Today a traveler, coming in sight of Bluff from the desert and canyon country to the west, is struck by the contrasting redrock cliffs and gnarled, green cottonwood trees. Indeed the trees are implausible until one sees the sinuous bend of the San Juan River, snaking its way against the bank that abuts the southern bluff. The cottonwoods suck their life from the brown waters and high water table, then give it back through an exploding tangle of leaves and limbs. Certainly nothing is more pleasant than a shady retreat, leaving behind the sun, heat, and dwarfed desert growth.

More than one hundred years ago, Mormon settlers, completing their six-month trip over the Hole-in-the-Rock Trail, felt the same emotions of relief. They had traversed some of the most inhospitable terrain, starting from Parowan and Cedar City in southwestern Utah, then moving across the desert of southern Utah to that narrow cleft called Hole-in-the-Rock that overlooks the Colorado River. The epic travail of building a road through a cliff and down one side of the escarpment, floating the wagons across the river, and continuing the road out of the canyon is a tale that has been told elsewhere. The Mormon faith in the leadership of this church-directed colonization and tenacity in facing the elements have become legendary.

When they finally arrived in Bluff, they did not have the strength to journey any farther. Bluff, with its numerous stands of cottonwoods, level floodplain, and sheltering canyon walls, was just too inviting. Trees for shade and building materials, the wide floodplain for crops, water from a continuous source—what location could be more perfect for an agricultural community? Why continue another twenty miles upstream to the Montezuma Creek-Aneth area, where eighteen non-Mormon families from Colorado had already made their home? Better to stay put and use the resources lining the banks of the river than get involved with outsiders.

And so on 6 April 1880, the main body of Mormon pilgrims from southwestern Utah settled in the southeast, attracted to a desert land of promise, made visible through trees, land, and water. Members of this religiously based community were accustomed to the idea that covenants, with visible signs, expressed intangible relationships. The life that appeared so possible could be shaped at this spot where resources spelled more than survival. Some of the people felt this was the appointed place where their deity wanted them to settle.

The ensuing one hundred years proved disappointing. The water that had enticed them to settle became one of the main drawbacks. The trees that offered shade from the blistering sun proved unsatisfactory for much of anything else, though large numbers were harvested from the riverine corridor. And much of the floodplain, so amenable to agriculture, washed down the river during a series of unpredictable floods. If a covenant of cooperation between people and land ever existed, it broke fairly regularly. One geologist summed up the situation this way: “The San Juan River has eroded its banks at Bluff during catastrophic floods to a greater degree during the past 100 years of historic agriculture than it had in more than 1400 years prior to this.”

This chapter examines what part this triad—river, cottonwoods, and settlement—contributed to this region’s history. Each one had an impact upon the other two as, year in and year out, they carved out and maintained
their ecological niches. Each seemed to have a
will of its own. Whether during the dramatic
floods of the San Juan or when the river faded
to a trickle; during times when cottonwood
communities proliferated or in years of decline;
during the infusion of settlers or the years of
steady exodus, all three elements struggled to
follow individual paths.

When the settlers arrived along the banks
of the San Juan, they encountered a variety of
plant communities. On the five-to-six-mile-long
river bottom near Bluff existed everything from
microscopic spores of cryptogam to cottonwood
trees averaging sixty feet high. Erastus Snow, a
Mormon apostle visiting the newly founded
community in 1880, remarked about the land
and its variety. He estimated that the bottoms
along the river varied in width from one-half to
one mile, with some places upstream as wide as
a mile and a half. He went on,

extensive cottonwood groves in places, and gen-
erally [the ground is] covered with sunflowers,
greasewood, rabbit brush, sagebrush and other
luxuriant growth. Deep rich alluvial soil. The
bench lands and adjacent hills covered with
grass not a very heavy growth and in places
extensive forests of cedar [juniper] and pinion
pine. . . .

Other plants found along the river includ-
ed cattail, reed, cane, willow, arrowweed, ser-
viceberry, Mormon tea, spiny aster, milkweed,
Indian paintbrush, broadleaf and narrowleaf
yucca, scrub oak, and a variety of cacti.

Into this comparatively untouched region
came 230 people, eighty-three wagons, and
more than a thousand head of livestock. The
group encountered three families who claimed
small tracts of land in Cottonwood Wash. Now,
however, true civilization (i.e., city building)
had arrived in one day. Division of the land and
the start of an irrigation ditch were top priori-
ties. After some abandoned schemes and heated
debate, fifty-nine men each drew an acre lot in
town and a field of from eight to twenty acres,
depending upon the quality of the land. Since
the planting season was already upon them,
work started immediately on the ditch, whose entrance was placed four miles above the town.

Church leaders counseled the pioneers shortly after their arrival to remain nearby. A half-dozen families continued to their original destination and established a community at Montezuma Creek; another thirty families had already had enough and moved on to Colorado or returned to southwestern Utah and a brighter hope. For those who stayed in Bluff and Montezuma, the order of the day was erecting a fort for protection. They built the Bluff fort with houses around a four-hundred-foot square and all doors facing inward. Stockade fences stood between the houses, a well within the courtyard provided water, and a meeting house was the first completed public edifice.\(^6\)

While materials for later construction relied on the straight ponderosa pines of the Abajo Mountains, forty miles away, lumber for early building came from local cottonwood trees. Results were less than gratifying. Albert R. Lyman, who lived in Bluff beginning in 1881, described the results of using this wood that was so “determined to warp and twist like a thing in convulsions, [it] would not lie still after being nailed down.” Fences were made with “crooked stakes and riders of crooked cottonwood limbs into a hocus-pocus barrier,” which he blamed for the “breach cows that have pestered Bluff ever since.” And here is his classic description of life in a high-desert environment under a cottonwood roof:

More still, it [invincible attitude] undertook from that same rams-horn breed of trees, to select logs and build houses, whose walls bowed in and out with wonderful irregularity and chinks ranging from nothing to a foot wide. It roofed them with thick coats of sand, which feathered out into a crop of runty sunflowers and stink-weeds, if the weed seed had time to sprout before the wind carried the sand away. But whether it raised weeds or blew away, it never turned the rain, which dripped dismally from it long after the sky was clear. These houses had doorways without glass and floors which

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The early home of the Wayne H. Redd family in Bluff illustrates building with what Albert R. Lyman called “that rams-horn breed of trees . . . whose walls bowed in and out with wonderful irregularity.”

(San Juan Historical Commission)
required sprinkling at intervals to lay the native dust and tempt the soil to harden.7

Lyman recorded other uses of native cottonwoods. The hundred cribs built to line the banks and irrigation ditches and prevent the sandy soil from washing away came from these trees. He estimated that thousands of these logs were harvested from the banks, jammed together, then backed with brush and stones. “Even then these tortuous members lay ready, with a little help from their kinsman the river, to come writhing from their prison and go twisting and rolling in glad somersault down the streams.”8

No one kept track of exactly how many trees were cut and what comprised the brush that fortified the banks. But the project went on year-round for years. The winter was a particularly good time for construction because of the low water level before the spring onslaught. Settlers removed stone from above the riverbank and cut cottonwoods from both banks and sandbars. Lyman recorded in March 1897 that a recently exposed twenty-acre island was quickly cleared, stripping all the brush between Bluff and Recapture Wash, a distance of about six miles. The product: a mile of riprap.9

Although the “cottonwoods sprang up again like so much big hay,” making the settlers believe they had an endless supply, the river continued to whittle the riprap away about as fast as it was erected. Entire “forests of new cottonwoods were gnawed away,” and when the river “surrendered” access to a previously unavailable source of trees, it was “promptly skinned.”10 Little wonder that when Lyman writes about the community’s struggle with the river, the rhetoric is steeped in war metaphors. The desperation seemed comparable.

What was taking place in Bluff occurred on varying scales in other settlements upstream. In addition to the Montezuma Creek community and the non-Mormons living in the Aneth-McElmo area, small, family agricultural operations and trading posts were scattered along the river. Each demanded something of the local resources. Take for instance, John Holyoak, who in 1882 established a village at what became known as Peak City because of a prominent feature nearby, possibly Peter’s Nipple. Described by Platte Lyman as twenty-five miles upstream from Bluff, it was probably located near Rockwell Point on today’s maps. The “city” included a home and store that doubled as a post office, which was soon augmented by the cabins of John Robb and James Dunton. By November of that year, however, these two men had pulled out, and Holyoak eventually followed suit. Like so many who had seen the promise of financial gain in the land, he found looks deceiving. Later a passerby described the remnants: “Its lonesome cabins and rude chimneys became the doleful abode of rats and chipmunks, until the pestulent [sic] river whittled the sand from under them and scattered their logs along winding banks.”11

The land paid a price for supporting the efforts of this pioneering generation. Over the first twenty years, the cost included materials to sustain settlements, trading posts, large herds of livestock, a gold rush, agricultural efforts, and the start of an oil boom. In a relatively fragile, high-desert environment, where recuperation is slow and scars long lasting, the sudden onslaught exacted a heavy toll.

A good indicator that the land was ecologically challenged was the explosion of weeds. These plants are themselves pioneers; they take advantage of unsettled or “new” conditions where the land and plant communities have been disturbed. Windy, sunbaked areas subject to erosion were prime candidates for the new invaders. Weeds followed a marked succession. The first rooted quickly but also didn’t last. Their seeds arrived in massive numbers, laying the foundation for sturdier, more slowly developing plants. Some of these pioneers provided shade, retarded wind flow over the ground, produced organic material, and stabilized soil. One author has described them as the “ecological Red Cross” that helps heal and prevent further damage.12

While most people view weeds as bothersome and unworthy of notice, a few settlers recorded their presence in Bluff. In 1885 Jens Nielson, the local patriarch and bishop, wrote that the community’s greatest drawback in planting crops was a “heavy growth of weeds that have sprung up on our cleared land. Sunflowers grow large enough for fence poles and as close together as it is possible for them to stand.”13 In the same breath, he mentioned that beekeeping was a success, no doubt because of the profusion of flowers that accompanied the weeds.

102 River Flowing from the Sunrise
Albert Lyman made a similar observation, saying that the sandy roads of the metropolis of Bluff in 1888 were nothing more than a “narrow pass between two forests of stinkweed [purple bee balm]. They grew ten feet high, loaded with rich purple blooms, and always full of the buzz of bees wild and tame.”

He went on to tell that a neighbor had spent two days scouring the countryside for a missing cow, only to find it in the weeds between Bluff streets. In other areas, where large herds of livestock grazed, there was no such luxurious growth.

One pioneer plant that grew quickly but hurt the livestock was pigweed (*Amaranthus retroflexus*). In the early spring, redroot pigweed contains high concentrations of nitrates which can poison horses. Lyman recalled it growing in profusion on the benches above Bluff on a heavily grazed winter range. Later the settlers deduced that this plant caused their horses to go blind.

If the horses had trouble with their eyesight, so, too, did the settlers, but for a different reason. Sandstorms that “make your eyes look and feel like kidney sores on a cayuse” arose in the spring. Lyman reported one sandstorm was so bad that he could not see five feet in front of him. Ernest Hyde, another longtime resident of Bluff, related that the gulches west of town filled in level with the sand blown by these storms. Heavy rains later loosened the sand and silt, then dumped them in the river. Fish sometimes found it difficult to breathe as they choked in the sediment-laden water. The settlers, on the other hand, capitalized on the situation, scooping the fish out by hand from the shallow eddies, throwing them onto the bank, then later collecting the catch.

While all of the problems of wind, sand, and sedimentation cannot be laid at the feet of the settlers and their livestock, certainly the removal of grass and trees was a significant factor.

Undoubtedly the most powerful of all the antagonists in this struggle for dominance was the San Juan. It is no small irony that the river that drew the settlers to its waters also proved to be the biggest challenge. Poor crops, sand-filled
ditches, and destruction of dams and channels discouraged the heartiest souls. By December of 1882, church authorities in Salt Lake City gave an official release for those who wanted to quit the San Juan “mission,” but encouraged all to remain. Three years later Francis A. Hammond, the stake president (ecclesiastical leader) of the Four Corners region, made a progress report. Of the 150 men called to serve initially in the San Juan mission, only 25 had remained. The primary reason for many was the river.

Before examining the historic record, it is useful to look at the general interplay of forces that affect the San Juan River, both locally and long distance. For instance, one side canyon may consistently deposit far more silt than another, and local storms may be more prevalent in one area than another, but there are always exceptions.

The San Juan has two different sources of runoff. The first occurs at lower elevations (from five to six thousand feet) and consists of the snowmelt and rain that flow down the canyons and washes and dump their load during the late winter and early spring. Local summer thundershowers also contribute. The second, higher-elevation runoff appears in April through June and originates in the mountains of Colorado, New Mexico, and Utah. The flow at a specific time depends upon the available snowpack and how quickly it melts. High temperatures lead to sudden release. The entire drainage area of the San Juan is twenty-three thousand square miles.

Another aspect to consider is how much precipitation above or below normal an area receives over an extended period of time. While data were not scientifically collected, some interesting weather patterns started in the Southwest about the same time that the Mormons arrived in Bluff. What had been a fairly placid and predictable seven-hundred-year period of precipitation and scouring of streambeds suddenly changed into a series of violent storms that delivered large amounts of water over short periods. A parallel to what occurred in Bluff has been well documented by Richard Hereford, G. C. Jacoby, and V. A. S. McCord in their study of the Virgin River, Utah.

Gullyng moved at a rapid pace into the twentieth century as flash floods tore away at the landscape. A few examples corroborate that what was occurring in southeastern Utah was happening elsewhere in the Four Corners region. Oraibi Wash at the southern end of Black Mesa, Arizona, was only 20 feet across and 12 feet deep in 1897; by the 1930s, it averaged 150 to 300 feet across and 30 to 35 feet deep. In 1880 Keams Canyon Wash did not exist; by 1930 it was 25 feet deep. The culprit was not necessarily increased rainfall but the type of storms and suddenness of water delivery. Certainly the removal of trees and brush, the grazing of livestock, and general settlement activities (both Navajo and Anglo) had an impact. It is, however, interesting to note that a similar phenomenon of erosion and gullying occurred during the twelfth and thirteenth centuries (the Anasazi Pueblo period), long before modern activity could have caused deterioration. Beginning in the 1880s, violent, heavy storms tore at the landscape with a frequent ferocity that ravaged the river corridor.

Besides the water, what and how much flowed down the river? Between 1970 and 1979, more than 18 million tons of sediment (averaging a daily load of 5,000 tons) made their way through the channel. Compare this to the 1930–39 period, when 395 million tons flowed down the river past Bluff. Just as impressive was the contribution made by Cottonwood Wash, which drains only 205 square miles or about 1 percent of the total upstream area. During one six-month period in 1968, it contributed 10 percent of the annual sediment load of the entire river. In addition to the soil sluiced down from canyons and washes, sandstone, siltstone, and shale underlie the channel, contributing to the suspended particle load. At flood stage as much as 75 percent of the river’s volume can be silt and sand.

The actual flow of water varies with the season, but an annual average is 2,542 cubic feet per second. This capacity can increase to 62,300 cubic feet per second during the highest flood stage, an event that can statistically happen every fifty to one hundred years. Although floods are often viewed by those living along the river as highly destructive events that should be controlled, scientists who study riverine habitat now believe that flushing and scouring are actually healthy for the river. By flooding the banks
and carrying materials downstream, the water adds nutrients to the bottomlands and washes old, spent soil and debris away. Since the impoundment of water by Navajo Dam in 1962, extreme floods have been reduced. Now that the river is more confined, the banks are stable and heavily infested with tamarisk, Russian olives, coyote willows, and other undergrowth. Flooding and replenishing soil, however, have also slowed down. In the lower canyons of the San Juan, because there is no floodplain and the river drops more steeply with high rock walls to maintain the channel, flooding has had minimal impact. Understanding this general behavior of the river makes what happened to Bluff starting in the 1880s clearer.

Kumen Jones, one of the original settlers, noted that at the time of his arrival, the San Juan River coursed through the middle of the bottomlands and was confined to what appeared to be a permanent channel “with cane and willows and cottonwood trees up and down.” He also noticed piles of driftwood some distance from the river, indicating big floods in the past.

Past phenomena, however, soon became part of the present. Starting on 22 December 1883, Bluff received the first of many prolonged dousings of rain and snow, lasting for forty-eight hours. One storm followed another. Heavy showers in February 1884 continued into March, raising the river seven feet above normal. Cottonwood Wash added to the melee, spewing forth a torrent of water “loaded with drift and stinking loud with filthy sediment.” Worthless white sand spilled over and covered some of the best agricultural fields; ten inches of water pooled on the floors of homes in the southwest corner of the community and the fort; the river badly mauled irrigation ditches.

By May the San Juan, swollen by continuing heavy showers, gained more momentum from the melting snows of Colorado. The precious headgate at Walton’s Slough, key to the entire irrigation system and symbol of sacrifice,
was now threatened. Samuel Rowley recalls that the community mustered everyone into service, but the people’s efforts were like “pitching straw against the wind.”

The men camped away from the river that night, listening to trees that had stood for “centuries” crash into the water. In the morning, the headgate bobbed in the current, entangled in a cottonwood. As it broke free, some of the men tried to lasso it, but to no avail. It disappeared, taking their hope with it.

The flood peaked on 18 June, sweeping everything except the settlement of Bluff before it. All of the buildings in the Montezuma Creek-Aneth area, as well as the individual homes along the river, were first flooded, then washed away. The experience of Jane Allen is typical. Jane and her small children tried ditching to turn the river away as it flooded one side of their bottomland farm. Montezuma Creek contributed its share to the problem, so soon water stood a foot deep in their home. Bob Allen, one of Jane’s sons, came from Fort Montezuma, where things looked generally bleak, and tried to rescue the woman and her children with a buckboard. The wagon quickly mired in the mud and sand. He then lassoed a molasses boiler, placed as many family members in it as he could manage, and pulled them to safety. After a number of trips, the family sat on high ground, watching home and belongings disappear. All three log cabins on the property, the fields and orchards, Fort Montezuma, and the entire community of Aneth flushed down the river, except for the Harriman home, built too high on a rock for the river to snatch. “The site of Montezuma was a yawning gap of sand. . . .”

The flood was too much. Many people left the San Juan to return to southwestern Utah or greener fields in Colorado. A few went to the battered city of Bluff, where friends and relatives helped them. No one stayed in Montezuma Creek.

In cool retrospect, what can be said about the flood of 1884? Most obvious is that it followed a classic pattern. First, local precipitation produced flooding, followed by a rising river from more-distant spring snowmelt. This was also a year with an inordinate amount of precipitation, accompanied by cooler global temperatures, associated with the explosion of the volcanic island of Krakatau in the Indian Ocean and probably an El Nino off the west coast of South America. The ash and debris sent into the atmosphere affected major weather patterns, increasing rain and snowfall around the world. The combination proved fatal to most of the settlements in southeastern Utah.

On the other hand, Bluff, one of the lone survivors, was not without fault. As early as 5 September 1880, church authorities counseled the settlers to avoid building communities close to a bend in the river or “near the mouth of any wash” that might be subject to cloudbursts or “mountain floods.” Bluff sat right next to Cottonwood Wash, one of the main contributors to its problem. It is also interesting that the white sand that covered the fields washed down from the bench above town, a site of intense livestock grazing. No doubt most of the grass and other plants had either been trampled or eaten so they no longer stabilized the soil. If these lessons were difficult to grasp, the future would present many opportunities to relearn them.

Floods were one type of problem; droughts were another. Although the 1880s were generally characterized by above-normal precipitation, the 1890s proved to be the opposite. By 1893 a prolonged drought was taking its toll on the farms and ranges of southeastern Utah. Streams that had run full now dried to a trickle; springs that had consistently gushed water were now as “devoid of moisture as a tinder box.”

Three years later there was little relief. Presaging what would occur in the Oklahoma dust bowl of the 1930s, the elements exacted their dues.

Albert Lyman, with typical detailed observation, recorded that the “hideous specter of drouth came stalking over the whole country.” All of nature worked in concert to undo the settlers. “Dry winds drove clouds of dust fiercely along from the southwest, drinking up moisture like a sponge, leaving weeds and grass dry and withered. Crops failed. Loose soil on newly plowed land was swept from hilltops, leaving naked markers of the plow running across the hard earth.”

The San Juan River ceased to flow, so now people could cross without getting their shoes wet. Intermittent pools in the streambed contained barely enough water to support fish. Settlers and Navajos, however, descended on the river with spears in hand,
filling their sacks before heading to town to sell their catch.\textsuperscript{41}

In September 1896 the cycle temporarily broke with three continuous days and nights of precipitation. Hammond later reported more rain and snow pelting to earth that winter than anyone in Bluff could remember. Again Cottonwood Wash played havoc with the town. The “boiling mass” crested the eastern bank after attaining a depth of twenty and a width of one hundred feet near Hammond’s house. Closer to the San Juan, it was half-a-mile wide. Two to three feet of sand and mud washed over the orchards, suffocating some of the trees; sand and silt again buried the fields; water and sediment tore at, then filled the ditches; and green cottonwoods, sixty to eighty feet in length and one to two feet in diameter, floated, then settled in “great piles” upon the land.\textsuperscript{42} It was time once again for the town to dry out.

By 1898 and 1899 the drought had resumed. Now the people of Bluff had a new idea: Pump the water out of its diminishing, wandering church services. Initially it had been situated one hundred feet near Hammond’s house. Hammond later reported more precipitation. Hammond later reported more rain and snow pelting to earth that winter than anyone in Bluff could remember. Again Cottonwood Wash played havoc with the town. The “boiling mass” crested the eastern bank after attaining a depth of twenty and a width of one hundred feet near Hammond’s house. Closer to the San Juan, it was half-a-mile wide. Two to three feet of sand and mud washed over the orchards, suffocating some of the trees; sand and silt again buried the fields; water and sediment tore at, then filled the ditches; and green cottonwoods, sixty to eighty feet in length and one to two feet in diameter, floated, then settled in “great piles” upon the land.\textsuperscript{42} It was time once again for the town to dry out.

By 1898 and 1899 the drought had resumed. Now the people of Bluff had a new idea: Pump the water out of its diminishing, wandering bed and send it down the ditch. The machine—a large steam engine—looked promising. Once in operation, it pumped a “fair quantity of muddy water through its pipe.”\textsuperscript{43} There was one problem: Where could the operators find enough wood to keep the old engine going? Wood haulers searched “up and down the river for many miles . . . nor did it take very long to complete the skinning.” Soon the enterprise was abandoned; damming and riprapping continued.

In 1902 citizens from Bluff wrote to the Navajo agent, saying that his wards were starving because of nine years of drought.\textsuperscript{44} Upon investigation, the condition of the Indians was far better than reported; there was, however, no denying the stressful climatic conditions. Louisa Wetherill, trader to the Navajos, recalls 1902 as the year the San Juan died to its lowest stage of six inches deep and three feet wide outside of Farmington, New Mexico.\textsuperscript{45}

The fall and winter of 1904–05 again reversed the sequence. Just like a serial on television, the newspapers carried the latest word about the ongoing struggle of Bluff with the San Juan. October: The river was on a “big spree,” fed by the heavy rains in the “upper country”; March: News had just arrived in Mancos, Colorado, that “Bluff was washing away”; May: The San Juan had sliced around the dam, threatening to “cut a new channel right through the town.”\textsuperscript{46}

Bluff was not alone. William T. Shelton, Navajo agent at Shiprock, had been fighting a similar battle ever since he founded the agency in 1903. Shelton recognized that every year the river cut away hundreds of dollars of valuable land and was very “shifting in its nature . . . from first one side of the valley to the other. Hundreds of fine trees were swept away by the high water this spring that should have been used in protecting the banks and to prevent encroachments of the river on the farming lands.”\textsuperscript{47} The San Juan continued to antagonize anyone wishing to settle its banks.

Shelton had other plans. In the fall of 1906, he considered buying either Bluff or the Navajo Faith Mission (near Aneth), owned by Howard R. Antes. Either site could accommodate a boarding school for the children of the estimated two thousand Navajos living on the Lower San Juan. Agriculture would be the school’s main curriculum. By June of 1907, Bluff appeared to be the strongest candidate, since the bottomlands of Aneth were in the process of washing downstream.\textsuperscript{48} After the government considered its options in obtaining Bluff, interest cooled. The rough land south of the river, the danger of crossing during high water, and the large amount of quicksand along the banks made it impractical to establish a school there. Cottonwoods for fuel were “none too plentiful,” raising the issue of heating in the absence of coal.\textsuperscript{49} As far as Shelton was concerned, there was no place between Shiprock and Bluff where topography, water, and Navajo needs could successfully merge. The town remained a private enterprise.

It is pertinent to ask at this point just how much land was actually washing away. A rough estimate is provided by two newspaper items from 1907. The first, published in July, tells that the river line was approaching the historic landmark known as the Old Swing Tree. Under this cottonwood, Bluff settlers had held their first church services. Initially it had been situated approximately halfway between the town and the river on the northern floodplain. Now the water was gnawing at the bank fifteen feet away. By September the cottonwood was gone, but not
before a crowd of residents paid local photographer Charles Goodman to take their picture with the “doomed sacred tree.”

There is little wonder that two years later, one of the townspeople took pen in hand to let the world know how desperate the situation was. He wrote that Bluff’s hay fields were being transferred “down into the Gulf of California” and that if something was not done to stop the river, “we will have to take to the cliffs and become cliff dwellers.”

As the river “licked up lucerne patches, barbed wire fences and ponderous old trees with a fluency which would sicken a saint,” the people determined to launch a war to make Bluff safe for habitation. The river’s main avenue of approach was up Walton’s Slough, east of town. Community members donated time and money, while the LDS Church opened its coffers to support the fight. Workers hauled pine logs from Blue Mountain, set them in the ground with pile drivers, and backed them with rock and brush, making “all other riprapping campaigns dwindle to insignificance.” After two years of extensive labor, the dam met the river’s onslaught successfully, turning away the flood of 1911.

Other communities were not as fortunate. Starting in July and August, rain deluged the Four Corners area. In October the precipitation intensified as one two-hour storm dumped 4.8 inches of rain. The weather bureau later reported that between September 1911 and March 1912, 27 inches of rain fell in San Juan County, twice the normal amount for even the wettest areas. Bluff averages almost 8 inches a year.

Water from both local and distant sources coursed down the river, sweeping everything before it. Shelton reported that, starting in Shiprock, the entire valley flooded, in many
places “from hill to hill.” He estimated the depth as twenty times greater than he had ever seen it; he knew that parts of the school lay submerged under six feet of water, nine adobe structures had “melted” away and all the larger buildings held water, and he had “sent ten to twelve thousand fine melons down to the people living along the Gulf of California.”54 The river also replanted the recently placed steel bridge a quarter of a mile downstream.

In Utah, Navajo homes along the river near Aneth washed away, as did the two-year-old steel bridge at Mexican Hat. The bridge had cost the state four thousand dollars, a sum willingly paid for the anticipated wealth from the oil fields.55 In the lower canyon, Otto Zahn, a miner, returned to his camp to find only the top of his home protruding out of a mass of mud. After estimating the low water level of the river, the height of his home, and what was left, he believed the mud flow was seventeen feet deep.56 Once again, the San Juan emerged the victor.

But nothing was ever final with the river. There would be periodic floods for the next fifty years until its turbid waters were finally brought under control. There was the flood of 1927, which, according to one eyewitness, raised the water to thirty-three feet above its normal September level. Debris from Gypsum Creek, opposite the town of Mexican Hat, was so plentiful that it almost dammed the river.57

After the flood of 1941, the Soil Conservation Service assumed the responsibility for forcing the river back into its original channel. “Lovely cottonwood trees,” a report tells, were cut down for riprapping to protect the land and seventeen families residing in Bluff. By now it was all a familiar scene: “The water rolled and boiled, cottonwood trees fell, the banks melted like sugar until 96 acres of irrigable pasture had disappeared in two weeks. Two days later an additional 18 acres of alfalfa sluiced away.”58 Five-foot waves swung the river from one side of the streambed to the other. At the end of June, the waters finally abated.

In 1948 the Army Corps of Engineers linked arms with the Soil Conservation Service, county officials, and Bluff residents to raise money for a joint venture in erosion control. The project, costing an estimated fifty-five thousand dollars, attempted to prevent more acreage from washing away. The plan included a large rock crib southeast of Bluff, with a stretched cable securing pole jacks or large cedar trees to a protruding bank. When the river washed against this breakwater, slowed velocity made the sediment drop, while the jacks caught the floating debris. The structure helped but never affected the extreme fluctuations during flood times.59 It was not until 1962, with the completion of Navajo Dam, that the cycle of torrent and trickle took on any semblance of managed uniformity.

After eighty years of combat with the river, what conclusions can be drawn about wood, water, and people? There are no simple answers. The life of the river is complex, and its environment depends on many factors, some far distant and others very localized. Trees, both near the river and farther away, have definitely played an important part in the history of the Lower San Juan. The trees cut along the river and its headwaters had an impact further downstream. Frank Hyde, who traveled through areas such as Dolores, Mancos, and Arboles in Colorado, remembered how destructive clear-cutting timber was to the ground cover. Once the yellow pines and blackjacks covering the base of the mountain had been harvested, the trees on the slopes were the next to fall beneath the axe and saw. The heaviest cutting of low timber occurred before 1896 and was associated with the settlement of towns and construction of the Denver and Rio Grande Railroad. Big sawmills continued to operate for another thirty years. Hyde recalled, “I saw a great many of those forests before they were cut and I have seen the places where they have been. . . . There were great forests in there for miles. The sawmills took out all, cleaned it up. . . .”60

A. L. Kroeger, a civil engineer and resident of the area in Colorado for more than forty years, was familiar with the lumber companies and corroborated Hyde’s astute observations. Kroeger stated that 782,000 acres of Colorado and New Mexico forests were harvested for timber.61 The result was no underbrush, pines, thistles, or leaves remained on the mountains to slow the wash of water and subsequent erosion into the San Juan. Hyde verified the impact: “Since the timber was cut down, my observation has been that the water in the river flows off quicker.”62

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Removing cottonwood trees on the lower San Juan also had a debilitating effect. Large trees provided shade and slowed surface evaporation, decreased wind, added organic materials to the soil, reinforced the riverbank, and rooted the ground. Since local precipitation could arrive in sudden, violent, downpours, streaming off the sandstone cliffs and naked slopes in a deluge, cottonwoods helped stem the flow.

Along the banks and bars of the river, mature trees did not stand a chance fending off floodwaters that first undermined, then toppled the stately monarchs. They were just too inflexible to withstand a direct onslaught. In some instances, large trees, caught in the tide, created a horseshoe vortex upstream that channeled the water around them and destroyed the bank even more. On the other hand, younger trees, especially those on sandbars, were limber enough to bend with the floodwaters, slow and catch the sediment, and scour the stream bottom, which eventually changed the course of the channel. The more plant cover existed on a floodplain, the greater chance of withstanding the ravages of a flood. So as the settlers cleaned the land of any vegetation that could be used for riprapping, they ironically destroyed the most beneficial element in counteracting erosion: natural cover.

But it was also the river that fostered the life and regeneration of cottonwood stands. Besides providing necessary moisture for growth, the San Juan played a crucial role in planting the trees. Cottonwoods have adapted to the ebb and flow of water in the Southwest. Their seeds are viable approximately three to four weeks, peaking in mid-May. This period corresponds exactly with the high water on the river, so that when the level drops, the seeds have moist soil for germination. Indeed, one method of seed dispersal is floodwater that washes over banks or sandbars and plants a new tree in a safe spot. Sufficient

This riprap barrier in Bluff suggests not only fear of flooding but the tremendous toll exacted from the environment to combat it. Multiply the quantity of trees necessary for this structure by the miles of riprap dam; then multiply that by the number of years riprapping was constructed. The amount becomes staggering.
( Charles Goodman photo, San Juan Historical Commission)
shade also prevents the soil and germinating cell from drying out too rapidly. Understanding this cycle of growth explains why there are fewer cottonwood communities along the river. As the settlers cut the trees to build their riprap walls and homes, they not only removed the source of new seeds but also altered stream flow that encouraged regeneration.

Early settlers’ descriptions of the riverbanks make it clear that the San Juan was confined to a well-established course lined with mature growth. Kumen Jones’s observations on the banks and riverbed, cited earlier, bear closer examination. He wrote,

The channel was fixed and definite when I arrived and these were lined on each side [with] old trees and old willow patches and the river had definite banks and the channel was confined in the original position of the river as I saw when I first went there; and that condition continued until the first flood [1884] changed it some by running over the old channel in some places, and after the flood subsided, the channel almost entirely resumed its position in the old channel. The position of the river changed during the second flood. After the flood was over it did not come back in most places. The [first] time that the channel changed in any substantial degree was during the flood that occurred in 1896.

That was sixteen years after the settlers arrived, sixteen years of intense tree and brush cutting that left the banks and sandbars bare. Add constant livestock use and the effects of drought and wind, mixed with periods of extensive precipitation, and there is little wonder why the San Juan ignored its earlier boundaries and started eating away at the bottomlands.

Many variables must be considered when examining the geologic characteristics that affect the river. Stream depth and gradient, sediment loads, volume of water, texture (roughness) of bank and bottom, soil consistency, vegetation, and tributary washes are all factors. A few general points, however, can be made about the Bluff experience. The town sits on a wide floodplain, but across the river stands a four-hundred-foot sandstone cliff. During floods there was no direction for the river to go but toward the settlement. Water follows the path of least resistance. The high rock cliffs, barren slopes, and Cottonwood Wash just compounded the problem when intense showers or rapid snowmelt overloaded the waters of the San Juan.

The loosely packed, sandy soil of southeastern Utah did not retain this gift of extensive moisture very long. The water selectively eroded gullies, then fashioned mud flows and sandbars from the materials. Frank Hyde recalled a time when Cottonwood Wash deposited so much sediment that the north side of the San Juan River was “choked off,” and it took another five or six days to flush the debris downstream. The river also created mud balls, some as large as a wagon wheel, from cobblestones, clay, and sand. The spheres rolled down the river channel, sometimes collecting and damming the flow. Quicksand, either blown by the wind or carried by the water, accumulated in shallow bends, ensnaring livestock that ventured into the mire. This was particularly true of the thirty-five-mile stretch of river between McElmo Canyon and Comb Wash. Once submerged in quicksand with only their backs showing, horses and cattle had to be dislodged by ranchers.

Even more dramatic than pockets of quicksand and moving mud balls was the braiding of the stream. This phenomenon was caused by the decreased velocity and capacity of the water to transport its bed load and sediment. The deeper, narrower, and faster the river, the more capable it is of transporting large objects. When the moving silt, sand, and rocks hit objects or entered still water or a broad floodplain with unstable banks, they dropped and came to rest. As velocity decreased, the finer sediment settled out. On the San Juan, this meant that gravel bars were more common above the narrow canyons of the lower river and the open area by Paiute Farms became a multichanneled series of sandbars. Other factors like sediment load and amount of water also caused the channel to shift dramatically, sometimes in a relatively short period of time.

Historic testimony supports these occurrences. Eyewitness accounts tell that the main current “would shift from one side to another,” the water would be “four feet deep on one side, and coming back three or four days later, the deep channel would be on the other side and it [Clay Hills] would be impossible to cross on

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account of quicksand,” and, once the channel was filled with sand, “it had a tendency to throw the heavy body of the current against the banks, undermining them and caving them in. It cut in a half circle until it cut the bottom entirely in two,” then returned to its old channel.\textsuperscript{70} The more sand was added to the channel, the greater the possibility that the water would rise and spill over the banks. Thus, the dramatic swings in the river’s channel from high and dry to submerged and deep were all a result of the equation of water, velocity, bed, sediment load, and makeshift dams.

There were also seasonal variations. Sudden showers in the fall often washed wind-blown sand out of gullies. Fall floods characteristically deposited more sand, which remained in the river all winter. The water in the spring rose and fell more gradually, eating away at the sandbars and rearranging the load downstream.\textsuperscript{71} Paiute Farms provides a good example of the result on a grand scale. Bert Loper, a miner and river runner with a long history (beginning in 1893) on the San Juan and Colorado, estimated the riverbed at Paiute Farms was between three hundred and four hundred feet wide. Years of flood and deposit changed it dramatically. By 1921 the actual Paiute farms were gone, and the river measured thirty-three-hundred-feet wide. Nothing but three or four shallow streams of water were braiding through a landscape of sandbars.\textsuperscript{72}

Layers are still being added to the environmental history of the San Juan River. The stabilization of the river, the introduction of salt cedar, and the government’s plans to control the San Juan as a resource will be discussed later. But even since Navajo Dam was built, there have been problems with flooding. Cottonwood Wash continues to be a nemesis. In 1968 a summer flood carried large cottonwood logs down the wash in a flow metered at twenty-three thousand cubic feet per second. The steel-girder bridge spanning the wash was badly damaged, and a number of homes were flooded.\textsuperscript{73} In 1973 Cottonwood Wash repeated its performance, washing out a steel bridge, splashing ten-foot waves along its banks, and flooding Bluff so that some people could paddle around in boats.\textsuperscript{74} Nothing is new under the sun.

But most of the riparian landscape has changed. Only faint traces of the extensive irrigation ditches once important to Bluff’s survival still exist. The shores stripped for riprapping are now covered with tamarisk, Russian olive trees, and other vegetation. Cottonwoods persist and tower above the lower growth, harkening back to the time when they dominated the banks and floodplains. And the San Juan, partly restrained by Navajo Dam, winds its way to Lake Powell. Much like the country it passes through, the river can only suggest the freedom it once enjoyed.