their behavior have become the accepted approach (Baker and Hill 2003).

Smith followed the standard technique used by other beaver researchers. Close ground inspection is probably the most accurate survey method, but covering an area as large as Yellowstone is most efficiently done from aircraft. The aerial surveys took from 12 to 14 hours of total flying time spread out over six or seven surveys. To assess the accuracy of aerial counts, Dan Tyers of the Gallatin National Forest and Smith have been comparing them against ground counts outside the park for about 10 years. Each year that Smith surveys the beaver colonies by air, Tyers surveys a subset of the same areas on the ground on the Gallatin National Forest. Although preliminary, the results indicate that ground counts are only a little better than aerial counts, but this finding will surely vary by location. In 1999, Smith and Consolo Murphy compared

ground and aerial beaver counts in southeast Yellowstone and found the results to be approximately equal (Consolo Murphy and Smith 2002).

For each aerial survey, Smith flew the entire park, usually during October, looking for lodges with a cache and other signs of beaver presence, such as mud on lodges, peeled sticks that glint white in the sun, and freshly maintained dams with brimming water levels. Counting hundreds of colonies in Minnesota, Wisconsin, and Michigan, Smith found that beavers typically build one cache per family. However, the incidence of two-cache colonies is higher in Yellowstone, where he has found three or four 2-cache colonies per year, especially on the west side of the park. This phenomenon is ripe for further investigation because some inspections from the ground indicate that this may actually be two colonies close to each other (A. Easter-Pilcher, University of Montana–Western).

The first year, pilot Roger Stradley of the Gallatin Flying Service and Smith looked for beaver colonies on all the creeks, rivers, and lakes in the park that have low gradient. (A gradient  $>4\%$  is typically too steep for beavers to be able to dam.) They found 49 active colonies, all of them in places where they had been recorded on previous surveys. They found only one colony (Slide Lake) on the northern range, the lowest tally for this area of any survey since 1921 (Table 1 and Figure 2). They found no use of aspen anywhere in the park and the cutting of cottonwood in only two places (two trees in Lamar Valley and two on the Gardner River). They were able to identify three areas of concentrated beaver occupation (or “hubs” as Stradley called them): the Yellowstone River Delta south of the southeast arm of Yellowstone Lake, Bechler and its many streams and rivers, and the drainages north of West Yellowstone (Figure 2).



NPS/DONALD SMITH

Beaver density in the Yellowstone River Delta is the highest in the park and rivals high densities elsewhere in North America.

In the three surveys from 1999 through 2003, the count of beaver colonies stabilized, indicating [Smith and Stradley] had probably achieved maximum efficiency and were getting a relatively accurate parkwide count.

Table I. Number and locations of active Yellowstone beaver colonies, 1996–2007. Data from Smith fall aerial surveys.

Location	Number of Active Colonies						
	1996	1998	1999	2001	2003	2005	2007
<b>Northwest</b>							
Campanula/Gneiss/Duck Creek	7	6	7	8	10	15	16
Cougar Creek	4	7	11	9	3	4	5
Maple Creek <sup>1</sup>	-	-	-	-	4	6	7
Fan Creek	0	0	0	0	0	2	5
Bacon Rind Creek	0	0	0	0	1	1	3
Gallatin River	2	2	5	6	1	7	7
Harlequin Lake	0	1	1	1	1	1	1
Grayling Creek	3	0	1	6	5	5	5
Madison River	3	3	3	3	1	2	1
<b>Southwest</b>							
Bechler River	1	0	3	2	3	3	1
Boundary Creek	2	2	1	3	7	0	6
Falls River	0	2	3	6	3	2	6
Mountain Ash/Proposition Creeks	7	6	6	1	0	3	1
Other Bechler	0	1	1	0	1	0	2
<b>Southeast/Southcentral</b>							
Snake River	3	2	4	4	3	*	3
Yellowstone River Area	15	14	23	17	21	*	29
Heart Lake Area	0	0	0	0	6	*	2
Basin/Otter/Moose Creeks	*	*	*	*	0	0	7
<b>Other</b>							
Glen Creek	0	0	0	0	1	*	1
Chipmunk Creek	0	0	2	0	0	*	1
Slough Creek	0	0	1	3	6	9	6
Grouse Creek	1	0	0	0	1	*	1
Outlet Creek	0	1	0	0	0	*	1
Shoshone	0	1	1	1	0	*	0
Slide Lake	1	1	0	0	0	*	0
Willow Park	*	2	4	3	4	4	6
Hayden Valley	0	0	0	1	0	*	0
South Lewis Lake Area	0	0	0	2	2	*	0
Lamar Valley	0	0	0	1	1	*	3
Yellowstone River	0	0	0	0	0	1	0
Elk Creek	0	0	0	0	0	0	1
<b>Total</b>	<b>49</b>	<b>51</b>	<b>77</b>	<b>77</b>	<b>85</b>	<b>65</b>	<b>127</b>

<sup>1</sup>For years 1996–2001, Maple Creek data was tabulated under Campanula/Gneiss/Duck Creek or Cougar Creek.

\*Not censused



Beaver density in the delta area was the highest in the park, and rivaled high beaver densities elsewhere in North America. These beavers were living entirely on willow in the winter; no aspen was observed. The wide willow expanse of the delta provides enough habitat to support about 15 beaver colonies in only about a two-mile stretch along the Yellowstone River. The delta's wetland area enables beavers to occupy places off of the main river channel, but that is still a very high density.

Although they found no colonies in Willow Park during that first survey in 1996, they have found two to six colonies there in every survey since, indicating that they were probably missed the first time. Being the observer in the back of the plane, Smith remembers well the first survey. After hours of flying and counting colonies he was somewhat green, as they say, from so much circling in an airplane at low altitude. This is a key issue for any aerial survey: observer fatigue or, as some say, "stop before the puking point."

In the three surveys from 1999 through 2003, the count of beaver colonies stabilized, indicating they had probably achieved maximum efficiency and were getting a relatively accurate parkwide count. In 2005, early ice prohibited the completion of the count, but in 2007 the count significantly increased (Table 1). Smith speculates that beavers dammed more areas because long-term drought in the park reduced water levels on several streams, making them easier for beavers to dam. Beavers

could better handle the normally high-flow creeks found in mountainous Yellowstone that usually blow dams out. New colonies and dams were discovered across main-stem streams like Cougar, Maple, Slough, and Hellroaring creeks due to diminished flows. In the Midwest where gradients are low, drought decreases beaver numbers because habitats dry up, whereas more water creates new habitats. The reverse may be true on the high gradient streams of Yellowstone.

All of the colonies found were amid willow rather than aspen. In fact, mapping willow distribution against beaver distribution showed a strong association between them (Figure 1). The other notable finding was that beavers made a dramatic comeback on the northern range, from one colony in 1996 to 10 in 2005. After years of stunted growth, in the late 1990s willows increased in stature in many areas across the northern range and this resurgence is correlated with the increased number of beaver colonies there. Most of these colonies were along Slough Creek, but new colonies were also recorded elsewhere, including a spot on Elk Creek that, according to Jonas, had not been occupied since the early 1900s. Importantly, none of the sites reported by Warren or Jonas were occupied from 1996 through 2007.

## Absaroka-Beartooth Wilderness Beaver Reintroduction

The rapid re-occupation of the northern range with persistent beaver colonies, especially along Slough Creek, occurred because Tyers of the Gallatin National Forest released 129 beavers in drainages north of the park (*see sidebar*). In a remarkable and ingenious project that took place from 1986 to 1999, Tyers arranged to have "problem" beavers that were caught live by Montana Fish, Wildlife and Parks staff sent to Gardiner, Montana. Dan packed them in via horse and mule, a skilled packing job for sure, to release at sites on the Gallatin National Forest (Figure 3). Some of these beavers moved downstream into YNP.

Beaver have been present on the northern range of YNP since the 1920s, as documented by Warren, Jonas, and Consolo Murphy, and by occasional sightings and observations of sign as Consolo Murphy described, but there were few places of persistent beaver occupation until the late 1990s. This was probably because there was too little of the woody vegetation that beavers need for food and building materials. In the late 1990s, these necessities were offered by some northern range willow stands that had grown taller, and reintroduced beavers dispersing out of newly established colonies found areas that they could settle. Beavers found places to live in areas where willow was recovering, primarily along Slough Creek, but also in other areas. Lamar Valley now has three beaver colonies.

Beaver re-occupation of the northern range could have eventually occurred from the opposite direction. Beavers existed along the Yellowstone River downstream of the park during the

*continued page 14*



Beavers were packed into the Absaroka-Beartooth Wilderness by horse and mule.

# Absaroka-Beartooth Wilderness Beaver Reintroductions, 1985–Present

Dan Tyers



PHOTOS USFS/DAN TYERS

**A**LTHOUGH BEAVER have been continuously present along the Yellowstone River north of Gardiner, a cursory investigation in 1985 found no evidence of beaver populations in the Absaroka-Beartooth Wilderness, USDA Forest Service, Gardiner Ranger District. Consequently, a reintroduction effort was considered. Procedurally, returning a species to designated wilderness requires that four criteria be met: (1) the species is not present and therefore not capable of repopulating without intervention, (2) suitable habitat exists, (3) humans can be implicated in the extirpation, and (4) the species has a limited opportunity to return to the area by natural means.

Suitable habitat is obviously abundant in the study area. At a minimum, the three primary drainages (Hellroaring, Buffalo Fork, and Slough Creek) have extensive and robust willow stands. When I surveyed these areas during the summer and fall of 1985, I found plentiful and widely distributed dams and lodges that had apparently been abandoned many years before. This evidence of prior activity matched archived reports and maps found in district files. However, these surveys did not reveal any contemporary activity.

I conducted the surveys by walking the banks of all areas likely to support beaver: Eagle Creek, Bear Creek, Hellroaring, Buffalo Fork, Slough Creek, the upper reaches of the Stillwater, Soda Butte Creek, and the Clarks Fork. These occurred predominantly in the Absaroka-Beartooth Wilderness, but included several adjacent drainages in associated watersheds.

I also interviewed current and former sheepherders, outfitters, and Montana Fish, Wildlife and Parks (MTFWP) employees who had knowledge of the area's history. All agreed that beaver had been well-established in the study area and there was a general consensus that the population was robust until the 1940s or 1950s. They cited very determined trapping, a tularemia epidemic, and a general decline

of willow stand condition due to drought and moose and elk browsing as possible reasons for the observed beaver decline. Many of the interviewees could recall specific dams and lodges they had seen in the backcountry, or at least general areas of activity. Some described dams that were noteworthy in size and the amount of water impounded, and some named trappers who had persistently removed beaver from the area. Others recalled seeing dead beaver floating in ponds, which they interpreted as evidence of disease. However, no one in 1985 could provide definitive evidence of current beaver activity in the study area.

Based on these findings, the Forest Service determined that the criteria had been met to warrant a reintroduction effort. MTFWP Region 3 personnel, principally Mike Ross and Harry Whitney, assisted the project by live-trapping beavers when responding to complaints from property owners. Complaints generally involved beaver cutting shade-trees, plugging culverts or irrigation ditches, or flooding fields. MTFWP has also assisted the project by putting a



*Transporting beaver into Buffalo Fork on pack-stock. Above left: beaver did not immediately run off after being released from cages. Above right: beaver cages on ice at Charlie White Lake.*



moratorium on beaver trapping in Absaroka-Beartooth drainages that extend into the park.

For humanitarian reasons and to help ensure that beaver stayed in the release areas, the trapping efforts targeted family groups. Beaver separated from family groups are more likely to leave release sites, presumably in search of family members. In addition, beaver were released only in late summer or early fall because they might be more inclined to stay in the area when they needed to prepare structures and food caches for winter.

Each beaver was transported in a specially designed cage which had a block of ice placed on top and was then wrapped in canvas, keeping the animal cool, wet, and sheltered. Also, pack-stock are less skittish about carrying a live animal when they cannot see it. All of the 129 trapped beaver survived the handling and transit to release areas in seven drainages between 1986 and 1999. They were transported to locations within the Absaroka-Beartooth using pack-stock and to the release site outside of wilderness by vehicle.

Since the reintroductions began, about 15 to 20 miles of stream have been surveyed annually to record active and inactive lodges, dams, and caches. These inventories have charted the expansion of the population into what we believe is nearly all suitable areas within the study area. From 2000 to 2007, we typically located 20 to 30 lodges each year. During the 2007 survey, we found 16 primary areas and 27 active lodges. With the study area now nearly saturated, it is likely that natural displacement of juveniles and intra-specific competition have resulted in dispersal within the study area, as well as downstream into Yellowstone National Park (YNP).

To assess the possible survival and dispersal of the reintroduced beaver, 10 instrumented animals (4 in 1998 and 6 in 1999) were released into an area about three miles north of the YNP boundary that did not have an existing population. Although the sample size was very small and the

batteries had failed in all transmitters by the fall of 2000, these animals provided some insights into the fate of the larger population. At least 5 of the 10 animals survived until their transmitters failed. Four of these survivors stayed in the willow stand where they were released and the fifth beaver established in a willow stand about one mile away. Two other beavers, one found in the release meadow and the other about 10 miles away, were alive when their first winter after release began but did not survive until spring. Neither showed signs of predation. The other three beavers could not be located the spring following their release. However, the search was limited to the Gallatin Forest and it is presumed that these three beavers relocated into the Lamar and Yellowstone drainages downstream in the park.

The reintroduction effort has clearly been successful. Beaver are currently established in nearly all areas that had been identified as formerly occupied. Now the project affords opportunities to assess the effects of beaver on riparian areas in the headwaters of the Yellowstone River. For example, in partnership with the USDA Forest Service Remote Sensing Applications Center, remote imagery will be used to determine changes in the amount of standing water, willow canopy, and riparian footprint since the project began. Other research is comparing sites with perennially active lodges to sites with ephemeral lodges to determine what characterizes locations where beaver are able to persist long-term in this environment. Annual stream-side surveys will continue to be used to monitor beaver colony locations.



Beavers were also packed in by sled and transported by truck.







Figure 3. Beaver reintroduction release sites in and near the Absaroka-Beartooth Wilderness, 1986–99.

beaver decline in the park, and in time they would have found their way upstream. This has probably already happened; there are new colonies along the Yellowstone River above the Black Canyon, and on Elk Creek near Garnet Hill just up from the Yellowstone River. The Yellowstone River serves as a beaver highway, with a constant flow of immigrants looking for a suitable place to settle.

### Beaver-Aspen-Willow Relationships

A key finding of recent beaver surveys is their lack of aspen use. Warren documented significant use of aspen on the northern range, Jonas noted some use but much reduced on the northern range, and Consolo Murphy and Smith reported very little parkwide. Beavers currently living in Yellowstone are subsisting on willow where previously it appears they subsisted on aspen and willow. Elk may have affected this beaver-aspen-willow condition or state, as some ecologists call it.

Beaver ponds, whether full or drained, provide ideal habitat for willow, which seeds best on wet, mineral substrate. Full ponds create excellent hydrologic conditions for willows and they respond with lush growth. Eventually when beaver ponds drain, the wet soil left behind is ideal for seeds to grow and establish new willows, repeating the beaver cycle and creating a positive feedback loop.

One group of researchers has hypothesized that the loss of beavers on the northern range has led to greater stream incision and reduced opportunity for willows to establish; water runs faster and straighter, cutting more deeply into the substrate when beaver dams are not present to impede water flow and create floodplains of mineral substrate. They maintain that the beaver-aspen-willow state that existed on the northern range in the 1920s was replaced by an elk-grassland state, possibly as a result of wolf extermination affecting elk numbers and behavior. Further, they postulate that the restoration of the wolf that began in 1995 is not enough to restore the beaver-willow state because of the dramatic changes that have occurred in stream

morphology and functioning due to the loss of beavers (Wolf et al. 2007).

Beaver populations that rely primarily on willow may not cycle in a boom-bust fashion like they do when their primary food is aspen. Willow is a hardy shrub that readily resprouts after being clipped by beaver and some studies have found beavers unable to suppress willow growth (Boyce 1974). Beavers also tend to move to different feeding sites from year to year, which allows willow to recover. Hence, once established in stands of willow, beavers seem able to exist in stable numbers for years and possibly decades unless something else, like ungulate browsing, alters the cycle.

### Conclusion

In addition to benefiting many insects, fish, birds, amphibians, reptiles, and mammals, the beaver's creation of aquatic habitats provides favorable hydrologic and light conditions for plant species. Chuck Peterson of Idaho State University believes beaver ponds are critical habitats for boreal chorus frogs. Beavers have been reintroduced in other western states as a way to restore degraded riparian areas (Baker and Hill 2003).

In Yellowstone, surveys that took place from the 1920s to the present show that beaver numbers have fluctuated and colonies have shifted locations, but beavers are distributed throughout the park and activity is abundant in the southeast, southwest, and northwest corners of the park, where habitat is most suitable. A decline in beaver numbers on the northern range that took place between the 1920s and the 1950s was likely caused by a decline in aspen and willow there. The U.S. Forest Service reintroductions of beaver that took place north of the park from 1986 to 1999 along with recent willow recovery in some areas hastened re-occupation of the northern range with persistent beaver colonies. Park staff will continue to perform biennial aerial surveys to monitor beaver population status and trend.

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NPS/DOUG SMITH

Beaver colonies on the park's northern range increased from one in 1996 to ten in 2005, most of them along Slough Creek.



# “Between Heaven and Hell”

## Religious Language in Early Descriptions of Yellowstone

Michael D. Barton



Thomas Moran's *The Great Blue Spring of the Lower Geyser Basin*, 1875.

*“For most people, wilderness is nature at its most unruly...and as recently as a century ago, that unruliness was not popular; wilderness was a place of wild beasts and demonic presences. But through the eloquence of Henry David Thoreau, John Muir, John Burroughs, and a host of other nineteenth-century travelers, writers, and thinkers, wilderness became not merely good but a kind of quasi-sacred sanctuary; under the pens of these writers, ‘Satan’s home had become God’s own temple.’”*

—Paul Schullery, *Searching for Yellowstone* (1997)

BY THE TIME YELLOWSTONE became a national park in 1872, the region was already known as a hell on earth by hunters and trappers. For them, the geysers, hot springs, mudpots, and fumaroles conjured feelings of being in or near where the Devil resided. Jim Bridger called the area “the place where Hell bubbled up.”<sup>1</sup> Yet in 1871, journalist Calvin Clawson wrote of his travel party’s view of Yellowstone Lake, “We could not help feeling that we were lifted up BETWEEN HEAVEN AND HELL, for while the seething, sulphurous

lakes were on each side and far beneath us, the placid sky hung in grandest beauty above us.”<sup>2</sup>

Those who visited Yellowstone in the nineteenth century made sense of their experience with words, images, and concepts that were part of their culture, and therefore often had religious overtones. This article looks at how and why religious terminology was used to describe a place that seemed to many people to embody aspects of heaven and hell.

## The Language of Romanticism

Using religious language to describe Yellowstone came out of the Romantic movement of the nineteenth century. Countering the attempt during the eighteenth-century “Age of Enlightenment” to order nature and understand the world in scientific terms, Romanticism stressed emotion and personal intuition in obtaining knowledge.<sup>3</sup> Whereas science used reason, empiricism, and objectivity to make sense of nature and society, Romanticism used subjective methods—imagination and mystery. Images of the underworld, diabolic characters, and grotesque shapes worked their way into Romantic literature. Rebelling against the Enlightenment’s “banishing of the divine from nature,” Romanticism used religious thought to express its point of view.<sup>4</sup>

Romantic writers used the Bible as a “repository of deep spiritual and artistic truths.”<sup>5</sup> Writers of the time expected their readers to be familiar with the Bible as well as Shakespeare, Dante’s *Inferno*, and Bunyan’s *The Pilgrim’s Progress*, a Christian allegory about a man’s journey to heaven with a detour through hell.<sup>6</sup> Revelation 19–21 of the New Testament contains several passages about the Devil and his followers being thrown into a lake of fire and brimstone, an image that appears in some nineteenth-century descriptions of Yellowstone.<sup>7</sup> Writing for *The New North-West* newspaper of Deer Lodge, Montana, Clawson referred to geysers as the “escape-pipes of purgatory” and to lakes “of fire and brimstone that burneth forever.”<sup>8</sup> He imagined the “prongs of a pitchfork...rising up out of a geyser,” and in the thin crust of the geyser basins, the “gates of the Infernal Regions were not only ajar but clear off their hinges.”<sup>9</sup> For elk, moose, deer, and bear, though, Clawson regarded Yellowstone as “their Eden.”<sup>10</sup>

“Between Heaven and Hell” not only described Clawson’s feeling of place in a *terra incognita*, but marked a time when Yellowstone was viewed by many tourists, journalists, and military men as a place of wonder and enchantment as well as mystery and fear. According to historian Chris Magoc, “Yellowstone *literateurs* suffused the national park with the language of romanticism, classical antiquity, Christianity, and the technologically sublime” in the late nineteenth century.<sup>11</sup>

Osborne Russell trapped in Yellowstone throughout the 1830s. In his journal, he described an area north of Yellowstone Lake as having a “resemblance to the infernal regions.”<sup>12</sup> Referring to Midway Geyser Basin in his account of his 1869 expedition with Charles Cook and William Peterson, David Folsom admitted that “we experienced no bad effects from passing through the ‘Valley of Death,’ yet we were not disposed to



MICHAEL D. BARTON

A view of Grand Prismatic Spring, a prominent feature of Midway Geyser Basin, an area once dubbed “Hell’s Half-Acre.”



MICHAEL D. BARTON

Devil’s Thumb at Mammoth Hot Springs.

dispute the propriety of giving it that name.”<sup>13</sup> But after a day at the falls of the Yellowstone River, Folsom and Cook wrote, “we return to camp realizing as we never have before how utterly insignificant are man’s mightiest efforts when compared with the fulfillment of the Omnipotent Will. Language is inadequate to convey a just conception of the awful grandeur and sublimity of this masterpiece of nature’s handiwork.”<sup>14</sup> This was a refer-



ence to Yellowstone as a divine landscape in which the human was, as historian William Goetzmann stated, “insignificant in the face of the immensity of nature and nature’s wonders” and merely “a figure in the foreground, just beginning to turn the tide in favor of the forces of civilization.”<sup>15</sup>

The 1870 Washburn expedition, which carried copies of the Cook-Folsom diaries, also saw aspects of both heaven and hell in the Yellowstone landscape. Henry D. Washburn, surveyor general of the Montana Territory, commented that “it needed but a little stretch of the imagination” for a member of the party to name “Hell-broth Springs,” and a rainbow arching over Giantess Geyser gave “that halo so many painters have vainly tried to give in paintings of the Savior.”<sup>16</sup> In Nathaniel Langford’s 1871 articles for *Scribner’s Monthly*, he explained that a rock formation atop Tower Fall was called the “Devil’s

Hoof” because of its “resemblance to the proverbial foot of his Satanic Majesty,” yet thanked God that “he permitted [us] to gaze, unharmed, upon this majestic display of natural architecture.”<sup>17</sup>

## The Devil’s Western Holdings

In *Names on the Land* (1945), George R. Stewart commented on the frequent reference to the Devil in Western place names after 1868:

*The Devil’s western holdings became varied and numerous. However profane he might be in speech, the American did not apply the name of God to places. When he wished to give any idea of the supernatural, he resorted to the Devil... A dike of hard rock projecting from a mountain side often presented a regular curve suggesting a gigantic slide. But its jagged top also suggested an extremely painful process. So it became The Devil’s Slide with the implication that hisimps would put poor lost souls to sliding down it...*<sup>18</sup>

In addition to a Devil’s Slide, there is a Devil’s Den, Elbow, Gate, Hoof, Inkstand, Kitchen, Thumb, Stairway, and Well in or near Yellowstone.<sup>19</sup> The Devil’s Caldron, Frying Pan, Glen, Grotto, Soup Bowl, and Workshop appear in nineteenth-century writing about Yellowstone, but did not become official names. Worried that “Hell’s Half-Acre” sounded “too ominous,” Superintendent Philetus Norris renamed it the Midway Geyser Basin in 1878,<sup>20</sup> but at least two other places in Wyoming and Idaho are still known by that name. Geologist Arnold Hague, who sought to have “a proper nomenclature established in Yellowstone,” wanted to “eliminate as much as possible Hellfire and the lower regions” but achieved limited results.<sup>21</sup>

According to Stewart, “Hell was often used with much the same ideas as Devil” to describe “any bad stretch of trail or river” and “any particularly desolate area.”<sup>22</sup> Ferdinand V. Hayden remarked that the Hell-Roaring River flowed “with tremendous impetuosity down the deep gorges, thus receiving its peculiar name.”<sup>23</sup> By 1890, Yellowstone also had Stygian Caves, the River Styx, Dante’s Inferno, and Brimstone Basin.<sup>24</sup> Far fewer Yellowstone place names make a non-infernal religious allusion: Angel Terrace, Cathedral Rock, Cathedral Peak, Joseph’s Coat Springs, Pulpit Terrace, and Rock of Ages.<sup>25</sup>



MICHAEL D. BARTON

Angel Terrace in Mammoth Hot Springs is one of a few Yellowstone features with celestial nomenclature, compared to the many infernal names.



Stalactic Cave along with Stygian Cave and Hermit’s Cave, form the Stygian Caves in Mammoth Hot Springs. F. Jay Haynes stereoview, circa 1881–84.





NPS, YNP, YELL 43469



NPS, YNP, YELL 8533

Above: A circa 1905 postcard of Devil's Inksand, a hot mud spring at Washburn Hot Springs. Right: Did Thomas Moran paint a devil's profile into the rocks in this 1872 watercolor of Devil's Slide?

## Rebelling against the Enlightenment's "banishing of the divine from nature," Romanticism used religious thought to express its point of view.<sup>4</sup>

Why did Americans name places after the Devil? Rositer Raymond, who traveled in Yellowstone with Clawson in 1871 offered an evasive explanation: "It is my impression that we called one spring the Caldron, another the Kettle, a third the Safety-Valve, a fourth the Reservoir, and a fifth the Devil's something or other. Necessity is generally the mother of profanity in the nomenclature of hot-springs."<sup>26</sup> Major-General John Gibbon, who "saw nothing of the Devil, and had very little time or disposition to even think of him whilst contemplating the beauties placed there by the All-beneficent Power" during his tour of the park in 1872, suggested that people naming beautiful features after the Devil had to do with his having the "exclusive right to every thing in the vicinity of hot water."<sup>27</sup> Langford acknowledged that there was "little excuse" for it, but attributed the practice to the weight of tradition:

*For some reason, best understood by himself, one of our companions gave to these rocks the name of the "Devil's Slide." The suggestion was unfortunate, as, with more reason perhaps, but with no better taste, we frequently had occasion to appropriate other portions of the person of his Satanic Majesty, or of his dominion, in signification of the varied marvels we met with. Some little excuse may be found for this in the fact that the old mountaineers and trappers who preceded us had been peculiarly lavish in their use of the infernal vocabulary. Every river and glen and mountain had*

*suggested to their imaginations some fancied resemblance to the portions of a region which their pious grandmothers had warned them to avoid...and these names, from a remarkable fitness of things, are not likely to be speedily superseded by others less impressive.*<sup>28</sup>

Many published as well as non-published writers used underworld terminology in describing Yellowstone, but many may have been largely influenced by what those who had gone before them had written. Cultural traditions were a way of making the unfamiliar and sometimes frightening landscape familiar and comfortable. As Magoc explained:

*Tourists found the names tantalizing and terrifyingly apt... With the hellish motif, Yellowstone tourists could dare the gates of a sinfully tempting and terrifying underworld and live to joke about it.*<sup>29</sup>

To return from Yellowstone with stories of dodging or even approaching a place known as "the Infernal Regions" enhanced the experience. Historian Coll Thrush has suggested that the use of diabolical place names in the West may be a "bastardization" of Native American traditions.<sup>30</sup> Stewart offered an example of this: "If the Sioux wacan [holy man] indicated that a body of water was spirit-haunted, the American usually translated it as Devil's Lake."<sup>31</sup> In Yellowstone, however, research has



MICHAEL D. BARTON

Rock of Ages, a house-sized boulder, in the Yellowstone River about 1/4 mile above the Upper Falls.

failed to “turn up the slightest evidence that whites ever even knew any of the Indian names that must have been applied to individual natural features.”<sup>32</sup> The use of Christian terminology as well as industrial and mythological nomenclature that reflected the culture of the park’s white visitors may have provided reassurance that Yellowstone was for the “benefit and enjoyment of the [white] people.”

## Heaven and Hell as Vacation Destinations

Even though they did not appear as frequently in place names, images of heaven and divinity may have appeared in early descriptions of Yellowstone as often as images of hell. “To bid farewell to such a scene,” Raymond wrote on leaving Tower Falls, was “like descending from the heights of heaven.”<sup>33</sup> In the first guidebook for Yellowstone (1873), Harry Norton described the geysers as erupting from the “burning souls and bodies” of the “everlasting punishment of friends and relatives,” but he nonetheless dreamed of an “underground tour” during which he was whisked away by a “golden-haired sprite” to see “this sacred spot.”<sup>34</sup> Despite mentioning a “demon” below some mud geysers, Gibbon closed his article for the *Journal of the American Geographical Society* by asking, “Have we not the greatest national park on the face of God’s earth?”<sup>35</sup>

For Methodist preacher Edwin Stanley, the thermal springs brought to mind “scenes in Dante’s *Inferno*,” but he returned

to camp one night feeling he was a “better man” for having viewed Tower Fall, and at Yellowstone Lake he was “tempted to bow the knee and worship at Nature’s shrine.”<sup>36</sup> Although Seth Bullock of Montana wrote in his diary that “Hell is sure close to the surface here” after visiting the park in 1872, he felt that Yellowstone should be a place for religious revivals.<sup>37</sup> The idea that travel could inspire visitors to keep their faith or convert to Christianity was also evident in the *Janesville Gazette* (Wisconsin) which reported in 1872:

*The World [New York] says: “The time was when baptism was the thing most needed to make a person respectable. Now the one indispensable is a trip.”...Now it is the Yellowstone, the Yosemite, or Europe, Paris, Venice, Florence, Naples or Rome. As facilities for rapid traveling increase, the Mecca will be transferred further east, west or north. Presently, we suppose, nothing short of a visit to Alaska, the Nile or Japan, will justify the hope of a seat in the kingdom of heaven.*<sup>38</sup>

Visitors often wrote that their experience in Yellowstone could not be adequately described, yet in pages and pages they attempted to do just that. For Clawson, Yellowstone Lake has “something spiritual, beyond the reach of pen and tongue.”<sup>39</sup> Stanley felt his description of the Upper Geyser Basin was so unsuitable that he was “tempted to throw away the pen in disgust.”<sup>40</sup> This professed inability to describe the landscape was often accompanied by an impression that certain areas of Yellowstone offered the visitor either the glory of God’s creative power or a glimpse of God himself.<sup>41</sup> Environmental historian William Cronon believes that during the nineteenth century the “sublime wilderness had ceased to be a place of satanic temptation and bec[a]me instead a sacred temple.”<sup>42</sup>

Yet depictions of Yellowstone are often characterized by a mixture of revulsion and delight. In an 1871 article for *Southern Magazine*, Howard O’Neill described the falls as a “horribly beautiful cataract,” while Langford thought the “disgusting appearance” of a boiling mud spring was “scarcely atoned for by the wonder with which it fills the beholder.”<sup>43</sup> In *Wilderness and the American Mind*, Roderick Nash gives examples of what he refers to as a “double-mindedness” in the early nineteenth century—people who welcomed “advancing civilization” yet found “an elevation of thought more dignified and noble” in “uncultivated wilderness.”<sup>44</sup> Both dangerous and wonderful, Yellowstone did not disappoint the traveler who desired to get away, have religious experiences, and see the marvels of the West that embodied a sense of nationalism.

Comparisons of Yellowstone to hell seemed to be a literary tool that park visitors used to create an image of a mysterious and forbidding region; depicting it as a heavenly place where one could experience God may have reflected a desire to make more out of a trip into the mountains than just a sight-seeing tour. As geographer Judith L. Meyer has written, Yellowstone was “more than a recording or recitation of elevations, distances,



Cultural traditions were a way of making the unfamiliar and sometimes frightening landscape familiar and comfortable.

flora and fauna, geological features, and historical structures.”<sup>45</sup> The perception that Yellowstone had a “spirit of place” in the 1870s was a manifestation of the Transcendental movement, a branch of Romanticism. It stressed the attainment of knowledge through a spiritual state that “transcended” the Enlightenment methods of science and empiricism. An individual must find this knowledge for himself or herself intuitively, without relying on established religion or scientific data. Rather than ponder the depth of the Grand Canyon, Langford would have you “thank God that he had permitted you to gaze, unharmed, upon this majestic display of natural architecture.”<sup>46</sup>

Assessing the depth of canyons, the size of lakes, or the height of geysers in the 1870s was the pursuit of the scientist-explorer; only starting in the 1890s with guidebooks describing the measurements of park features did the “for-the-experience” visitor consider such facts an important part of the Yellowstone experience. If visitors wanted to think about the large size of something in Yellowstone, they thought of it in terms of the sublime.<sup>47</sup> The sublime was where one could directly experience God, and this would most often occur in vast natural landscapes where one could feel terror and insignificance, an experience felt by many visitors in the geyser basins or canyon edges. These expressions of the sublime also appeared in the works of nineteenth century landscape artists like Thomas Cole, Albert Bierstadt, and Frederic Edwin Church. Thomas Moran’s *Grand Canyon of the Yellowstone*, painted from field sketches made during the 1871 Hayden expedition and displayed in the U.S. Capitol, “called up in the viewer inner feelings of the sublimity of nature and the inconsequence of man.”<sup>48</sup>

But sublimity in nature became less terrifying as more for-the-experience visitors traveled to places like Yellowstone. Although they still experienced God in a powerful landscape, they were more fascinated than frightened by the sensation. John F. Sears, author of *Sacred Places: American Tourist Attractions in the Nineteenth Century*, wrote that the “reverence for nature, which before the Civil War usually took the form of a Romantic love of sublime scenery, was gradually replaced by the reverence for the complex system of nature articulated by writers like John Muir and John Burroughs.”<sup>49</sup> Cronon described this process as the sublime becoming “domesticated,” while Magoc notes more disparagingly that “an avalanche of narrative and imagery reduced the sublime mantra to cliché and convention” by 1890.<sup>50</sup>



MICHAEL D. BARTON

Devil's Gate, just below Kepler Cascades on the Firehole River.

## Science in Wonderland

Rossiter Raymond wrote that his 1871 expedition to Yellowstone “was not a full-fledged affair, with wings of military escort, and claws of tools and instruments for detailed scientific investigation.”<sup>51</sup> However, before describing the geyser basins for his readers, he insisted on explaining the science behind them: “I mean to get rid of a heavy weight of science which has burdened my soul long enough. You shall not see a single geyser till you have heard the geyser theory.”<sup>52</sup> Harry Norton was similarly dismissive of science in *Wonderland Illustrated*, his guidebook to Yellowstone:

*That's all we know about calcareous deposits and other things, and we propose to elaborate our ideas independent of science, taking the chances that some of our readers will appreciate it above an ostentatious display of “big words.”*<sup>53</sup>

For Raymond and Norton, scientific explanations of the park’s wonders and curiosities apparently detracted from the experience. For people like John Muir, who popularized the Yellowstone area in an 1898 article for *The Atlantic Monthly*, wilderness became God’s book of nature.<sup>54</sup> Preacher Edwin Stanley believed that an explanation of the geysers and hot springs was “known unto the Great Architect, and to him only.... His ways are past finding out.”<sup>55</sup> Stanley saw himself as a philosopher visiting Yellowstone with a different purpose from that of the scientist or tourist:



*The journey through the National Park will well repay the philosopher and the scientist, as well as the mere wonder-seeking tourist. The marvelous freaks and phenomena of Nature scattered over this area await the solutions of science and the revelations of philosophy.*<sup>56</sup>

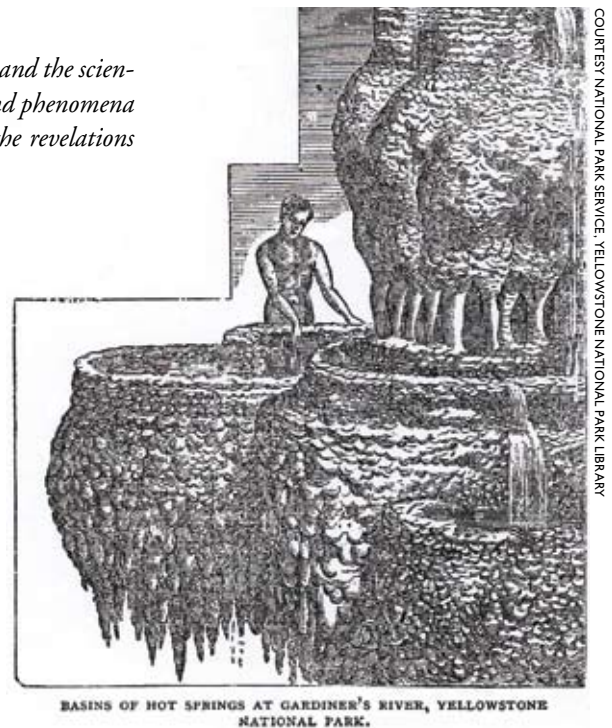
Predictably, the tone of reports produced by members of the geological and topographical expeditions that traversed Yellowstone in the nineteenth century to collect and classify its natural features diverged from that found in the writings of “for-the-experience” park visitors. Captain William Jones, who led a Corps of Engineers expedition into the park in 1873, wrote of “God’s awful laboratory” at the Upper Falls of the Yellowstone, but immediately noted that the barometric reading for the height of the fall was 150.2 feet.<sup>57</sup>

Ferdinand Hayden, who “sometimes burst into tears when viewing a geyser,” reported that “no language could do justice to the wonderful grandeur and beauty” of the Grand Canyon of the Yellowstone.<sup>58</sup> Hayden biographer James Cassidy has suggested that younger scientists like Albert C. Peale, C. L. Heizmann, and Theodore B. Comstock may not have approved of Hayden’s writings because they were “an older style of scientific literature.”<sup>59</sup> Peale did provide abundant data and charts on many of the then-known thermal features in his contribution to the Hayden expedition reports, but unlike the current style of scientific language, he also referred to “the unearthly appearance of the scene.”<sup>60</sup> An illustration of a faun-like character using the hot springs that appeared in Peale’s 1873 report (Figure 1) may have been inserted by Hayden, but the Romantic influence was also evident in a description of the geyser basins that Peale wrote in a letter to the *Philadelphia Press*:

*They rival any fairy place that can be imagined... One would scarcely suppose that a mud spring could present us with any beauty; yet, standing on the brim of the crater of one, we must concede that even mud may assume forms which render it attractive.*<sup>61</sup>

Scientist-explorers that came of age during the first half of the nineteenth century tended to interpret their disciplines within a broad context that pointed toward what Goetzmann calls the “complex mind of the Creator.”<sup>62</sup> While the next generation of scientist-explorers continued to draw on the language of Romanticism in their writing, they no longer used it to convey an understanding of the Western landscape as God’s work.

Just as the Devil and God pervaded Romantic literature of the nineteenth century, they permeated the romantic writing of people who came to Yellowstone during its initial years of Euro-American exploration and tourism. Descriptions of Yellowstone using infernal or celestial imagery continued into the next century, but as a growing tourist attraction, Yellowstone became known in the last two decades of the twentieth



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Figure 1. Illustration by W.H. Holmes in Peale’s 1873 Report in Ferdinand V. Hayden’s *Sixth Annual Report of the United States Geological Survey of the Territories*.

century as “Wonderland,” named after *Alice’s Adventures in Wonderland* (1865). It was called this because of the region’s curious landscape and geological features, but the name was and continues to be appropriate regardless of whether those wonders are considered from a religious, Romantic, scientific, or adventure-seeker’s point of view.

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COURTESY OF AUTHOR

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In fall 2008 he will begin his graduate studies, also at Montana State, working with his advisor on a project to transcribe letters of the nineteenth-century Irish physicist John Tyndall. Michael is interested in the history of science, particularly the life and work of Charles Darwin and the history of natural history as a discipline. He lives in Bozeman with his wife Catherine and two-year-old son Patrick.

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# Vaguely Disquieting Scenes

## Fishing Bridge and the Evolution of American Sport Fishing in the Environmental Age

*Paul Schullery*

FROM THE EARLIEST DAYS of the National Park Service (NPS), scientific constituents and observers offered guidance and applied pressure for the refinement of policy goals to reflect ecological realities. Yellowstone National Park was routinely a focus of this attention, and now provides numerous historical examples of how the agency responded to changing scientific knowledge and public interests.<sup>1</sup> As the nation's environmental conscience awoke and matured in the postwar decades, public and scientific scrutiny of national park resource management intensified. Fishing Bridge provides an illuminating case study of this issue.

### **Declining Fishery, Increasing Visitation**

Though many aspects of the setting at Fishing Bridge Peninsula were of concern to managers, the quality of the fishing was an urgent issue. The long-observed degradation of the fish population from overfishing reached crisis proportions in the

1950s and 1960s, as more anglers arrived each year.<sup>2</sup> Visitation increased dramatically just as managers were attempting to wean sportsmen away from the comparatively cheap thrills of fishing in waters whose fish populations were propped up by industrial-scale hatchery production of fish. Especially in the 1960s and 1970s, Fishing Bridge became a focal point for what amounted to a revolution in fisheries management—a revolution that would make Yellowstone even more world-renowned among anglers than it already was.

It is difficult to overstate the extent to which park visitors only half a century ago were conditioned to expect the type of fishing provided by an artificially supplemented aquatic resource. Anglers nationwide were conditioned, by decades of intensive stocking of hatchery fish in their local waters, to expect sport fish populations to be supplemented artificially. This state of affairs had reached such an extreme that many anglers and managers more or less assumed that fishing could only survive if supported by such programs.<sup>3</sup>

It may also be difficult for many of us today to imagine the magnitude of the fisheries crisis that finally drove management away from heavy visitor harvests of trout. Since the late 1800s and the initiation of the park's first fishing regulations, progressively lower creel limits had not prevented the decline in fishing success. In summary, "Until 1921 the daily limit of fish was 20; that year it became 10. In 1949 it was reduced to 5. In 1953 it was revised so that 5 fish could still be taken but no more than 10 pounds plus 1 fish, with a minimum size limit of 6 inches."<sup>4</sup>

And still the fish populations declined. The increasing number of anglers, while on average having a poorer and poorer fishing experience, cumulatively killed more and more fish. The hatchery program having failed, the only readily imaginable choice available to managers was to find more aggressive and decisive ways to limit the killing. The timing was right for the application of new thinking.

## Yellowstone and the American Redefinition of Angling Success

New thinking was available. During the first half of the twentieth century, at least some professional managers and key individuals in the sport-fishing community had begun to recognize that protection of a relatively robust fish population could be accomplished by the institution of special regulations that emphasized fishing for the fishing experience as opposed to fishing for the killing-and-eating experience.<sup>5</sup> Step by step, this was the course that the NPS adopted in Yellowstone.

In 1960, in describing the park's new "Fishing for Fun" programs that emphasized releasing fish for others to catch again, the superintendent explained both the need and the hoped-for result, especially on Yellowstone Lake. He also

revealed the central role played by Fishing Bridge in management deliberations:

*"During 1959 it is estimated that 393,467 trout were taken from the Lake. For the first time the annual capacity of the Lake has been exceeded. Moreover, the fishing pressure is known to be increasing, not only on Yellowstone Lake but throughout the Park as a whole. Further investigations have shown that in the Fishing Bridge area alone in a single month, 7,500 fish have been discarded in garbage receptacles. Such factors as the fishing pressure and the wastage of fish give management cause to consider seriously, measures designed to conserve and perpetuate the Park's outstanding natural trout fishery..."*<sup>6</sup>

*Concessioners handling fishing tackle will be asked to stock barbless hooks as a regular item of tackle. Fishermen will be encouraged to file the barbs from their bait, fly, spinning or trolling gear to make the taking of fish a true contest of skill between angler and fish. Anglers will be encouraged to release their fish carefully so that they may spawn or be caught again, thus providing enjoyment to many more anglers."*<sup>7</sup>

Additional study and research in the 1960s indicated that these steps, though significant, were still not sufficient. They relied too heavily upon the voluntary cooperation of anglers, many of whom held deeply ingrained habits of killing Yellowstone trout, and many others of whom had just arrived from regions where an older and more harvest-oriented sport-fishing tradition prevailed. Socially conditioned on their home waters for many generations to measure fishing success solely in terms of a full creel, many visiting anglers continued to kill more trout than managers wished they would. Merely that leading figures, or even meaningfully large segments, of the angling population appreciated the need for restraint in the harvest of trout was no assurance that the typical Yellowstone visitor felt the same way. The enthusiastic anglers at Fishing Bridge had, in fact, long been proof that they did not.



NPS, YNP, YELL 22539

The original Fishing Bridge, constructed in 1902, was 360 feet long with a camel-back center. The west end met the river bank very near where the current bridge does, but the east end was many yards upstream from the present bridge. Even though the original bridge was much narrower, anglers would have been little troubled by the very light traffic of horse-drawn wagons and coaches.



NPS, YNP, YELL 29320-2

The second Fishing Bridge, photographed in about 1925 on the upstream side looking toward the west bank of the river.



## Yellowstone as a Microcosm of the Evolution of Sport Fishing

The long recreational angling experience at Fishing Bridge provides an illuminating window into the social complexities of sport fishing in Yellowstone. Just as other visitor activities such as bear feeding, tree felling, rock collecting, geyser soaping, flower picking, and even hunting were eventually regulated out of existence because of their proven inappropriateness as park experiences, so has the place and practice of sport fishing in the park been dramatically reshaped by changing ideas of the “proper” park experience. And, as with those other activities, there has rarely been consensus, much less unanimity, about the chosen new direction. Sport fishing society is not monolithic; it is comprised of many different and often quite contentious factions.

Throughout the long written history of sport fishing—in a published English-language literature reaching back to the late fifteenth century, and an unpublished European manuscript literature reaching back centuries further—individual anglers seem to have become progressively more specialized in their interests. At the same time, thanks to advances in technology, the sport of fishing has offered a greater and greater variety of opportunities in terms of species to be angled for and tackle and techniques to choose from. With increasing specialization has come rivalry among anglers based on these many personal

preferences, and a widespread perception of a social hierarchy among anglers.<sup>8</sup>

For one historical example of special relevance to the history of Fishing Bridge, as early as the eighteenth century some British fly fishers began to pronounce their method of fishing to be not only the most effective means of catching certain species of fish, but also the most morally upright and aesthetically fulfilling method.<sup>9</sup> It was a natural consequence of such social stratification among these self-consciously “enlightened” sportsmen that they eventually decided that even the fish they chose to pursue with their fly-fishing gear—primarily but not exclusively salmonids—were qualitatively superior to other species.

Indeed, even before its establishment as a national park in 1872, Yellowstone was the scene of angling adventures that reflected the social stratification that characterized the greater American sport fishing scene.<sup>10</sup> Once the park was established, and recreational fishing assumed a significant role in the Yellowstone experience, anglers quite predictably sorted themselves out according to their interests, specialties, and biases. Today even a cursory inspection of park waters will reveal many types of specialists, including shallow-water boat fishers, deep-water boat fishers, float tubers, fly fishers who prefer small or large streams, small or large lakes, general-interest bank fishers, and opportunistic generalist anglers galore. Each of these groups contains its own internal spectrum of interests and preferences,

Everybody could fish at Fishing Bridge,  
but Fishing Bridge was not for everybody.



NPS, YNP YELL 17144

By the 1920s, the stratification of anglers on various Yellowstone waters was well established. While casual “tourist” anglers might try any water in the park, many tended to gravitate toward the famous Fishing Bridge; most expert anglers fished elsewhere, preferring a different set of social and sporting circumstances.

## Why “Fishing Bridge”?

CAPTAIN HIRAM CHITTENDEN, U.S. Army Corps of Engineers, designed the original Fishing Bridge and completed its construction in 1902, but it took another 20 years to settle on a name for this important structure. The first official mention of the name appeared, quite incidentally, in Acting Superintendent Lloyd Brett’s annual report for 1914. While discussing stream gauging work then underway, Brett said that Yellowstone River flow estimates could be “based upon one wading measurement and on three measurements from the Fishing Bridge at the outlet of Yellowstone Lake.”

There appears to have been some ambivalence in this sentence. On the one hand, Brett called it “the” Fishing Bridge, as if describing its use without quite meaning to officially sanction the name. On the other hand, “Fishing Bridge” was capitalized like any other proper name.

This ambivalence prevailed for a surprisingly long time. Even in the early 1920s, the name not only of the bridge but of the park development immediately to its east apparently remained up for grabs.

A few examples make the point. In 1916, when there was still essentially no development east of the bridge, Park Supervisor Chester Lindsley referred to the area around the bridge as the “Outlet of Yellowstone Lake,” capitalized as if a formal place name. Variations on the term “lake outlet” dated to the earliest years of the park’s existence and were the most common pre-Fishing Bridge label for the area.

In 1918, U.S. Army Engineer G. E. Verrill, in his annual report on road

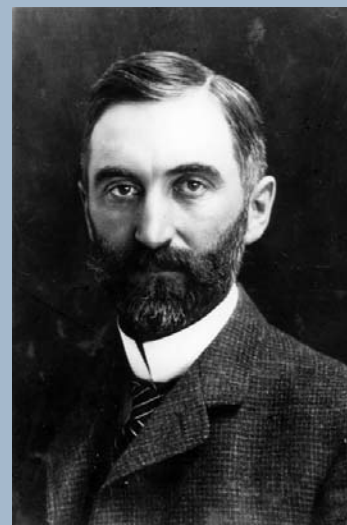
work in the park, referred to the bridge rather dismissively, as “the so-called Fishing Bridge,” indicating that the name was not yet official—and perhaps implying that the name might not even have been to everyone’s liking.

In 1919, the year the original bridge was reconstructed to become what we now think of as the “second Fishing Bridge,” Superintendent Horace Albright referred to it as the “Yellowstone River bridge.” The next year, however, Albright returned to Brett’s usage, calling it “the Fishing Bridge.”

By the early 1920s, though variations continued to surface, “Fishing Bridge” had replaced “the Fishing Bridge” as the most typical usage. At the same time, almost as if the bridge itself somehow elongated along the lake shore and took the shape of other buildings, the whole development to its east also came to be known as Fishing Bridge.

It isn’t hard to see why naming the development was complicated. It would not necessarily have been obvious that even if the name “Fishing Bridge” stuck as far as the bridge was concerned, it should also be applied to the neighboring development. It was and is rare to find a major visitor-use site in an American national park that is named for an artificial structure rather than for the primary natural attraction in the area (this tradition of naming things for natural features may help explain the occasional use of the name “Lake Fishing Bridge”).

But it also seems likely that waffling over the name was at least partly due to the changing relationship of the Fishing Bridge development to its pro-



Hiram Chittenden designed the original Fishing Bridge.

genitor: the considerably older development centered around the Lake Hotel, less than two miles away. After all, the Fishing Bridge development that blossomed with remarkable swiftness in the 1920s was just a slightly detached appendage—a suburb, as it were—of the Lake development.

With luck, further exploration of archival records will reveal surviving management dialogues in the 1916–1925 period that clarify this naming process. Until then, we are left with the impression that the name sorted itself out gradually and informally.

If we need a more decisive theory of why the naming worked out the way it did, we probably can’t go far wrong by following the money. Faced with the rapid growth and increasing importance of this “new” development at Fishing Bridge, savvy concessioners would have been quick to attach the most appealing possible name to the new development—not only to attract people to it, but also to clearly distinguish it from the Lake development just a short walk down the beach.

Besides, by the ’teens the name “Fishing Bridge” may have already worked its way into the consciousness of the visiting public. Once that happy identity was firmed up among visitors, it may have seemed to most practical observers that the matter was settled.



not only in their level of expertise but in their devotion to certain types of tackle, to certain theories and techniques, to certain species of fish, or to certain favored fishing waters.

## Quantity Versus Quality

In Yellowstone National Park's first two decades, most accounts of sport fishing dealt almost exclusively with the "fabulous" numbers of fish that could be caught.<sup>11</sup> Published accounts of Yellowstone fishing in the late 1800s focused on celebrating the capture of large numbers of native trout—fish that seemed to exist in an inexhaustible abundance. Such stories were eagerly employed by concessioners in promoting the park in the tourist trade.

The factors that contributed to an eventual prejudice against Yellowstone Lake fish included not only the excessive ease of catching them, but also their reputation as poor fighters and their often heavy loads of parasites, especially the tapeworm *Diphylllobothrium*.<sup>15</sup>

But even in these early days of "hog-heaven" fishing, there were stirrings that revealed other values at work among anglers. One example will serve to illustrate the dawning ambivalence among anglers about the Yellowstone Lake/Fishing Bridge fishing experience. In the mid-1890s, a party of visitor-anglers rented a boat at the Lake Hotel and rowed into the outlet of Yellowstone Lake, near the site of present Fishing Bridge. A member of this party related that "The outlet reached, we anchored our boat in the current, and commenced catching fish on our flies as fast as we could haul them out. We caught two or three at a time, and they all weighed about a pound. In an hour and a half we caught twenty-nine fish that weighed a little over thirty pounds."<sup>12</sup>

This account, which echoed contemporaneous guidebook accounts of the quality of the fishing, described a fishing success rate that probably kept virtually all visiting anglers satisfied, if not thrilled. When this writer said that they caught "two or three at a time," he did not mean that party members concurrently caught two or three at a time; he meant that an individual angler, fishing with two, three, or four flies on his line, could simultaneously hook and then land two or three fish at once.<sup>13</sup>

But unlike many others, this writer continued his discussion of this experience, revealing that even then, "successful" fishing was for some Yellowstone anglers a more complicated matter than the easy capture of lots of fish. He complained that "There were so many fish that there was no great pleasure in catching them; it was all too easy, and we still look back upon the fishing in the Firehole as the best fishing we ever had."<sup>14</sup>

Reference to the Firehole River is the key comment here. According to this writer, his party caught brown, rainbow, and cutthroat trout from the Firehole, doing so under more exciting and demanding conditions than the lake outlet provided. The Firehole offered "better" sport than the all-too-easy fishing to be had at the lake outlet. It is an enduring irony of Yellowstone fishing, as famous as it is for its "wild trout fishing" in a wilderness setting, that almost from the beginning, many anglers preferred the non-native fish, and pursued them in streams that had originally been fishless. For many twentieth-century anglers, especially those who thought of themselves as serious sportsmen, the Fishing Bridge area has never really measured up to their needs. The factors that contributed to an eventual prejudice against Yellowstone Lake fish included not only the

excessive ease of catching them, but also their reputation as poor fighters and their often heavy loads of parasites, especially the tapeworm *Diphylllobothrium*.<sup>15</sup>

But there were other things working against the public perception of the Yellowstone cutthroat trout. By the early 1900s, fly fishing in its most "scientific" form—with special emphasis on the precise presentation of an accurate imitation of an aquatic insect to a discriminating and wary trout—was becoming more exclusively a stream-oriented sport. It was a sport in which the angler's direct interaction with the stream, either by wading or by stalking the banks, was essential to the complete experience. Standing on a bridge high above the fish, on a crowded stream bank with dozens of other fishermen, or in one of dozens of boats anchored in a small area near the bridge, with little room to maneuver into an advantageous position for an effective cast, did not enable this complete experience.

No doubt some expert anglers reacted with snobbery to the unruly appetites and picnic-like atmosphere they witnessed among the tourist-anglers at Fishing Bridge, but the fundamental issue was not merely elitism; snob or not, you couldn't practice "serious" trout fishing in its most meaningful terms under those conditions. Indeed, just as the expert fly fishers found the conditions unacceptable at Fishing Bridge, there were undoubtedly dedicated bait- and lure-fishermen who agreed. The Fishing Bridge setting did not allow for the exercise of the hard-earned suite of skills—including sighting the fish or identifying the most likely spots where fish might be; stalking fish; casting a fly or lure accurately; manipulating the fly or lure persuasively; hooking a difficult-to-fool fish;

bringing the fish gracefully and humanely to hand or net; and so on—that made fishing enjoyable for these anglers. Everybody could fish at Fishing Bridge, but Fishing Bridge was not for everybody.

From the late 1800s on, all these factors resurfaced frequently in disapproving accounts of the fishing at Fishing Bridge. In 1908, an angling writer again described fast fishing for these trout: “We have all heard of the Yellowstone Lake trout and would not like to pass through the Park without trying them. Where they are most abundant is in the Yellowstone River Outlet. Here many a regular tourist comes and fishes with great success and enthusiasm and returns to the hotel with fifty or more which he has caught in an hour. He shows them to his friends and probably has a great mess cooked for his dinner.”<sup>16</sup>

But again, this admission of the abundance of the fish was followed by an expression of disappointment—mostly because of the ever-present parasites but also because the angler preferred the more challenging non-native species of fish found in the Firehole and other rivers, where it was possible to angle under circumstances that this angler found preferable. He wrote dismissively of the trout in Yellowstone Lake, saying, “One catches these Yellowstone Lake fish out of curiosity rather than for sport, and one or two for the purpose of examination is sufficient.”<sup>17</sup>

These and other accounts of fishing in Yellowstone also make it clear that the anglers who chose to fish from or near Fishing Bridge were perceived (except perhaps by themselves) as occupying the least discriminating end of the sport-fishing spectrum in Yellowstone National Park. They were routinely characterized, as just mentioned, as “tourist” fishermen, content with a carnival atmosphere and fast action from unsophisticated (often called “stupid”) trout that were seen as biologically and aesthetically compromised by parasites.



Fishing Bridge in its post-World War II heyday (1951), with anglers lining the bridge and many more boating on the river downstream. Until the 1960s, the boathouse on the west bank provided anglers with tackle and small boats.

## Elites and Masses

But while the most accomplished anglers of each generation continued to look upon the Fishing Bridge crowd as irrelevant to the meaningful sport-fishing opportunities in the park, these advanced anglers still represented only a very small percentage of the total angling public. Managers, then as now, were confronted with the need to address the interests of all these groups. Unlike the admittedly sometimes snooty expert fishermen, managers did not have the luxury or inclination to pass quick judgment on any park visitor's quality of experience based on something as obscure and complexly defined as that visitor's angling tastes. In the early 1900s, and especially after the NPS was established in 1916, park managers were inclined to a hospitable, tolerant approach to the needs of visitors. These were, after all, the same managers who in the 1920s seriously considered wiping out Yellowstone Lake's white pelicans to better protect the trout for visiting anglers.<sup>18</sup> In their view, if the Fishing Bridge experience was the American public's self-defined way of enjoying the park's waterways, it probably did not seem necessary to change things.

The first books devoted to fishing in Yellowstone were Kla-How-Ya's *Fly Fishing in Wonderland* (1910) and Howard Back's *The Waters of Yellowstone with Rod and Fly* (1938), both dedicated to fly fishing. These authors passed their harshest judgment on the Fishing Bridge angling scene simply by ignoring it, or at best referring to it as beneath their sporting interest. Kla-How-Ya (the author's real name is unknown) had remarkably little to say about Yellowstone Lake's famous trout except to point out that unlike them, all the other trout in the park were “fairly vigorous fighters.”<sup>19</sup> Back discussed the disappointing size of the Yellowstone Lake trout and briefly pondered possible reasons for this failing (especially, in his opinion, the Yellowstone Lake fish hatchery's aggressive manipulation of fish stocks to make it easy for tourists to catch fish). It was a question of only academic interest to him: “Again, as regards the river, it may be argued that the tourists come in their thousands to catch fish; that the Yellowstone River is the easiest and most accessible river for them, so it is stuffed full of fish for their amusement and in order that things shall be made easy for them.”<sup>20</sup> Like other “serious” fishing writers before him, Back quickly left the subject of Yellowstone Lake and River behind and moved on to the Firehole, Madison, and other more interesting streams on the west side of the park.

The underlying ethical and aesthetic stance of such skeptics as Back was somewhat more forcefully expressed by long-time local fly-shop owner Don Martinez in an essay on Yellowstone fishing in A.J. McClane's very popular *The Wise Fisherman's Encyclopedia* (1957): “From the standpoint of the casual tourist who is only mildly interested in fishing, Yellowstone Lake and River are the chief attractions in the Park. Trout are caught off Fishing Bridge, where the river emerges from the lake, on every conceivable sort of tackle, including cane poles, hand lines, and



surf tackle armed with spinners, flies, or worms. A confirmed fisherman will shudder and look the other way—it is vaguely disquieting to see sizable trout hauled out one after another in plain sight of noisy people.”<sup>21</sup>

Here again we see further explication of the complexities of the sport-fishing impulse; for Martinez, the problem at Fishing Bridge wasn’t only about wormy trout, or trout that didn’t fight much, or trout that he couldn’t cast to in a conventional stream setting. For Martinez, the crowded and festive conditions—which were probably part of the fun for most fishermen there—violated his idea of good fishing in the traditional, Waltonian sense of the sport as practiced in quiet surroundings, in relative isolation from large numbers of people. For anglers who shared Martinez’s ideals, Fishing Bridge was nothing short of an affront to the true meaning of the sport.<sup>22</sup>

For historians today, Martinez was an especially important voice in this informal dialogue over what constituted “good” fishing in Yellowstone. In the 1930s and 1940s, Martinez became the first West Yellowstone fly-shop owner and guide to earn national recognition for his fly-tying and fly-fishing savvy.<sup>23</sup> He developed a reputation for attracting an exclusive, well-heeled, and highly skilled clientele, and he saw the casual tourist anglers, with whom he preferred not to have to deal in his shop, as “club-footed peasants.”<sup>24</sup>

## Jack Anderson, Fly-Fishing Superintendent

Besides its failure in some minds as a sporting experience, by Martinez’s time Fishing Bridge’s fishing had also become a poor shadow of those glowing descriptions in popular magazines and guide books seventy years earlier. In the early 1960s, “an average of 49,000 anglers used the bridge every year, and the average time it took to catch a trout was more than seven hours.”<sup>25</sup> Even among anglers who enjoyed the festive camaraderie of the scene, there must have been some who were troubled by the compromises that sportsmanship necessarily underwent in those conditions.

It wasn’t until the late 1960s and the arrival of Superintendent Jack Anderson that Yellowstone fishing regulations were restructured to sufficiently restrict harvest and redirect the park angler’s enthusiasm toward a low- or no-harvest style of angling. Such restrictions were, fortuitously, also being promoted nationwide by a growing number of fishing societies and conservation groups at the same time, and before long Yellowstone National Park was hailed as a model program in the movement to adapt sport fishing to the needs of a growing population of anglers.<sup>26</sup>

Though the new special regulations aimed at celebrating (or, failing that, simply enforcing) this new “fishing ethic” were put in place throughout the park by the early 1970s, one extraordinary event at Fishing Bridge may best have symbolized the entire trend, as described by the superintendent in 1973: “One of the more significant changes in the Fishing

Bridge area this year was the closing of the first mile of the Yellowstone River below the lake outlet to fishing.”<sup>27</sup>

Social factors always weigh to some extent in a change like this. There is no doubt that management sympathies with the style of angling going on at Fishing Bridge had declined from earlier times. Yellowstone’s superintendent, Jack Anderson, was himself a serious fly fisher. Still, the decision to close the bridge area to fishing was officially based on ecological necessities. Fishing from the bridge was eliminated, “to protect spawning trout and to restore naturally occurring levels of trout in the area; other similarly-motivated regulations were instituted elsewhere in the area.”<sup>28</sup> The closure, after all, included a mile of the river in the critical spawning areas near the bridge, and not just the bridge itself. Though the goal was to protect the trout near Fishing Bridge, a primary reason for doing so was to enhance the quality of the fishing experience both upstream and downstream of the closed area.

On the other hand, the closure of the Fishing Bridge fishing spectacle echoed many similar changes in national park management that tended to induce a more respectful mood among visitors enjoying a given park feature. The historical tendency among national park policy makers to reduce the physical impacts of visitors on park features was almost invariably accompanied by the promotion of activities that favored



Superintendent Jack Anderson (rear of canoe), shown here guiding two avid fly fishers—sportscaster Curt Gowdy and restaurateur Peter Kriendler—on the South Arm of Yellowstone Lake about 1972, oversaw the closure of Fishing Bridge to fishing as part of a larger program of revamping park fishing regulations to better protect aquatic resources.

a lighter hand on the landscape and, if only implicitly, a more educated sensibility about the larger values associated with that landscape. Managers may not have articulated these tendencies in their rationale for closing of the bridge to fishing, but they certainly demonstrated their awareness of them. Fishing Bridge, rather like the hunting seasons that prevailed in the park's first eleven years, was in that sense part of the great long Yellowstone experiment in park appreciation.

Closing the bridge to fishing was thus a momentous decision. After three-quarters of a century, the bridge that served as both the namesake of a large park development and the focus of a grand recreational enthusiasm in the park was abruptly transformed into a kind of living historical artifact.

### Fishing Bridge's New Mission

The irony evident in an important park structure whose very name suddenly became untrue was not lost on many observers. Acquainting anglers with the closure of the bridge to fishing, with catch-and-release regulations, and other alterations of their beloved former Yellowstone experiences, was an uphill battle. Park interpreters from that era recall vividly the astonished reaction of park visitors to these new regulations, as encapsulated thousands of times in exclamations like, "You mean we gotta throw'em back?! What's the point of *that*?!" There was a serious information gap in effect, a gap that has never entirely disappeared.<sup>29</sup>

Needing to bring the visiting public up to speed on what was not only an essential change in park fishing regulations but also a growing national trend in fisheries management, NPS managers seized the opportunity provided by Fishing Bridge. Pedestrian traffic was still heavy on the bridge, even if some of the pedestrians were peeved that they could no longer cast to all those beautiful trout. Thus managers reimagined a visit to the bridge as an experience in "fish watching." From 1973 on, interpretive programs about the bridge (and the lake) would routinely emphasize the inherent worth and beauty of fish as wild animals ("underwater butterflies" was one analogy that interpreters employed) rather than as sporting quarry. In his annual report for 1974, Anderson said that "Naturalists were on the bridge daily interpreting the life history of the fish and their role in the total aquatic ecosystem. A series of three new exhibits were mounted on the bridge to aid in telling this story. Most revolutionary, however, was the installation of a cassette television system. A color movie of the life history of the Yellowstone cutthroat trout was transcribed

to color video-tape. Technical difficulties were experienced in obtaining a quality picture, which will be corrected."<sup>30</sup>

Unfortunately, the technical difficulties continued to prove too challenging for the technology of the time, and the film was shown in the Fishing Bridge Visitor Center in subsequent years.<sup>31</sup> However, the Visitor Center was also an essential communications center for explaining the new look in park fishing regulations to a generation of baffled and sometimes indignant visiting anglers.

Though it is difficult to equate qualitatively such different experiences as fishing and fish-watching, Fishing Bridge has since 1973 still provided a significant and far-reaching experience to large numbers of visitors. By the turn of the century, park fisheries authorities could celebrate the birth of a thriving "new" tradition of fish watching: "In 1994, an estimated 167,000 people used Fishing Bridge for fish watching; they spent about 31,300 hours there. Even more people, about 176,400, visited the LeHardys Rapids fish-watching area, most for brief visits averaging about seven minutes. These numbers indicate that more park visitors participate in fish watching

...the closure of the Fishing Bridge fishing spectacle echoed many similar changes in national park management that tended to induce a more respectful mood among visitors enjoying a given park feature.



In the environmental era beginning in the 1960s, the Fishing Bridge development's greater social, ecological, and scientific values became evident to conservationists and managers, resulting in a shift of management priorities that included the closure of the bridge to fishing in 1973. The lake is on the right, and lower Pelican Meadows are visible in the distance.



than in fishing, which suggests one of the ways in which our appreciation and use of Yellowstone have changed over the years. Of course, the fishermen put in a much larger [parkwide] total number of hours fishing, so their use of the resource is perhaps more intense, but they are no longer the only constituency these fish have.”<sup>32</sup>

Many in the NPS and in the conservation community have celebrated this remarkable and forward-looking step in fisheries management in Yellowstone. Rather than treat every foot of river bank and lakeshore as if it must be managed for the optimum possible presence of anglers and the maximum harvest of trout, Yellowstone managers recognized that the Fishing Bridge stretch of the Yellowstone River was extraordinarily important to the health of the trout population for many miles downstream, and for many miles into Yellowstone Lake itself. Since 1973, the partitioning of portions of the park into special management areas that would best benefit the park and visitors as a whole—whether for the sake of fish, bears, birds, wolves, or any other need—has been an important, occasionally controversial, and usually unheralded achievement of managers striving for greater sensitivity to the ecological imperatives of the whole natural setting.

In the 1990s, the catastrophic consequences of a series of clandestine and illegal plantings of lake trout, and the equally disastrous arrival of whirling disease, ushered in yet another era in the place of Fishing Bridge in Yellowstone Recreation. The native trout had no defense against the much larger predatory lake trout, and likewise succumbed in tremendous numbers to the effects of whirling disease. So successfully transformed in the 1970s from a fishing festival to a fish-watcher’s delight, the bridge quickly became the site of another and much less happy story. The combined impacts of lake trout and whirling disease are still incomprehensible for many of us. For thousands of years, and through the first century and a quarter

of the life of Yellowstone National Park, the Fishing Bridge Peninsula was surrounded by waters in which the numbers of beautiful native trout were “perfectly fabulous.” Those waters are now essentially bereft of those fabulous fish, and this has happened entirely because of the human agency of exotic species transmissions.

Nature and culture have often had an uneasy time sharing Fishing Bridge, but their confrontation has never before been as violent as this. Our ceaseless debates over what constitutes “good” fishing, to say nothing of our even more bitter and politically heated conflicts over Yellowstone Lake development, dwindle to triviality in the face of such blind malice and inconsolable loss.

It is both ironic and humbling that at the dawn of the twenty-first century, when the NPS and the entire American conservation community had not only awakened to the unthinking abuses visited upon Yellowstone’s aquatic resources in earlier times, but had also come so far in repairing the damage done by those abuses, that we are the generation who must preside over the abrupt and far-reaching demise of such a magnificent species.

Today’s interpreters roving on Fishing Bridge have perhaps the most difficult job of all. After 1973, as the trout numbers rebounded from the long era of overfishing and visitors got their first educated look at all those freely rising fish, Fishing Bridge made a happy kind of sense even if you couldn’t actually fish there. There is still hope—modern technology shows promise of being up to the task of suppressing the lake trout population through selective netting and other techniques—but hope is a tough sell, even for Yellowstone’s excellent interpreters.

For now, the most powerful new lesson of our Fishing Bridge experience is a much darker one. It is a story of the enormous harm that misguided human intentions can achieve even in a place as beloved and closely watch-dogged as Yellowstone National Park. Of all the

lessons we have learned in the long history of the Fishing Bridge Peninsula, that may be the smallest and least surprising, but it is also the most painful.

*Adapted and abridged from a history of the Fishing Bridge area, manuscript in preparation by the author, Yellowstone Center for Resources, June 1, 2008.*

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COURTESY OF AUTHOR

**Paul Schullery** is former editor of *Yellowstone Science* and the author or editor of many books about the American West, natural history, and outdoor sport, including ten about Yellowstone. For his work as a writer and historian, he is recipient of an honorary doctorate of letters from Montana State University and the Wallace Stegner Award from the University of Colorado Center of the American West.

## Endnotes

- <sup>1</sup> Pritchard, *Preserving Yellowstone’s Natural Conditions*.
- <sup>2</sup> Varley and Schullery, *Yellowstone Fishes*, 94–95.
- <sup>3</sup> Varley and Schullery, *Yellowstone Fishes*, 99. Among the many other essential publications relating to the change in management are Robert E. Gresswell, “Yellowstone Lake—A Lesson in Fishery Management,” Willis King, editor, *Proceedings of Wild Trout II*, Yellowstone National Park, September 24–25, 1979, Washington, D.C., Trout Unlimited and the Federation of Fly Fishermen, 1980, 143–147; and John D. Varley, “A History of Fish

- Stocking Activities in Yellowstone National Park Between 1881 and 1980," Yellowstone National Park Information Paper No. 35, Yellowstone National Park, U.S. Fish and Wildlife Service, January 1, 1980.
- <sup>4</sup> NPS, *Fishing Bridge and the Yellowstone Ecosystem: A Report to the Director*, November, 1984 (Yellowstone National Park: National Park Service, 1984), 48.
- <sup>5</sup> Paul Schullery, *American Fly Fishing: A History* (New York: The Lyons Press, 1999), 249.
- <sup>6</sup> Lemuel A. Garrison, "Yellowstone Lake Studies," Annual Report of Superintendent," 1960, unpaginated.
- <sup>7</sup> Lemuel A. Garrison, "Fishing For Fun," Annual Report of Superintendent," 1960, unpaginated.
- <sup>8</sup> Among the sources on the evolution of sport fishing practice are: William Radcliffe, *Fishing from Earliest Times* (London: Murray, 1921); and Charles C. Trench, *A History of Angling* (Chicago: Follett Publishing Company, 1974); and Andrew Herd, *The Fly* (Ellesmere, Shropshire: Medlar Press, 2001).
- <sup>9</sup> The rise of an elitist tone in fly-fishing writing is traced by Paul Schullery, *If Fish Could Scream* (Mechanicsburg, Pennsylvania: Stackpole Books, in press, 2008).
- <sup>10</sup> Paul Schullery, *Cowboy Trout: Western Fly Fishing As It Matters* (Helena, Montana: Montana Historical Society, 2006), 51–94, provides several examples of awareness of sport fishing's "class structure" among a group of educated travelers visiting the Yellowstone National Park area in 1870.
- <sup>11</sup> "Their Numbers Are Perfectly Fabulous: Yellowstone Angling Excursions, 1867–1925," *The American Fly Fisher* 7(2), Spring, 1980, 14–19, provides extended texts of several early fishing accounts.
- <sup>12</sup> Frank King, "In Nature's Laboratory: Driving and Fishing in Yellowstone Park," *Overland Monthly*, June, 1897, 602.
- <sup>13</sup> Varley and Schullery, *Yellowstone Fishes*, 94–95, suggested that even by the 1890s there appears to have been a decline in the average size of the fish reported by angling writers compared to the fish of the 1870s.
- <sup>14</sup> King, "In Nature's Laboratory," 602.
- <sup>15</sup> Varley and Schullery, *Yellowstone Fishes*, 17.
- <sup>16</sup> Ralph E. Clark, "Wyoming Summer Fishing and the Yellowstone Park," *The Outing Magazine*, July, 1908, 509.
- <sup>17</sup> Clark, "Wyoming Summer Fishing," 509.
- <sup>18</sup> Pritchard, *Preserving Yellowstone's Natural Conditions*, 93–100.
- <sup>19</sup> Kila-How-Ya, *Fly Fishing in Wonderland* (Chicago: O.P. Barnes, 1910), 29.
- <sup>20</sup> Howard Back, *The Waters of Yellowstone with Rod and Fly* (New York: Dodd, Mead and Company, 1938), 26–27.
- <sup>21</sup> Don Martinez, "Yellowstone Park," in A.J. McClaine, editor, *The Wise Fisherman's Encyclopedia* (New York: Wm. H. Wise & Co., Inc., 1910), 1333.
- <sup>22</sup> Schullery, *If Fish Could Scream*, in press. This same creed was expressed by another dedicated western fly fisher of Martinez' era, Alexander MacDonald, whose *Design for Angling: The Dry Fly on Western Trout Streams* (Boston: Houghton Mifflin, 1947), was an early tract promoting just such sporting definitions among anglers in the Rocky Mountains and Sierras.
- <sup>23</sup> Jack Berryman, *Fly-Fishing Pioneers & Legends of the Northwest* (Seattle: Northwest Fly Fishing LLC, 2006), 94–99.
- <sup>24</sup> Schullery, *Cowboy Trout*, 144.
- <sup>25</sup> Varley and Schullery, *Yellowstone Fishes*, 116. For a more affirmative view of the fishing and the spectacle of the trout at this time, see Ted Hughes, *Birthday Letters* (New York: Farrar Straus Giroux, 1998). Hughes visited the park apparently in the late 1950s; the poem "Fishing Bridge" (87–88) celebrated the bizarre combination of the wonder of the natural setting and the madness of the angling experienced by many at Fishing Bridge, few of whom were such literate observers as Hughes, later poet laureate to Queen Elizabeth II.
- <sup>26</sup> The increased popularity of catch-and-release fishing would soon demonstrate the continued evolution of attitudes toward sport fishing in Yellowstone National Park.
- When fish were no longer caught for human consumption but for recreation, fishermen were increasingly criticized for the perceived cruelty of catching fish purely for the sport rather than for food.
- <sup>27</sup> Jack Anderson, "1973 Annual Report of the Superintendent Yellowstone National Park," Yellowstone National Park: National Park Service, January 30, 1974, 5.
- <sup>28</sup> NPS, *Fishing Bridge and the Yellowstone Ecosystem*, 15.
- <sup>29</sup> According to U.S. Fish and Wildlife Service personnel who dealt with many anglers in the first years of these dramatic changes in fishing regulations, the public was generally accepting of the changes, perhaps because the cutthroat trout were so easily caught and the average catch-rate of visiting anglers increased so rapidly under the new regulations. See U.S. Fish and Wildlife Service, Division of Planning and Assistance, "Annual Project Report, Yellowstone Fishery Investigations, Yellowstone National Park, Calendar Year 1973," June 10, 1974, 42.
- <sup>30</sup> Anderson, "1973 Annual Report of the Superintendent," 5.
- <sup>31</sup> Jack Anderson, "1974 Annual Report of the Superintendent," 8.
- <sup>32</sup> Varley and Schullery, *Yellowstone Fishes*, 118. See also Lynn R. Kaeding, Daniel G. Carty, Daniel L. Mahony, Glenn Boltz, and Sonya M. Anderson, "Annual Project Technical Report for 1994, Fishery and Aquatic Management Program, Yellowstone National Park," March, 1995, especially "Nonangling Uses of Aquatic Resources of the Yellowstone River," 26–32. This appears to be the final year in which annual estimates of fish-watching visitor totals were made and reported by any park office, though interpretive staff did continue to keep track of numbers of visitors seen or contacted during roving time at Fishing Bridge, apparently without extrapolating to an estimate of yearly total.



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