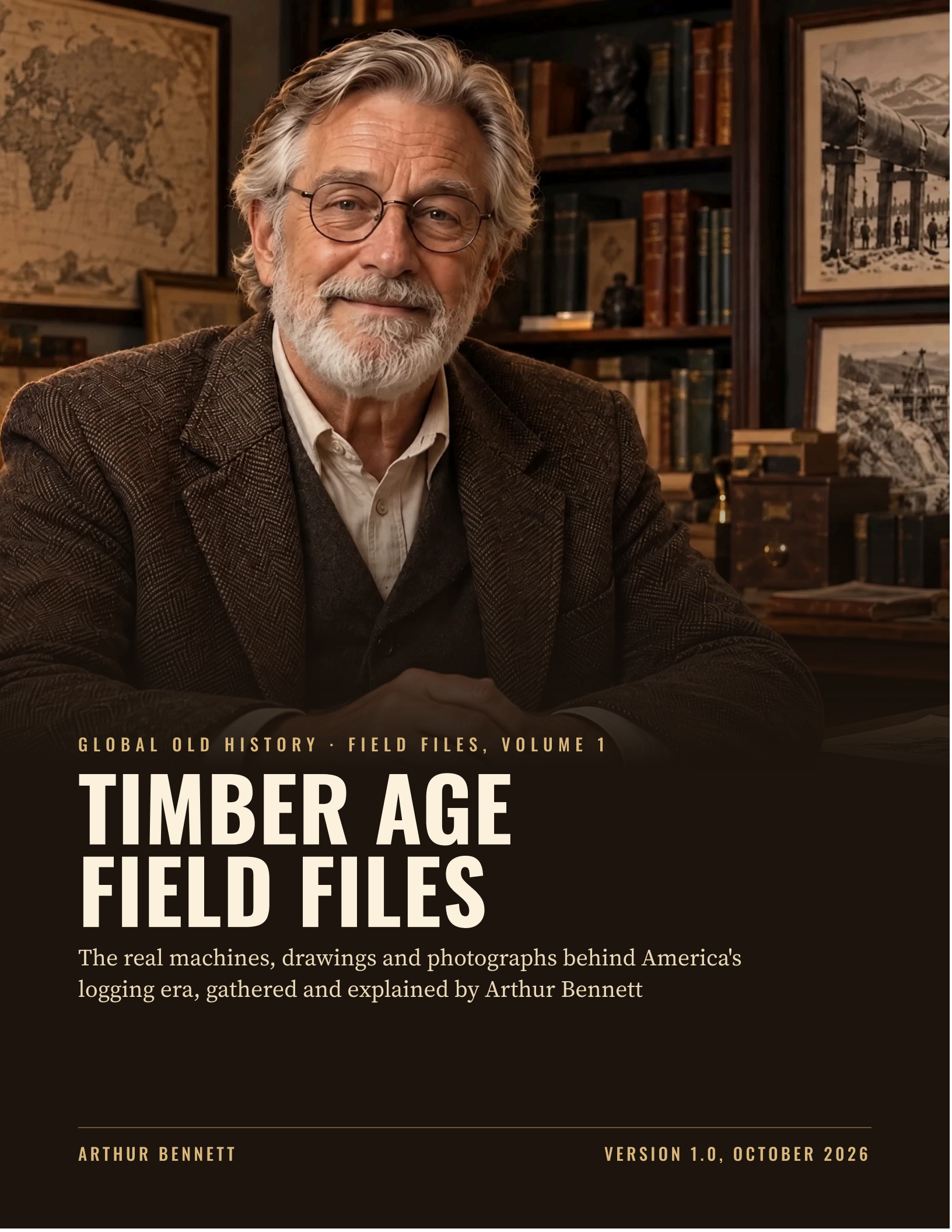




GLOBAL OLD HISTORY · FIELD FILES, VOLUME 1

TIMBER AGE FIELD FILES

The real machines, drawings and photographs behind America's logging era, gathered and explained by Arthur Bennett

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A NOTE FROM ARTHUR

When you watch one of our logging videos on a television, the pictures move on before you have really looked at them. That is the nature of a video. It tells you the story at the speed of speech.

The old records do not work that way. A photograph of a steam donkey rewards ten minutes of looking. A drawing in a 1913 logging textbook shows you exactly where the cable ran and why a man standing in the wrong place got hurt. A map tells you why a flume had to run fifty miles to go somewhere a road could not.

So I gathered those things here. These are field files, one for each of the machines and methods that run through our logging videos and through your comments about them: the springboard and the crosscut saw, the skid road, the winter haul, the donkey engine, the flume, the river drive, the stump puller and the timber trestle.

Every photograph in this book is a real one from the period, and every one is in the public domain, so you will find the archive it came from printed right under it. Where I am telling you what the records say, I give you the source. Where I am telling you what I think, I say so. And where a story was told in the camps but cannot be proved, I tell you that too.

No need to turn any of it into a miracle. What these people actually did was impressive enough.

Arthur Bennett Global Old History

HOW TO USE THESE FILES

Take them in any order. Each field file stands on its own. If you have just watched a video about flumes, go straight to Field File 5.

Look at the photographs first. Each file has one photograph with a short list called *What to look for*. The numbers in that list walk you around the picture the way you would walk around the machine itself.

Read the old records. The section called *What the old records say* quotes the people who wrote about this work while it was still being done, mostly from Ralph Clement Bryant's *Logging*, a forestry textbook published in 1913.

Check the numbers. *Field notes* puts the hard figures in one table, each one tied to a numbered source at the end of the file.

Go and see it. *Where you can still see it* lists places that still keep these machines and sites, where we could confirm them.

Watch it with the videos. Each file ends with the Global Old History videos it belongs beside.

Print what you like. The pages are sized for ordinary letter paper. Print a file to keep in a binder, or print the timeline and map for the wall.

THREE KINDS OF WRITING IN THIS BOOK

- **Fact.** Plain statements, with a source number.
- **Interpretation.** My own reading of the record. You will see "I think" or "my reading is."
- **Anecdote.** A story told in the camps or the newspapers that cannot be checked. It is always labelled as one.

FIELD FILE 5: FLUMES AND LOG CHUTES

Lumber flumes, log sluices and timber chutes in the American West and beyond, 1850s to 1920s

Of all the machines in this book, the flume is the one that asks the least and gives the most. It has no engine and no wheels. It is boards, nails, water and a hillside that someone measured very carefully. When I read the old figures for how much timber these wooden troughs moved, I keep going back to the same thought: they built a river where none existed, and pointed it exactly where they needed it to go.

THE PROBLEM IN FRONT OF THEM

The best timber in the West stood high on mountain slopes, and the mills, railroads and markets sat far below. Ralph Bryant, writing in 1913, set out the case plainly. A flume could cross uneven ground and gulches on light trestles, run on grades too steep for a railroad, and squeeze into narrow canyons with no room for track [1].

The demand behind it could be enormous. On the Comstock Lode in Nevada, square-set timbering held up the mines, and over about twenty years the district consumed some 600 million board feet of lumber and 2 million cords of firewood [2]. That wood was on the eastern slopes of the Sierra Nevada. Getting it down was the whole problem.

Early water flumes with square, U-shaped boxes had been tried in the Sierra from as early as 1854. They did not work well. Lumber lodged in the box, water backed up, and the result was overflows and washouts [2].

HOW IT WORKED

The answer that took hold was the V-flume: two boards joined at a right angle, set on a trestle at a steady downward grade, and partly filled with running water. The shape solves the jam problem by itself. If a piece of timber catches, the water rises behind it, lifts it and pushes it free. A square box cannot do that [2].

Bryant's numbers show how carefully these were laid out. A 90 degree vertex was the preferred angle because the joints fitted easily and wasted the least lumber [1]. Some boxes had a "backbone," a triangular strip fixed in the bottom of the V. A typical lumber V-flume had sides 15 to 18 inches high and was 30 to 36 inches across the top [1]. Routes were surveyed with a transit and staked like a railroad, and curves were limited by the longest piece the flume would carry: 20 degrees for 8 foot material, down to 4 degrees for 100 foot pieces [1].

Grade mattered most. Bryant called 3 per cent or more the most desirable grade for a straight flume, and allowed up to 75 per cent on short stretches if the changes were gently curved [1].

The box flume was the other type. It carried more water, so it needed a heavier trestle and cost more, but it could carry more. One California box flume moved 300,000 board feet a day, three times a V-flume's maximum, by clamping five or six boards into a bundle and, on the flat lower end, tying 25 to 30 bundles together with manila rope [1]. My reading is that the choice between the two was a trade between lumber, water and money, made fresh on every job.

Then there were chutes and slides, which used gravity with little or no water. A timber slide was a trough of two or three long poles on cross-skids, the inner faces hewn smooth with a broadax because any rough spot would make a log jump [1]. Slides were run dry, greased, or iced. Iced slides were the most efficient and could run on the lowest grades; dry slides were the least efficient [1]. On a steep flume the line between the two blurred, as the quote below shows.



A log chute of long logs laid side by side, with a smoothed timber down the middle and a man standing at the far end, built by Dan Little near Kelso, Washington, about 1898. The handwritten caption on the original reads "showing logg schut built by Dan Little." Source: L. Heath, University of Washington Industries and Occupations Photographs Collection, via Wikimedia Commons (public domain).



The Kings River (Sanger) flume under construction in 1889 in the rugged Kings River Canyon, California: bare trestle bents climbing a steep slope before the flume box was added, with workmen standing on the crossbeams. Source: Fresno County Historical Society, via Wikimedia Commons (public domain).

What to look for in the photograph

1. The trestle is bare. These are the bents and stringers only; the V-box that carried the water had not yet been laid on top.
2. Each bent is a frame of posts and diagonal braces, wider at the base than at the cap. That spread, called batter, is what kept tall bents plumb on sloping ground [1].
3. The men standing on the crossbeams give the scale. Count them from bottom to top and the height of the work becomes clear.

4. The grade line runs straight up the slope. The tops of the bents had to sit on one surveyed line, or the water would pool and the lumber would jam [1].
5. At left, a line of planks runs down the slope beside the trestle, with loose boards scattered along it.

WHAT THE OLD RECORDS SAY

"On steep grades a flume requires less water than on low grades because the flume box becomes a wet slide and the logs run freely with very little water."

Source: Ralph Clement Bryant, *Logging*, 1913, p. 410.

"During the cold season such stretches are iced by throwing water on them at night."

Source: Ralph Clement Bryant, *Logging*, 1913, p. 239.

What strikes me about the second line is the barrel. Bryant goes on to describe a barrel with two holes bored in one end, one over each slide timber, filled with water and lowered down the slide in the dark [1]. A whole mountainside of ice, laid down by one barrel and a cold night.

WHERE IT WENT WRONG

James W. Haines is commonly credited with building the first successful V-flume in the Sierra, in 1867, a line of about 32.5 miles from Alpine County, California, to Empire City, Nevada [2]. He patented the idea in 1870 as patent No. 107,611 [3].

The patent did not hold. In *Haines v. McLaughlin*, decided in 1890, the Supreme Court affirmed a verdict against him. The record showed a V-shaped flume of two boards nailed together, built and used by others in the summer of 1868, and a V-shaped log sluice in Mariaville, Maine, built in 1858 [3]. I don't read this as a failure of Haines so much as a sign of how obvious the shape became once someone needed it.

Flumes failed in physical ways too. Bryant lists windstorms, fires, floods and falling trees as their enemies, and notes that lumber came out roughened and battered at the ends [1]. Riding them was worse. In 1875 the mine owners James Flood and James Fair rode their new 15 mile V-flume from Hunter's Creek down to Huffaker's Station south of Reno in small V-shaped boats with a New York Tribune reporter, H. J. Ramsdell. One boat rammed the other, both were wrecked, and Fair is reported to have said they traveled "a mile a minute," a figure I can't confirm [2]. Forest historian Thomas Straka records that death and serious injury were frequent outcomes for other riders [2].

The Kings River flume ended in decline and fire. Logging around Hume Lake stopped by the early 1920s [8], and a forest fire in 1926 destroyed several miles of the flume [4][6].

THE PEOPLE WHO DID THE WORK

Flumes needed crews along their whole length. Bryant describes feeders at the head, "runners" stationed where jams formed, and laborers at the lower end; the runners carried a pick-a-roon, a hooked pole for steering floating material [1]. On the Allen flume in Montana, about 16 miles long, thirty men handled about 3,500 mine timbers and logs a day. Four fed the flume and twenty-six patrolled it, most of them where it crossed the Continental Divide on a very low grade [1].

Building them was work done aloft. On one Washington V-flume with trestles up to 128 feet high, a crew of four set 20 to 25 sixteen foot sections of box in a ten hour day, while one man walked the finished flume to keep the new sections floating down to the front [1]. Men who worked aloft earned 30 to 40 cents an hour; ground men earned 25 to 27.5 cents [1]. I think those two numbers, side by side, say a great deal about what the height was worth.

The Kings River operation alone employed more than 500 men, according to Robert Zimmerman's history of the flume [4].

FIELD NOTES

FACT	FIGURE	SOURCE #
Kings River (Sanger) flume, original length and completion	about 54 miles, finished September 3, 1890	4, 5
Kings River flume, elevation at head and total drop	about 4,500 ft; dropped almost 4,200 ft	4
Madera Sugar Pine Co. V-flume (1899 to 1900)	53.5 miles, \$275,000, 2,100 kegs of nails	1
Fresno Flume and Irrigation Co. box flume, begun 1891	65 miles, Shaver to Clovis, max grade 45%	1
Nevada flumes, surveyor general's report 1879 to 1880	10 flumes, 80 miles, 33.3 million board feet	2
Cost of log flumes per mile (Bryant)	\$6,000 to \$8,000	1

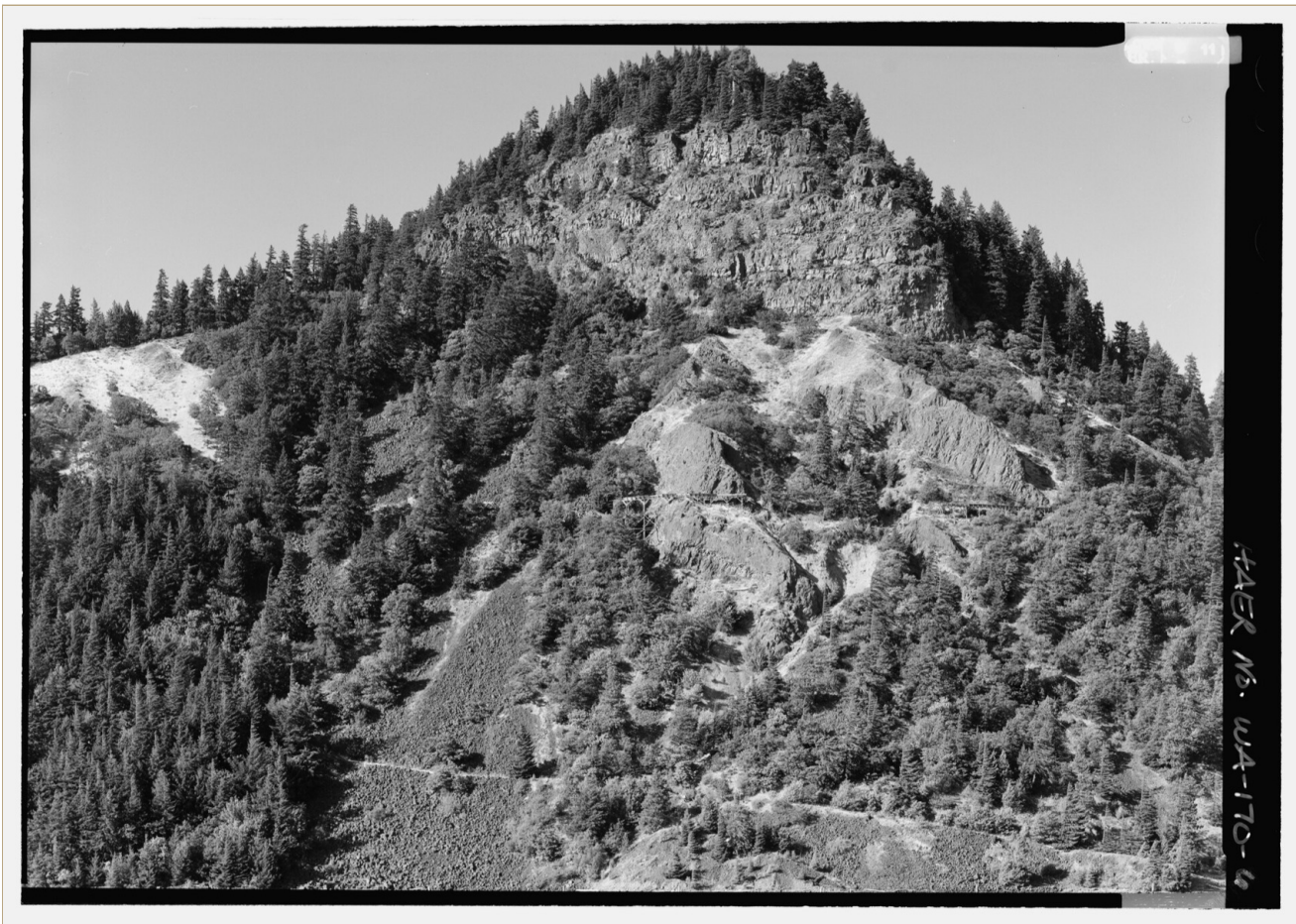
For the map page: the Kings River (Sanger) flume route. Start: Millwood, the company's mill site in the Sierra Nevada above the Kings River, at about 4,500 feet [4]. Route: down through the Kings River canyon [10]. End: the lumber yard and railroad depot at Sanger, Fresno County, California [6]. Length: about 54 miles as built in 1890 [4][5]. Drop: almost 4,200 feet [4]. Later, the head moved up to Hume Lake by an extension of about 17 miles; sources give the full system's length anywhere from 62 to 73 miles [5][6], so I treat the longer figure as unsettled. The exact line through the canyon has not been verified mile by mile here, so the map should draw it as approximate.

WHERE YOU CAN STILL SEE IT

- **Sanger Depot Museum, Sanger, California.** The museum's flume exhibit shows a model of the flume and a pictorial display of the lumbering operation [7].

- **Hume Lake Dam, Sequoia National Forest, California.** Built in 1908 by John Eastwood for the Hume-Bennett Lumber Company as a log pond and water reservoir, it is described as the world's first reinforced concrete multiple arch dam, and it still holds Hume Lake [8].

The Broughton flume in Washington's Columbia River Gorge was documented by the Historic American Engineering Record in 2000 [9]. I could not confirm from an official page what remains standing today or whether it can be safely viewed, so I list it as a record rather than a destination.



A surviving stretch of the Broughton flume on trestles crossing a cliff face midway up a mountain in Skamania County, Washington, photographed in 2000. Source: Jet Lowe, Historic American Engineering Record WA-170-6, via Wikimedia Commons (public domain).

WATCH IT WITH

- "How America Built 50-Mile Wooden Flumes Through Mountains" (youtu.be/yVKkClMVGv0). This file adds the route data for the map, the

Supreme Court's ruling on Haines's patent, and a labeled construction photo.

- "How America Built 5-Mile Log Flumes Using Only Gravity" (youtu.be/Y-62N9anGq4). This file adds Bryant's own figures for a 5 mile Idaho log flume and the crew counts of the Allen flume.
- "How America Built Wooden Rivers to Move Forests Down Mountains" (youtu.be/PPMDQBWrpCI). This file adds the V-box versus box-flume comparison, the dry, greased and iced slide methods, and a period photograph of a pole log chute.

SOURCES

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3. U.S. Supreme Court, *Haines v. McLaughlin*, 135 U.S. 584, 1890 (Legal Information Institute, Cornell Law School). <https://www.law.cornell.edu/supremecourt/text/135/584>
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9. Historic American Engineering Record, Broughton Flume, HAER WA-170-6, photograph by Jet Lowe, 2000, via Wikimedia Commons. https://commons.wikimedia.org/wiki/File:Flume_midway_up_mountain._North_0_degrees_-_Broughton_Flume,_Hood_River_Junction_on_Columbia_River_at_Washington-Oregon_border,_Hood,_Skamania_County,_WA_HAER_WA-170-6.tif
10. Fresno County Historical Society, "Sanger Flume Construction," 1889, via Wikimedia Commons. https://commons.wikimedia.org/wiki/File:Sanger_Flume_Construction.jpg

11. L. Heath, "Log chute, Washington, ca. 1898," University of Washington Industries and Occupations Photographs Collection, via Wikimedia Commons.
[https://commons.wikimedia.org/wiki/File:Log_chute,_Washington,_ca_1898_\(INDOCC_415\).jpg](https://commons.wikimedia.org/wiki/File:Log_chute,_Washington,_ca_1898_(INDOCC_415).jpg)

END OF THE FREE SAMPLE

This sample holds the cover, the contents, my note, how to use the files and one complete field file. The full Volume 1 has eight field files, the timeline, the map, the glossary, places to visit, a page on keeping family photographs and the viewing guide.

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