

Dedicated to the increase and diffusion of knowledge about how the nation's lands are apportioned, utilized, and perceived.

The Lay of the Land

The Center for Land Use Interpretation



WINTER 2024

If you do name something, as soon as you name something, then you destroy its reality. So that as soon as you're, like, named at birth, you're already, like, wiped out.
- Robert Smithson

TULARE BASIN NOWHERE ELSE TO GO



Signs of the times: the Center explored hydrological phenomenology in the Tulare Basin in 2023, and opened the exhibit *Tulare: Persistent Apparitions of a Terminal Lake* at CLUI Los Angeles in December. CLUI photo

TULARE LAKE, IN CALIFORNIA'S CENTRAL valley, was often in the news this past year, due to flooding concerns from the record snowpack that had accumulated in the Sierra over the previous winter. That a normally dry and disappeared lake would suddenly become a flood hazard is a reminder that the way things seem at any given time can quickly flip, and become the obverse (and not for the first time, in the case of Tulare Lake).

Once occurring at a more glacial rate, oscillations of large-scale inundation and desiccation are accelerating in human-altered times. Tulare Lake, at the bottom of the Tulare Basin, could be a new kind of "paradox lake," where opposite conditions, wet and dry, exist in one place, simultaneously. Perpetually actual or potential, Tulare Lake is there even when it is not.

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Editor's Note

Welcome to this newsletter, our 47th. It covers CLUI projects and programs over the last year, which share a theme of *confluence*, perhaps the most fundamental landscape metaphor. Confluence is where journeys from remote and disparate origins merge, and continue, roiling and mingled. The growing flow creates and destroys the terrain it passes through, sustaining life, and catastrophe. Bound to the conveyor of gravity and time, we make note along the way, pointing things out, posting signs, sharing the experience, trying to understand as we pass by, before we are all swept out to sea, or evaporate into the sky. Until that happens, though, we are glad you are there, dear reader, headed downstream with us on this curious raft, the latest edition of the *Lay of the Land*.

ON INTERPRETATION THE NATIONAL PARK SERVICE AND HARPERS FERRY



The landscape of interpretive signage was investigated in the CLUI exhibit *Designing Experience: Harpers Ferry and the Interpretive Infrastructure of the National Park Service*, which was on view at the Center's Los Angeles location in the summer and fall of 2023. CLUI photo

THE NATIONAL PARK SERVICE IS a master interpreter of the American land. Over the last century it has developed a sophisticated system for shaping our experiences at what are, officially, among the nation's most superlative places. Park Service methodology has become the standard for place-based interpretation, and there is no better place to take it all in, than at Harpers Ferry, West Virginia.

Harpers Ferry was an important place in the formative years of the nation, and much of it has been reconstructed into a historical park by the National Park Service. This park provides a full spectrum of Park Service interpretive devices and mechanisms, applied to a complex pre-existing place which spans the history of the USA.

The park is also the location of the Park Service's Interpretive Design Center, the central design bureau for interpretive projects nationwide, where the look and feel of the Park Service's brand, is generated, applied, and eventually encountered at all 429 units of the Park Service, including Harpers Ferry National Historical Park—an interpretive proving ground in its own right.

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SIGNS AND WAYSIDES

THE SIGN LANGUAGE OF THE NATIONAL PARK SERVICE



National Park Visitor Centers evoke the aspirations of the park, and are interpretive worlds unto themselves. While not all of the hundreds of individual units in the National Park System have visitor centers, some of them, including many of the 63 official National Parks, have a few.

CLUI photo

NATIONAL PARKS ARE PLACES WHERE a piece of the continuous fabric of the American landscape is cut off from its surrounds, and described from within, through a network of interpretive devices, comprised mostly of signs—signs designed according to the guidelines of the Interpretive Design Center, at Harpers Ferry.

These signs direct and control crowds, enhance visitor experiences, and impress the ideals and ideas of the National Park Service upon the public's hearts and minds. Looking at the signs in a National Park is to read the story of a nation attempting to explain itself, to itself.

Signage is generally divided into three categories: Park Identity Signs, Motorist Guidance Signs, and Visitor Information Signs.

Park Identity Signs



The entry sign for Grand Teton National Park, Wyoming. CLUI photo

National Park entrance signs are the most prominent and important Park Identity signs. Located at the main entrance of the park, these signs are often designed to embody and express qualities about the park, especially the more popular and significant National Parks.

Park entrance signs can be constructed using stone, metal, or wood, reflecting the context of the park, such as in a desert, urban area, or forest, and the signs sometimes use local materials, drawn from the ground. Some entrance signs, especially those at the more celebrated parks, have pullouts, so visitors can park their cars and pose for a group photo, as confirmation that they have arrived, and are, indeed, there.



A feature at every entrance sign, no matter how big or small the park, is the NPS Arrowhead emblem. The Arrowhead is a registered and protected trademark of the National Park Service, which began using it in the 1950s as the official stamp of authority on NPS signs, publications, uniforms, and places. Its use is limited, controlled and policed by the NPS. CLUI photo

Motorist Guidance Signs and Visitor Information Signs



Colonial National Historical Park, Virginia.

CLUI photo

Motorist Guidance signs provide directions, list regulations, and indicate hazards along roadways. They are brown in color to distinguish them from the more common green color used by state and federal transportation agencies, and to remind people they are traveling in a National Park. These signs help guide drivers to resources, services, and activities within the park, and point out significant features.



Though design guides generally suggest uniformity, the style of signs in pedestrian areas can vary according to local park management and aesthetics. CLUI photo

Visitor Information signs provide guidance and other useful information for visitors when they get out of their cars and are on foot in outdoor and indoor areas. Visitor safety signs help keep people on the trails and out of trouble by warning of hazards and clarifying boundaries to protect natural and cultural resources. Pedestrian wayfinding signs direct people towards park features and useful services such as restrooms.

Interpretive Signs and Waysides

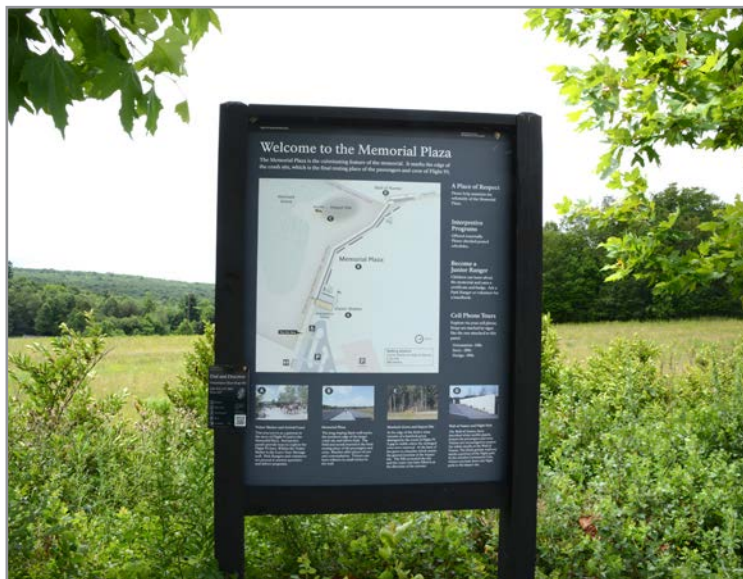


A battery of signs outside the visitor center at Zion National Park, Utah. Outside and beyond visitor centers is where Park Service interpretive signage blossoms to its full flower. CLUI photo

The signs closest to the visitor center generally provide information, rules, regulations, and orientation. They are usually vertical signs, known as uprights or high-profile signs, providing information at eye level for most people. These signs also provide information when the visitor center is closed.

At some locations, these vertical signs guide people around the site, using clear and concise maps, which always show you where you stand, in relation to the other points of interest.

These high-profile vertical signs are located along linear walking trails, often at decision points, providing utilitarian orientation information to help you decide if you want to continue, one way or another.



Upright display at Flight 93 National Memorial, Pennsylvania. CLUI photo

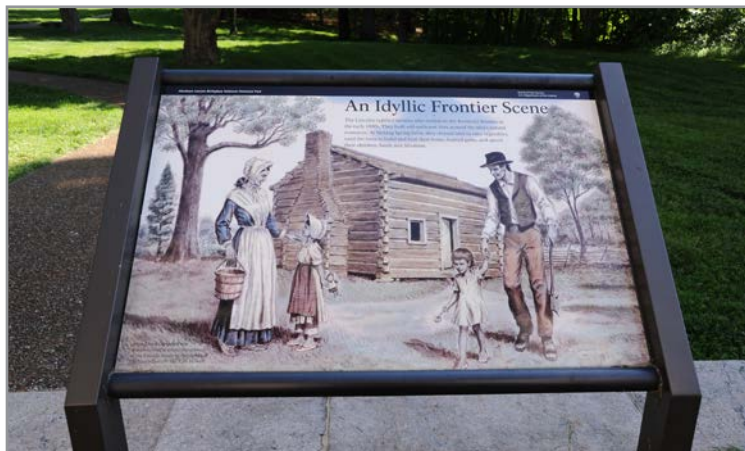
Uprights are typically made of steel, and have a single panel, commonly 36" by 48". They can be double-sided or single-sided. They can be coupled with a second sign, or a third (with an additional post), or with a bulletin case, used for changing information such as seasonal notices and programming schedules. In NPS sign language, bulletin cases are known as ancillaries, which include other add-on items, such as an audio box or brochure holder, to further engage and enhance the visitor's experience.



Another common variant of the upright sign is the narrow vertical, typically with three small panels, providing brief information on what, where, and how, and often found at a trailhead, such as here at Sunset Crater Volcano National Monument, Arizona. CLUI photo

High-profile signs are typically used for information, orientation, and wayfinding, not for interpreting the immediate scene. That function is performed by the classic NPS interpretive sign, known as a low-profile sign. This is the most prolific interpretive sign, found all over the country, in nearly identical form and dimension.

The Classic Low-Profile Sign



Narrow low-profile signs, like this one at Abraham Lincoln Birthplace National Historical Park, in Kentucky, are used to convey a simple message, with one image, one paragraph, and no inset images. CLUI photo



Wide low-profile signs, like this one at Gettysburg National Military Park, in Pennsylvania, allow for multiple images and text to explain more complex taxonomies, but are less common, as they exceed the typical visitor's attention span. CLUI photo



The most common low-profile sign allows for a primary image, an inset image, and few paragraphs of text, such as this one at Death Valley National Park, California. CLUI photo

The typical low-profile sign is a flat graphic panel mounted on a metal frame and base, anchored into the ground or onto a low wall, angled and oriented to direct the visitor's attention towards a particular view, scene, or object, which is addressed directly in the content of the sign. In this way, these signs serve as a kind of caption for the landscape.

The typical panel size is 36" wide by 24" tall, with printed images, text, and graphics. The graphics panels are usually printed directly onto aluminum, and finished with a clearcoat. Other fabrication methods include prints saturated with fiberglass resin and baked at high temperatures, applying high-pressure laminates and phenolic sheets, or porcelain enamel.

The signs have to last in extreme environments, exposed to UV, weather, and vandalism, and the Park Service has been a major contributor to developments in the science and techniques of outdoor sign preservation. Even so, their average life expectancy in the field is only five years.

National Park Service designers have a lot to say about how to design the content of these signs. First, the signs need to capture the viewer's attention with arresting images, graphics, and a brief, bold declarative heading or title of just a few words. Without this, people will just walk by after a glance, and there will be no point to the sign's existence.

Then, the sign should provide just enough information to explain the thing being pointed out, but without being didactic; to convey why it is being pointed out without appearing judgmental; and how doing so helps the world become a better place as a result, without saying how.

All this, without losing the viewer's interest. The Park Service estimates capturing the visitor's attention must take place within three seconds, and if successful, viewers will only spend as much as 30–45 seconds looking at the sign. This limits the text on a typical sign to 75–100 words. Style guides also recommend using one primary image or graphic, with just a few smaller insets, if any. Larger signs provide space for a bit more, and smaller ones a bit less. Signs can be coupled, but there should be a good reason for it, and they should each make their own point.

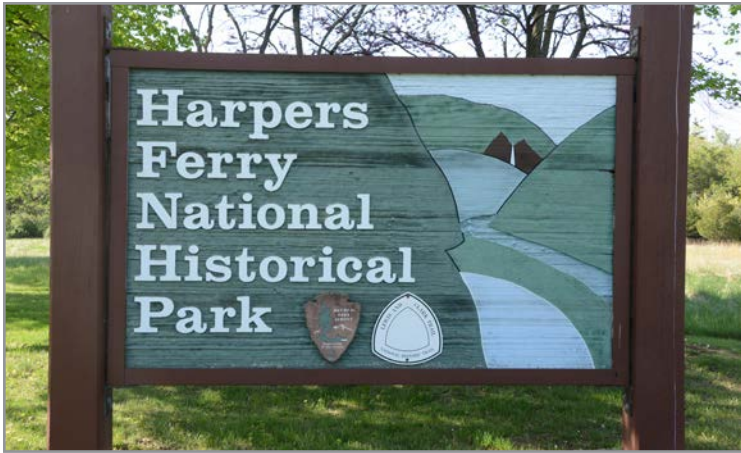
Most of these low-profile signs are found at waysides along trails and roads. Waysides are places to pause, take in a view, and connect with where you are. They are, in park parlance, located immediately adjacent to features on the landscape, the "original objects" enjoyed firsthand by active visitors. The Park Service acknowledges that a wayside is an intrusion into the landscape, and that having too many waysides dilutes the message. Having too few, on the other hand, misses opportunities to enrich and enhance the visitor's experience. ♦



A wayside with two points of view at Sunset Crater Volcano National Monument, Arizona. CLUI photo

CASE STUDY

HARPERS FERRY NATIONAL HISTORICAL PARK



CLUI photo

HARPERS FERRY NATIONAL HISTORICAL PARK offers a full buffet of interpretive food for thought. It is a dramatic and historic confluence, literally and figuratively, situated where the Shenandoah and Potomac Rivers meet, at an important junction in the early years of the nation, when rivers were highways. Harpers Ferry was a 19th century gun-making factory town, where the abolitionist insurrectionist John Brown took over the federal arsenal in 1859, and where the Civil War, which followed, destroyed the town and created a new free state—West Virginia.

Harpers Ferry is also where the National Park Service descended into the ruins, in the 1950s, to reconstruct the town as a multi-levelled interpretive proving ground. This ongoing project continues to this day, guided by the programs and designs of the Harpers Ferry Center, the Park Service's national design campus, also located in the park, on the hill above town.

Entering the Park

Visitors turning off the highway into the park soon encounter the entrance sign. The sign is made of wood, and is hand carved, evoking a rustic professionalism, with stylized green hills and blue rivers, converging on a black and white pointy abstraction, perhaps a church steeple, just around the bend. The NPS Arrowhead trademark, a feature of all NPS entrance signs, makes it official.

Just past the sign is the vehicle entrance booth, where visitors must purchase or display an entry pass, generally \$20 per vehicle. Unless they happen to visit on one of the five days of the year when the park entrance fee is waived.

Since it is possible to drive or walk into the park on the paths and public streets around it, without paying admission, visitation is principally managed by restricting parking on park property (a tactic employed at parks across the nation, suggesting another meaning for the National *Park* Service). This visitor center and lot opened in 1990, to provide remote parking with shuttle service to the park, as parking at Lower Town, where the main features of the park are located, is problematic.

Beyond the booth is a parking lot where visitors can select from nearly a thousand parking spaces, and head to the Visitor Center Plaza. The visitor plaza has a four-sided upright sign kiosk, a type often found outside visitor centers, to provide initial orientation. The kiosk describes and depicts park features, and has an annotated bird's-eye view map graphic, which, importantly, shows your current location, at the Visitor Center Plaza. The two primary geographic areas of the park are also described: the open landscapes of the Civil War Battlefields and Trails, and the built up Lower Town.

The Park Service provides a self-guided Battlefield Driving Tour to five of these Civil War sites, described and located on the main map of the park's Unigrid brochure. Trails meander past Civil War cannons and empty mowed fields, where General Stonewall Jackson battled Union forces in 1862. Harpers Ferry changed hands more than a half-dozen times over the course of the war. These sites are tranquil and largely unvisited today.



Visitor center interior.

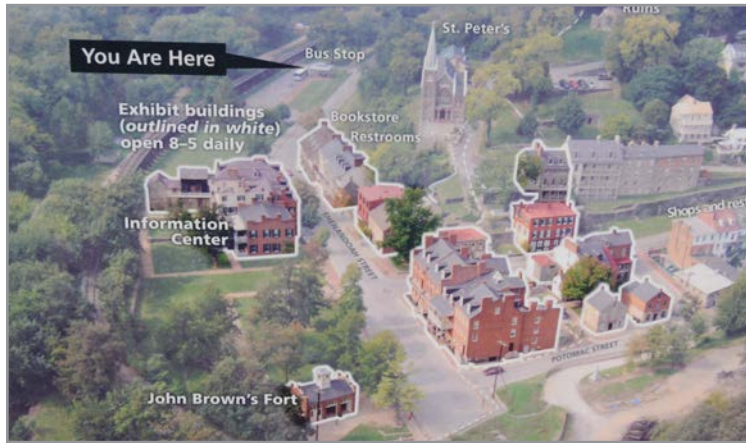
CLUI photo

The small visitor center building serves as a point of contact for visitors to ask questions, and to pick up maps. Inside is a diorama of the park, focusing on the Lower Town and Camp Hill areas. Also at the plaza is a public restroom, perhaps the most important feature of any park gateway.

A covered area at the plaza provides shade and shelter while waiting for the shuttle bus, which arrives and departs every 15 minutes or so. Visitors can also walk the mile and a half from the visitor center to Lower Town, or drive there themselves on other roads, but most of the 300,000 annual visitors to the park ride the bus. A recorded audio program on the bus welcomes people to the park, and includes a folk song titled "Take Me Back to Harpers Ferry."

On arrival at Lower Town, buses unload at a bus stop with an upright sign that provides more orientation. Visitors generally head into the heart of the park along Shenandoah Street—into one the densest interpretive environments in the entire park system.

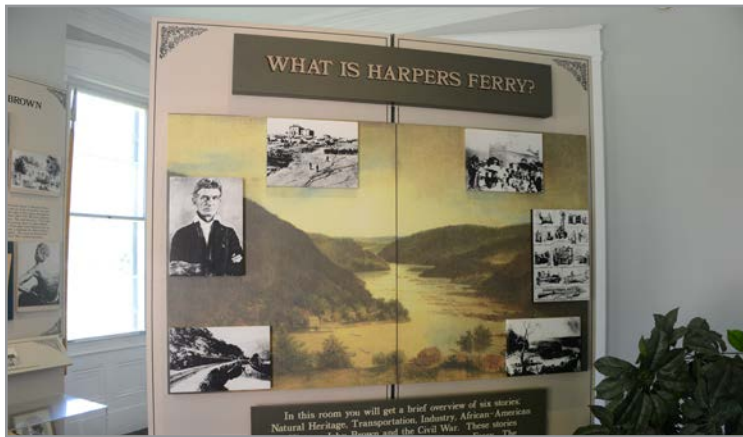
A Stroll Down Shenandoah Street



Close up of the bird's-eye view map at the bus stop at Lower Town, which shows the Park Service buildings along Shenandoah Street. CLUI photo

The buildings along this street were in ruins when the park opened as a National Monument in the 1950s, and their restoration has been one of the Park Service's main projects here since that time.

The cluster of buildings on the south side of the street have housed the introductory interpretive displays for most of the park's existence. Currently the Master Armorer's House, at the end of the row, has the main introductory exhibit, the first of several multi-room exhibits in the restored buildings of Lower Town.



Entering the first room of exhibits in the Armorer's House, visitors are faced with a question that may or may not have occurred to them, but which will undoubtedly be addressed by proceeding onwards. CLUI photo

The introductory exhibit explores six principal interpretive themes for Harpers Ferry National Historical Park: Natural Heritage; Transportation; Industry; African-American History; John Brown's Raid; and the Civil War. The displays consist of two-dimensional images and text panels, enhanced with three-dimensional artifacts in protective acrylic boxes, mounted on the panels. There is also a detailed diorama of Harpers Ferry, and additional rooms used for occasional presentations by Park Service staff and volunteers.

Building A, at the other end of the row of buildings along the south side of Shenandoah Street, also has introductory exhibits and displays, and as the closest building to the bus stop, is often one of the first buildings to be visited.



Part of the *A Place In Time* exhibit, in Building A.

CLUI photo

Inside is an exhibit called *A Place In Time*, which resembles the exhibit in the Master Armorer's House in some ways, using two-dimensional panels embedded with three-dimensional artifacts, and serving as a general overview of Harpers Ferry, but without the structure of the six interpretive categories.

A Place In Time offers another take on the same place—the armory, transportation, tourism, rivers, “freedmen find opportunity”—as well as different ways of seeing Harpers Ferry's past: the documentary view, the romantic view, and the photographic view. The display, produced under the direction of the Harpers Ferry Center's Division of Exhibits, also includes an introductory film.

Across the street is a building once known as the Stagecoach Inn, which was the park visitor center in the 1960s, and is now the park's bookshop and gift shop. Next to it is another partially restored building, with a window display and sign saying Stonebrakers Bakery. Inside are the public restrooms for this part of the park.

Next door to that is a building with old-looking signs for a grocer and shoemaker, but inside instead is an exhibit area called the Industry Museum. Here displays are focused on the industrial history of Harpers Ferry, where water from both the Shenandoah River and the Potomac River were diverted into canals that powered factories.

George Washington named Harpers Ferry and Springfield, Massachusetts, as the sites of the first federal arsenals, and until the Civil War, manufacturing rifles was the main industry here. The Industry Museum describes how breech-loading rifles were produced at Harpers Ferry using interchangeable parts, which reduced the need for skilled craftsmen, and helped usher in the era of factory mass production.

The displays in one end of the room are image and text panels, with artifacts in clear acrylic boxes inside grey veneered cabinetry. At the other end is a full-scale replica of a portion of a gunsmith shop, with wooden work benches and belt-driven cast iron lathes and tooling machines.

Continuing down Shenandoah Street, the next of the NPS restored buildings contains a historic recreation of a clothing shop, one of a few buildings along Shenandoah Street where exteriors and interiors were made to look as they might have been in the mid-1800s. These displays are static full-scale dioramas, viewable from just inside the door, but otherwise un-enterable. Low-profile interpretive signs help describe and animate the scene.



Part of the *Reading an Old Building* exhibit.

CLUI photo

Another partially restored building on the row contains the *Reading an Old Building* exhibit. Inside, a walkway suspended over the rough floor guides visitors past a battery of low-profile interpretive signs, describing elements of the scene. The exhibit describes the forensic, archeological process for reading physical evidence of old buildings, in order to understand their past.

Starting in the 1950s, this process was used by the Park Service throughout Harpers Ferry, in their efforts to restore buildings to the 1859–1865 period—the years from the John Brown Raid through the Civil War, mandated to be the park’s main focus.

Over the years, buildings along Shenandoah Street and adjacent streets, owned by the Park Service, and extant in the mid 1860s, were stabilized, preserved, rehabilitated, or restored. If the building was built later, such as in the Victorian period, which many were, they were demolished. The exhibit continues out the back door deeper into the historic jumble of building walls in the steep hillside, peeling back the layers of time in order to reconstruct them in the present.

Back outside, on Shenandoah Street, interpretive plaques show photographic views of the same place, in different times. Images show this street when it was flooded, as it often was, badly in 1889, 1896, 1902, 1924, 1936, 1942, 1972, 1985, and 1996, as indicated on a flood level chart on the side of Building A, giving visitors a deep sensation of immersion in the past, and likely into the future.



View down Shenandoah Street.

CLUI photo

The community of Harpers Ferry once extended far below the flood chart on Shenandoah Street, up the Shenandoah River shore, and into an area known as Virginus and Halls Islands, with housing for workers, a rifle factory, and mills for cotton, flour and pulp.

In the late 18th century, the Shenandoah Canal was constructed here for cargo boats to bypass the rapids at the end of the river. The canal was part of the Potowmack Canal system, an extensive commercial enterprise to expedite regional and national trade, founded by founding father George Washington himself. In the early 1800s a power canal was added to run the mills here.

Though floods were especially hard on this lower part of Lower Town, it persisted until the last operating mill closed in 1935. Its remains were washed downstream in a flood a year later.

The ruins and overgrown wooded land along the riverbank and canals has been cleaned up by the Park Service, and this part of the park is an architectural cemetery, with former building sites outlined by stones, like chalk lines drawn around departed bodies. Some romantically reconstructed and stabilized ruins of waterways remain, marked with descriptive plaques, like clues in an interpretive game board, used to reconstruct, in the mind, what was once here, on the ground.



Signage in the woods in the once flooded parts of town along the Shenandoah River.

CLUI photo

The Point



The confluence is the reason Harpers Ferry, the town and the park, exist, and the scenic view over it, known as the Point, is awash in interpretive signs pointing things out. CLUI photo

Shenandoah Street ends where the rivers and rail lines converge, at the Point, a low bluff overlooking the confluence of the Shenandoah and Potomac Rivers. It is a place to look out from, and at. For visitors to come together, look together, and see together. The Point has a variety of signs, starting with the classic low-profile tilted sign with an annotated bird's-eye-view map graphic, mounted to the railing at the most advantageous part of the overlook.

Nearby is a row of four smaller low-profile signs of an earlier vintage. Each describes a different aspect of the significance of this point of confluence as a corridor, with successions of canals and railways that came through here, connecting the East Coast with the Ohio River Valley, enabling the early nation to push westward.

Another different type of sign at the Point is one in a series installed at Harpers Ferry to commemorate the Lewis and Clark expedition, a minor parallel sub-narrative within the park. Though Lewis and Clark's famous 1804-1806 trek across the West happened far from here, starting in St. Louis and heading up the Missouri River, the federal arsenal at Harpers Ferry provided provisions and guns for the trip.

The Point also has a four-sided eye-height upright sign, typically used for orientation and wayfinding, as it is here. One panel is similar to a panel located at the visitor center, at the other end of the park, and shows the location of the visitor center, as well as the visitor's current location. Another panel, with a more zoomed-in map, is similar to the one at the shuttle bus station at Lower Town, and shows the visitor's location relative to that.

The sign is located along a pathway, at what park designers call a decision point, where visitors may benefit from additional information to help them decide which way to go, and how to spend their time. One decision that can be made at this point is whether to visit the Maryland side of the confluence, by walking along the old railroad bridge.



Four-sided upright orientation sign at the Point, with the bridge over the confluence in the background, beneath the cliffs of Maryland Heights. CLUI photo

The rail bridge is one of two crossing the river here. It provides a view of the Point itself—an overlook of the overlook—and provides views of the ruins of the first railroad bridge over the confluence, built in 1836, and later destroyed in the Civil War.

The grounds of Harpers Ferry National Historical Park extend into the Maryland side of the river, and into the hills of Maryland Heights where a 1.5-mile hike through the woods leads to Overlook Cliff, with a view over the confluence, a few hundred feet above the railway tunnel.

The trail along the Maryland shore of the Potomac here is multi-jurisdictional, part of three other National Park units: the Chesapeake and Ohio Canal National Historical Park; the Appalachian National Scenic Trail; and the Potomac Heritage National Scenic Trail. A stroll here is truly a compounded park experience.

Back to Harpers Ferry, over the bridge, leads immediately to a curious anomaly within the park, a gated area where the public is excluded. The map labels this as a dangerous active railroad area. The site, centrally located at a focal point for the town, is maintained as a functional location for CSX Railroad, and is a kind of a hole in the park itself.

Beyond the brief interruption of this forbidden zone, the abandoned tracks atop the old railroad right of way head to the train station, an old B&O Railroad facility that dates back to 1894. The tracks in front of the station are still active, part of the mainline for CSX freight, whose double-stacked shipping container cars thunder past the old platform—like a freight train. Amtrak comes through town, too, and makes a stop at the station.

The Park Service purchased the station from CSX in 2001, and restored it. The station was valued for its parking lot, the only NPS controlled public parking area in Lower Town. Rangers manage access to the park through this back door portal, and make sure park and parking fees have been paid.

The Armory

Adjacent to the train station is a mowed area full of interpretive plaques that help to conjure up the original federal armory. The grassy area covers just a small portion of the factory complex site. Some of it lies under the raised ground of the railroad embankment, constructed in the 1890s to protect the railway from flooding. More of the factory complex lies in the overgrowth upstream, beyond the current scripted space of the park, lying in wait for interpretive cultivation in the future.

Stairs take visitors down the railroad berm, to the interpretive field below, where low-profile signage explains what lies beneath the green lawn, and the extensive archeology that has taken place there. Signs explain how a power canal was constructed along the river, starting more than a mile upstream, providing a 22-foot power head to run machinery in the factories.



Some signs include tactile elements embedded in the sign for emphasis, such as interchangeable gun parts found in the ground, which help the panel's narrative elucidate how refinements in production replaced skilled craftsmen with wage laborers, affecting working conditions. CLUI photo

Mandated into existence by George Washington in 1795, the armory and its arsenal buildings were intentionally destroyed and burned by the retreating Union Army in 1861, in the early days of the Civil War, to keep the weapons from falling into the hands of the Confederacy.

The only remaining structure from the original arsenal is the former firehouse, which has become the central focus of the park, as it was inside this structure that the abolitionist John Brown held out during his famous raid on the arsenal, in 1859, and where he was finally captured, 36 hours later.

John Brown

Across from the firehouse, and the end of Shenandoah Street, is the John Brown Museum, the park's largest indoor exhibit environment, at the most prominent location in Harpers Ferry.

Inside visitors are first confronted with a large painting of John Brown, looking like a biblical Noah, guiding his rebels through the stormy torments of slavery and the Civil War. Beyond is a labyrinth of dioramas, artifacts, and displays, exploring his legacy.

The narrative arc of the displays are anchored by three primary themes, with introductory videos. The first theme describes John Brown's life, and the conditions of slavery before his raid. One large panel dramatically provides a history of slavery in America, and another explores the fundamental injustices of slavery. Others discuss the early days of John Brown, and what compelled him to become who he was.

The second section centers on the raid itself, and displays part of the armory gate through which he and his partners engaged in gunfire with the soldiers and townspeople who were trying to stop them.

The third section of the narrative is about the events following the raid, and includes a video viewing arrangement set up like a courtroom, where the man, John Brown, and his legacy, are on trial, on a screen. Artifacts on display include pieces of the scaffold where he was hung. Other panels consider the connections of the raid to the Civil War, which began a few years later. Other panels examine the effect the raid had on civil rights battles after the war, and the raid in the context of American protest and democracy overall.

John Brown remains a controversial figure to many, and the displays navigate a complex political balance, which extends to the Heyward Shepherd memorial, outside the museum, erected to honor the railroad porter who was the first person killed in the raid.

The Harpers Ferry Center designed most of the exhibits in the John Brown Museum, starting in 1972, and parts of it seem to date back to that era, with small cathode ray tubes touchscreens recessed in canted cabinetry, barely legible, or out of service. They are well aware that updates are needed, and have plans to address it, when resources are available.

The final moments of John Brown's life played out beyond Harpers Ferry, including his trial, which was held in the courthouse at Charles Town, a few miles away. A mile from the courthouse is the field where John Brown was hung. A large house was built on the site a few years later, by Colonel John T. Gibson, the commander of the militiamen who guarded John Brown from potential rescuers during the two months between the trial and his execution.

John Brown's body was sent to his family's farm in North Elba, New York, near Lake Placid, where it was buried. The site is now a New York State Park. Closer to home, in the community of Bolivar, at Harpers Ferry, there is a John Brown escape room attraction, and a John Brown wax museum on High Street in Lower Town. A reproduction of the John Brown Fort is used as a coffee shop at a nearby KOA campground, where Civil War reenactors often congregate.

The "real" John Brown Fort, next to the John Brown Museum, is a well-traveled reconstruction. It has been reassembled at least three times, starting in 1891, when it was disassembled and moved from its original location, near the gate of the armory, and put back together as a display at the 1883 Columbian Exposition in Chicago.



The John Brown Fort, across from the John Brown Museum. CLUI photo



The John Brown Fort, viewed from the original John Brown Fort site. CLUI photo

After a few weeks on display there, where it is said to have been viewed by less than a dozen people, it sat in storage for another two years, before a local farmer bought it for \$900, and shipped the pieces to his farm outside of Harpers Ferry, where it was reconstructed.

After 14 years there, the structure was disassembled again, and reconstructed at Storer College, on top of the hill at Harpers Ferry. It remained there until 1968, when it was moved to its current location, but this time in one piece, on a truck.

This is not the original location of the fort, however. While the fort was out traveling around, its original location was buried under a 14-foot-high railroad roadbed, built to protect the railway from the frequent floods of Lower Town.

The tracks have since been abandoned, and the site, across the street, is now topped with a stone monument inscribed with the text “John Browns Fort.” Next to it is a plaque that describes the monument, and the fort, 150 feet away from where it was, but close enough, for now.

Higher into Lower Town

Several other partially restored Park Service buildings are clustered around the John Brown Museum, each housing display environments expanding on Harpers Ferry Park themes.

Next to the John Brown Museum, on High Street, is a building containing exhibits about Storer College, a historically Black college that was established on the hill above town after the Civil War, and the Niagara Movement, a Black civil rights organization led by W.E.B. Du Bois and others, that held an important meeting at Storer College in 1906, and later evolved into the NAACP.

Across the street from that is a building with a sign above the door that says African-American History. In 2023, this exhibit was closed for renovation. Next to it is the Civil War Museum, in a three-story Park Service building, also closed for renovation in 2023.

Across the street from that is a building with a sign that says “Defeat and Victory: The 1862 Battle of Harpers Ferry.” Inside, a diorama models the battlefields around Harpers Ferry that were engaged during the Civil War, and wall panels with text, maps, and images go through the battles sequentially. It’s a story that is interpreted on site at full scale, for visitors that take the Self-Guiding Battlefield Driving Tour.

On the other side of the block, on Potomac Street, is an enterable display inside the first floor of a partially restored building, with a sign above the door that says Meriwether Lewis at Harpers Ferry. Inside is an exhibit about Meriwether Lewis’ 1803 visit to Harpers Ferry, to stock up on supplies for the trip he would lead to “discover” the West, as mandated by Thomas Jefferson.

The exhibit provides a list of these provisions, including 15 rifles made at the armory. The exhibit also talks about the collapsible iron frame boat that he designed and commissioned from the armory. Lewis spent many days testing it on the river, at the armory’s boat ramp. Unfortunately the boat quickly sank when they set it up on the Missouri River, and they went on the journey without it.

The Meriwether Lewis exhibit building is on the property line that runs down Hog Street, and divides one Harpers Ferry from another. On one side is Harpers Ferry National Historical Park, where the land and buildings are owned by the Park Service, and on the other side of the line, to the north, is the actual functioning town of Harpers Ferry. In the town, land and buildings are privately owned, are not limited by having to be made before 1867, and are developed into restaurants, gift shops, and inns, serving tourists. The line is abrupt, and is also visible as a change of asphalt along High Street.

Up the Stone Steps

Slicing through town, perpendicular to Potomac Street and High Street are the Stone Steps, connecting the river level Lower Town to the high grounds of Harpers Ferry, known as Camp Hill. The ancient-looking steps were an important public path, connecting the parts of the town built on steep slopes and terraces.

The steps pass by a row of structures that loom above town, along a narrow dead-end street called Public Way, built above the floods that destroyed much of Lower Town. At one end is Harper House, the oldest building in town. The house, with a commanding view of the community and confluence, was built by the founder of the town, Robert Harper, who operated the ferry that gave the name to the place, Harpers Ferry. He started building the house in the 1750s, but didn't finish it until 1782.

Harper died the year after the house was finished, and after that it was used as a tavern and public house. Thomas Jefferson likely stayed there when he visited Harpers Ferry in 1783, and George Washington, too, in 1785. It was one of the first structures preserved by the National Park Service in the 1950s, back when the park was still just a National Monument.

Connected to Harper House is the row of buildings on Public Way that were built by Harper's descendants in the early 1800s. Known as Marmion Row, the buildings contain offices and apartments for the Park Service, and are not open to the public.

A little further up the Stone Steps is St. Peters Church, a prominent feature of the skyline. The Roman Catholic Church dates back to 1833, and served the Irish immigrants who worked at the armory. Further up the steps is the Episcopal Church, St. Johns, built in 1852, which was abandoned in 1895, and became a romantic ruin.

Above it is the principal attraction on the steps, Jefferson Rock. Thomas Jefferson's visit to the rock in 1783 inspired him to declare in his book *Notes on the State of Virginia*, that the scene was "worth a voyage across the Atlantic," a quote often repeated in references to Harpers Ferry. John Quincy Adams, however,



Jefferson Rock. Sometime in the late 1850s, the armory superintendent ordered sandstone pillars to be installed underneath the upper stone, as the unstable rock was a threat to people and structures at the base of the steep slope. CLUI photo

after visiting the rock in 1834, said "there is not much of the sublime in the scene, and those who first see it after reading Mr. Jefferson's description are usually disappointed."

After two centuries of continued carving and vandalism, including being painted by teenagers in 2004, the Park Service now prohibits climbing on the rock.

Above the rock, the trail summits at Camp Hill, the upper part of Harpers Ferry, through the hilltop cemetery, where the best view is left to the departed.

Commanding Views

The commanding view of Camp Hill was the chosen perch for the armory's chief administrators and, later, Civil War generals, who occupied mansions here. Today the mansions are owned by the National Park Service. The first one, Lockwood House, is undergoing slow renovations, and is not open. Near it is Brackett House, currently used by Park Service administrators, and closed to the public. The third, Morrell House, is now the National Historical Park's headquarters, and is not open to the public either.

The edge of the Park continues along the crest of Camp Hill, along Freemont Street. One block north, on Washington Street, is the Appalachian Trail Visitor Center, which is also the headquarters for the Appalachian Trail Conservancy, the independent agency that is the primary manager and advocate of the trail.

Said to be the world's longest hiking-only footpath, more than 3,000 people attempt to hike the 2,200-mile-long trail from end to end, annually, connecting Springer Mountain in Georgia to Mount Katahdin in Maine. Three million people visit portions of the trail every year in some way.

The Appalachian Trail Conservancy was established in 1925, 12 years before the trail was even completed, and continues to work with local, state, and federal partners to manage the trail. The Park Service does not own the trail itself, but is one of its largest management partners, along with the US Forest Service, and considers the Appalachian Trail an official NPS unit, one of its 33 National Scenic Trails and Trail Systems.

As the trail passes through the region from the south, it follows the wooded slope along the Shenandoah River, then merges with the Stone Steps, and descends to Lower Town, passing by John Brown's Fort, and crossing the Potomac over the old train bridge at the Point.

A half-mile spur of the trail connects the Appalachian Trail Visitor Center to the main trail as it passes through Camp Hill. The spur enters the grounds of the former campus of Storer College, now owned by the National Park Service. It passes the Park Service's Mather Training Center, which occupies the largest of the former college buildings. Then the Appalachian Trail enters a shaded plaza, at the front entrance of the Park Service's Interpretive Design Center, the entity responsible for NPS designs implemented across the nation, including, and especially, Harpers Ferry National Historical Park. ♦

HARPERS FERRY CENTER

THE EPICENTER OF NATIONAL PARK SERVICE DESIGN



The Interpretive Design Center at Harpers Ferry.

CLUI photo

THE NATIONAL PARK SERVICE OPENED a centralized design bureau for the entire National Park system in 1970, at Harpers Ferry, West Virginia. Since then, the evolution and standards of the iconic “federal style” of landscape interpretation has emanated from this place, and principally out of one building, the Interpretive Design Center.

The Interpretive Design Center, or IDC, was conceived as a place to bring project managers, writers, artists, designers, cartographers, and fabricators together, to implement the principles and standardized methods of the Park Service into material form at NPS sites all over the country.

The IDC building, built in a modernist brutalist style, was designed by Ulrich Franzen, an American architect who studied with Walter Gropius at Harvard’s Graduate School of Design. Gropius is famous for directing and designing the Bauhaus in the 1920s and 1930s, an influential integrated fine arts, crafts, design, and architecture school housed in a modernist building in Weimar, Germany. Franzen’s building was imagined as a kind of Bauhaus for the Park Service.

In the 1950s the National Park Service was changing from its prewar, Civilian Conservation Corps-esque, rural, rustic “parkitecture” style, to a more uniform and modern entity. This was embodied in the Park Service’s Mission 66 Program, started in 1956, when the NPS was gearing up for its 50th anniversary, in 1966. Over this period, more than a billion dollars were spent on 100 new visitor centers, and on upgraded signage in its parks.

By the time the Interpretive Design Center opened in 1970, interpretation was moving away from the old-school “books on the wall” type displays, becoming a trade, using modern mass communication theories, display tools and technologies, like those at world fairs, expos, and commercial visitor centers.

The IDC developed style guides for all forms of Park Service media, providing uniform standards for the brand’s text, fonts, language, tone, images, maps, signs, films, displays, trails, waysides, visitor programs, and architecture, as well as preservation and conservation methods.

One of the most visible and significant developments of the IDC was to standardize the primary map brochure for the hundreds of parks and historic sites managed by the National Park Service. Known as the Unigrid brochure, each one has a black band, uniform fold size, and shaded relief map, with a consistent color range, graphic design palette, and placement hierarchy. Unigrid is not just a design, but a system for design; a scalable organizational template that was applied across the spectrum of media, and is now visible in interpretive signs and displays throughout the nation.

Unigrid was conceived for the Harpers Ferry Center in 1977 by Massimo Vignelli, the Italian modernist designer, responsible for the iconic typography and maps of the New York City subway, and much more. His firm is one of several famous corporate design firms that have been contracted to work with the IDC, and other related entities of the Park Service.

Today, the IDC is more inclusively called the Harpers Ferry Center for Media Services (or simply HFC for short), as its operations extend beyond the original IDC building. More than 100 people work for the HFC, on audiovisual programs, films, cartography, digital media, exhibit design and production, interpretive planning, publications, signage, waysides, museum conservation, and management of the NPS history collection.

But the HFC cannot legally require that all of its interpretive methods and approaches be adopted at the hundreds of NPS sites across the country. It can, however, compel the individual park units to comply with the HFC standards and guidelines. To do so, the HFC spends much of its efforts streamlining the process of designing and building interpretive content, publications, structures, and infrastructures, and applying convincing reasons to follow the guidelines it provides.



Though the IDC is among the most important places within the National Park System, and is located inside a National Park, it is not located on the park map—a map that was designed inside its walls.

CLUI photo



The Interpretive Design Center, the place that designs visitor experiences across the nation is, itself, not open to the public. Instead, outside the front door is an unusual tactile model of the building. CLUI photo

The Harpers Ferry Center is located on what the NPS calls its Camp Hill Campus, which was formerly the campus of Storer College. Storer opened in 1867, shortly after the Civil War, as one of the first Black colleges in the USA.

Storer closed in 1955 and the campus was purchased by the National Park Service, which turned the most prominent college building into the Mather Training Center, named after the National Park Service's first director. It is one of four training centers operated by the NPS for training their staff.

Other former college buildings are used by the Park Service, too, chiefly by the Harpers Ferry Center, including the Bird Brady House, behind the IDC, used for audiovisual production and information technology functions. Across from it is Anthony Hall, the former college library, which is now used as office space and storage for HFC reference materials. Below it is a maintenance area, used primarily by Harpers Ferry National Historical Park, and as an administrative annex for the Harpers Ferry Center, for acquisition management, deliveries, and security. Next to the IDC is Cook Hall, formerly a dormitory for Storer College, and now used by the NPS for workflow management offices.

Another former dormitory, at the west end of the Mather Training Center, was torn down to build an underground bomb shelter in 1963. The federal government was building bunkers for itself all over the federal arc region at that time. This one was mandated to be the relocation center for the National Park Service, a command post for its director, staff, and their families, which was stocked with items of importance, duplicate files, and emergency supplies. Today it is known as the Mather Annex, and contains the Museum Storage Area, a 2,100-square-foot climate controlled archive of artifacts related to NPS history, including old uniforms, hats, documents, and photographs.

The Harpers Ferry Center manages the NPS collection of more than 3.7 million items, only 10,000 of which are stored at the Mather Annex. Additional items are kept several miles west at



The entrance to the Park Service's bomb shelter/archive. CLUI photo

the Willow Springs facility in Charles Town, and elsewhere. The Willow Springs facility is an unmarked building in an office park, and is home to the Harper Ferry Center's audiovisual technical services, artifact conservation functions, knowledge archives, and media assets.

Several buildings were torn down after the Park Service took over the Storer College campus in 1960. Before the IDC was built, the most famous building in Harpers Ferry had to be moved: the John Brown Fort.

This was not the original site of the fort though. It was moved here to the college from a nearby farm in 1909. Before that it was at the Chicago World's Fair. In 1968 the fort was moved for the last time, from here to Harpers Ferry's Lower Town, to be closer to its original location, and to make room for the Interpretive Design Center. ♦



The IDC is on a ridge above the Shenandoah River. On its back side, the lower level has arched window bays that, some say, evoke the form of the John Brown Fort, the other key historic structure at Harpers Ferry National Historical Park. CLUI photo

CLUI VISITORS AND VISITATIONS



Class visit at the CLUI Los Angeles office.

CLUI photo

THE CLUI LOS ANGELES EXHIBIT space, bookshop and office is open to the public during regular hours, and at other times by appointment. Groups and university classes that visited in 2023 include Columbia University (Graduate School of Architecture, Planning and Preservation), ArtCenter College of Design (Humanities and Sciences), the University of Southern California (Architecture and Landscape Architecture), Berggruen Institute (Antikythera Studio), UCLA (Architecture), University of New Mexico (Architecture), CalArts, Mira Costa College, and a class from the Kunstakademie Dusseldorf, Germany. CLUI representatives also zoomed-in or traveled to give talks over the year, including at the University of Colorado Boulder, CalArts, and UC Santa Barbara, and met some classes in the field, including with UCLA Art History professor Miwon Kwon. ♦

REPORT ON CLUI REGIONAL FACILITIES

THE CENTER MANAGES A VARIETY of regional facilities that serve as public contact stations, project support centers, and exhibition sites. Some are open with a specific program for just a few months, others for a few years, and some continuously.

Desert Research Station

The Desert Research Station is an interpretive test site and outpost in the Mojave, near Barstow, which the Center has operated since 2000. Facility work and upgrades continued in 2023, in preparation for programming scheduled in 2024, related to Getty's next Pacific Standard Time initiative, *PST ART: Art & Science Collide*.

CLUI Wendover

A number of university and museum groups visited CLUI Wendover, located on the edge of Utah's Bonneville salt flats, over the 2023 season. Art and architecture groups came from the University of Utah, Illinois College of DuPage, the Institute of Contemporary Art Los Angeles, and the New York-based Dia Art Foundation. Texas Tech's Land Arts of the American West field program made its annual week-long visit, camping out at the Center's support facilities on the old flightline, across from the Enola Gay Hangar.



The Center's facilities at Southbase are recontextualized in the 2024 Amazon series *Fallout*, which spent months on location at Wendover in 2022. Based on a videogame, and directed by Jonathan Nolan (brother of Christopher Nolan, the director of another fallout story, *Oppenheimer*), the show sets a new high water mark for Wendover as post-apocalyptic paradigm.

Image from the official *Fallout* trailer

CLUI Swansea

The Center operates a site on the eastern shore of Owens Lake, at Swansea, California, under the shadow of Mount Whitney. A new exhibition opened there in March 2023, called *Fountains of Owens Lake*. ♦

FOUNTAINS OF OWENS LAKE

EXHIBIT AT CLUI SWANSEA



One of dozens of "fountains" captured in sound and video by the CLUI over the last year, mostly by CLUI corps member Cindy Hooper, for the exhibit *Fountains of Owens Lake*, shown at the Center's exhibit space on the shore of the lake that was dried up by the Los Angeles Aqueduct over a century ago.

CLUI photo

THE FOUNTAINS OF OWENS LAKE is the latest presentation at our exhibit hall in the dunes of Swansea. The video/audio display depicts selections from the vast and curious array of water spouts found on the engineered lakebed, ranging in form from battered and stingy sprinkler heads to broad belching pipes. In the context of this parched terminal lake—dried up when its waters were piped to Los Angeles, and then re-engineered for dust-control by LA's Department of Water and Power—these devices appear (and sound) like provocative celebrations of this most precious terrestrial fluid.

CLUI ACTIVITIES

Though remote from the city, Owens Lake can be considered an urban space, as it is intrinsically linked to Los Angeles, like a displaced city park. In some ways, the Owens Lake lakebed is like the Tuileries, the grand central park of Paris. Both are constructed spaces, open for the public to enjoy, and adjacent to the river that created a great city at the center of an empire of its time. Though not built as a palace garden by a Medici, Owens Lake was built by the Department of Water and Power, the institutional monarch that created Los Angeles.

Like the Tuileries, though less symmetrical, Owens Lake is full of designed geometries, linear paths lined with artifacts



View of the Tuileries Gardens of Paris.

Engraving by Adam Perelle



The Nile, by Lorenzo Ottoni, one of several river sculptures at the Tuileries Gardens.
Photo by Thesupermat/Wikipedia



Inside the Orangerie, a display hall at the Tuileries, is an immersive exhibit of Monet's *Water Lilies*.
Photo by Brady Brenot/Wikipedia

and cultural displays, punctuated by ponds and fountains, and sculptural forms that tell the story of the city, its battles with nature, and allegories told by river gods.

Instead of the Grand Allée, we have the Brady Highway. Instead of the Jeu de Paume, we have the DWP Operations Center. Instead of the Musée de l'Orangerie, we have the CLUI Exhibit Hall, which, instead of housing splotchy pond grasses and water lilies depicted impressionistically by Claude Monet, recently showed portraits of colorful scums, bacterial mats, and dendritic microcosmic flows, and now celebrates the fountains of Owens Lake. ♦



Fountains lined up in geometric patterns and rows at Owens Lake.

CLUI photo



Recumbent waterpipes at Owens Lake.

CLUI photo



Inside CLUI Swansea is a dedicated space for immersive watery viewing.

CLUI photo

THE COAST REALTY ARCHIVE MAP ONCE UPON A TIME IN LOS ANGELES

THE CLUI INTRODUCED A NEW feature on our website in 2023—the Coast Realty Archive Map. The map puts the 14,000+ real estate listings in the Coast Realty Archive (dating mostly from the 1960s) into a searchable, scalable map format, allowing people to explore and browse by location.

Coast Realty Archive sites take travelers back to a time when Los Angeles' postwar boom was still taking off, when modest single family homes, simple storefronts, and brand new dingbat apartments were ripe for the picking. Most of the real estate listings are on the west side of Los Angeles, around Venice and Santa Monica—for many people the ultimate destination for postwar westward migration.

CLUI researchers continue to extract patterns, themes, and notions latent in the archive, some of which are presented on our website. These include a rephotography collection, where



A photo from a 1960 real estate listing shows two people chatting outside the Sea Haven Pool Apartments, while a giant anchor looms above them, looking ready to drop.
Coast Realty Archive photo



This image, of a house for sale at 3316 Colonial Avenue, shows a man, likely the homeowner, looking in, or possibly at, a window on the side of the house.
Coast Realty Archive photo

images of properties listed in the archive are coupled with images taken today, to show changes from then to now, which can be extreme, or subtle in compelling ways.

Another online feature, *Re-Listings*, shows addresses where specific properties are listed more than once, with a few years between them. In this way change is captured with rephotography being done within the archive itself. The images often show a modest single-family home replaced a few years later with a new stucco multi-family building on the same site—part of the first wave of Los Angeles' residential densification.

Residents of the Coast Realty Archive is a slideshow which selects images from listings where people are captured by accident in the frame of the itinerant real estate photographer. The effect at times is like a low-tech analog street-view, where faces are not intentionally anonymized by Google algorithms, but rendered more alluring by the haze of low-resolution rephotographics. ♦

Explore the Coast Realty Archive on the Center's website at clui.org/collections/coast-realty and clui.org/collections/coast-realty/about



Children are often depicted, sitting or playing outside, or shown in the midst of hanging out, looking at the real estate photographer with curiosity or suspicion.
Coast Realty Archive photo



Dogs are visible in several listings, sometimes in windows, perhaps waiting expectantly for their owners to come home.
Coast Realty Archive photo

continued from first page

TULARE BASIN NOWHERE ELSE TO GO



Formerly submerged truck on Tulare Lake, left stuck in the muck next to Dairy Avenue. CLUI photo

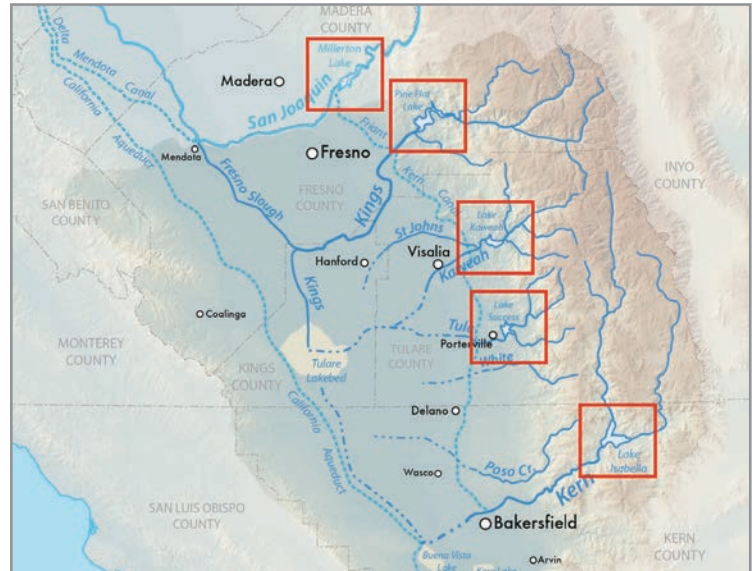
The Tulare Basin, at the southern end of California's Central Valley, is a semi-landlocked watershed, whose drainage ends at Tulare Lake, once the largest freshwater lake in the west. The lake was part of a vast and biologically rich marsh that supported a Native American population. Starting in the mid 19th century, canals changed the basin's hydrology, draining the swamps to create agricultural land, and diverting the flow of the rivers away from the lake to farms. The lakebed dried up, fell under the plow, and disappeared from maps. By the 1980s, the lakebed was one of the largest contiguous industrial farms in the nation, as it is still today.

But despite all the engineering on it and around it, Tulare Lake stubbornly remains the lowest point in the basin, and when larger than typical flows from the Sierra Nevada's streams occur, the water has to go somewhere. Floods overtake the levees and ditches of the modern farms, as occurred in 1937, 1952, 1969, 1983, 1998, and 2023. The old Tulare lakebed is still the end of the line, and the bottom of the bowl.

A conventional view of the Tulare Basin (not taking into account its connections to watershed-spanning aqueduct systems like the Delta-Mendota Canal and the California Aqueduct) is of a large endorheic watershed, with no typical drainage to an ocean, covering more than 20,000 square miles. The basin extends from Fresno in the north, to Frazier Park in the south, and ranges vertically from the highest point in the Lower 48 (Mount Whitney, at 14,505 feet), to the basin's lowest elevation, the bottom of Tulare Lake (around 175 feet above sea-level). However, land subsidence from groundwater pumping is changing even this fundamental topography of the Tulare Basin.

Drifting Down the Former Rivers of the Tulare Basin

In many watersheds, a journey upstream is the course that brings you closer to the truth, the goal, the source. In Tulare, it seems, as perhaps is the case in other endorheic basins, the reverse is true. Going with the flow takes you closer to a conclusion, to the end zone.



The Tulare Basin and its rivers, with Tulare Lake at the bottom. Square boxes are drawn around each of the five river reservoirs that exist between supply and demand. Base image from Wikipedia

Going downstream in the Tulare Basin, however, is not a clear path. The flat lands of the basin are a dynamic network of converging deltaic fans of former episodic river channels, some consolidated and reinforced, but most disappeared, circumvented by irrigation canals, ditches, and other diversions. Here we will attempt to travel down the five principal rivers that drain into the basin, starting from their respective modern "headwaters"—their flood control reservoirs, perched in the foothills of the Sierra Nevada, above the valley floor.

These reservoirs are the buffer between a watery feast of snowmelt in the spring and summer, and the relative drought that exists for most of the rest of the year. Each reservoir is the fulcrum between the dendritic capillaries of the tributaries upstream, and the river's engineered downstream distribution network. Collection, storage, and delivery. Starting at the top, with the San Joaquin.



Millerton Lake is the reservoir on the San Joaquin River, and is drawn down in anticipation of the winter rains and spring snowmelt every year. In the fall of 2023, the reservoir was drawn lower than usual, so that the Friant-Kern Canal could be emptied and repaired, as the canal's capacity has been degraded due to land subsidence along its course because of groundwater pumping. CLUI photo

San Joaquin River

Before agricultural canals and reservoirs, the San Joaquin River emerged from the mountains near Fresno and flowed north along the bottom of the Central Valley, adding the waters of the Merced, Tuolumne, and Stanislaus Rivers on its way to the Delta, past Stockton, where it slowly blends with the waters of the Pacific Ocean.

Since the San Joaquin River flowed north, and drained into the ocean, the river and its watershed was not part of the Tulare Basin, but rather defined that basin's northern edge. This changed in 1949, with the opening of the Friant-Kern Canal, which begins at the base of the dam, and diverts nearly all of the water from the river south, along the Sierra foothills, all the way to the Kern River in Bakersfield, 152 miles away.

Construction of the Friant Dam started in 1937, as part of the Bureau of Reclamation's Central Valley Project, a New Deal federal program to build irrigation and water resources during the Dust Bowl and Great Depression. Though the dam and the resultant reservoir, known as Millerton Lake, help control flooding in the valley below, and some water is dispatched northwards through the Madera Canal, its primary purpose was to bring additional water to the southern parts of the Central Valley, where groundwater levels were dropping, after nearly a century of farming.

The diversion of the water southward meant that little remained for the San Joaquin River itself, and the river channel, extending for more than 50 miles from the base of the dam, soon dried up. Some of its waters have since been replenished with water flowing in reverse from the river's terminus at the Delta, delivered by the Delta-Mendota Canal.

Upstream of the dam, the San Joaquin River and its tributaries collect water from snowmelt in the High Sierra, over an area that spans the geographic center of California, and extends north of Mammoth Mountain and into the Ansel Adams Wilderness, on the edges of Yosemite National Park. Much of the river above the dam is engineered by the Big Creek Hydroelectric Project, a series of dams, reservoirs, tunnels, and powerhouses, which collectively generate around 12% of the hydroelectricity produced in California.



Millerton Lake was named after the town of Millerton, which was removed to construct the reservoir. The town's courthouse, which dates back to 1867, was rebuilt in 1965 as a historic monument on a bluff above the lake.

CLUI photo

Downstream, the old riverbed emerges at the base of the dam, runs past the town of Friant, and through a mixture of parkland and former gravel quarries. The river channel delineates the limit of the northern sprawl of Fresno, holding housing blocks back like a horizontal wall, with the grid of farmland on the other side. 20 miles from the dam, the riverbed passes under Highway 99, the central artery of the Central Valley, and under a massive viaduct for California's new (and interminable) high-speed rail project.

After another 25 miles flowing west, across the center of the Central Valley, intensely developed with farms and dairies, the San Joaquin River curves northward at a complex hydrologic intersection, known as the Mendota Pool. Several canals converge here, ending or beginning, depending on how you look at it. Foremost among them is the Delta-Mendota Canal, which brings water from the San Joaquin-Sacramento Delta, 117 miles north, and terminates here, filling up the channel of the San Joaquin River back to the dam, and feeding other irrigation canals, radiating from the vortex of the Mendota Pool.

The San Joaquin River north of here is a historic waterway that once allowed boats from San Francisco Bay to travel upstream to this point. As the valley developed with cities, farms, and canals, the river became less and less navigable.

Precedent-setting water rights battles over the San Joaquin made the San Joaquin River one of the most litigated rivers in America, especially since its waters passed through a big part of the powerful empire of the Miller & Lux Corporation, which in the late 19th century owned more than 1.4 million acres of land in the west, making it among the largest ranching and farming concerns in the nation, even by today's standards.

Much of the land around the San Joaquin River near the Mendota Pool is now farmed and owned by the Resnick family, who are often cited as the largest farmers in the nation today, with close to 200,000 acres under cultivation, most of it in the southern San Joaquin and Tulare Basins. Their company, called Wonderful, owns several brands, including POM Wonderful pomegranate juice, Halos mandarins, and Fiji Water bottled water. They are likely the nation's largest producers of pistachios and almonds, and one of their nut packing plants is four miles northeast of the Mendota Pool.

Though located outside of the Tulare Basin, the Mendota Pool is connected to it in an important way, as this is also the northern end of the Fresno Slough, which, historically at least, and in various channels, runs southeast for 40 miles, providing a drain for the Tulare Basin during times of extreme flooding. This has rarely occurred in history, but did for the last time in the 1870s, when the normally endorheic Tulare Basin drained into the San Joaquin, connecting Tulare Lake to San Francisco Bay.

The southern end of Fresno Slough is also connected to the Tulare Basin by engineered channels to a branch of the Kings River, which flows out of the Sierra as the principal river feeding Tulare Lake.



Pine Flat Lake is the reservoir on the Kings River. In July 2023, after an especially snowy winter, the lake was at capacity. By November 2023, the reservoir had dropped 85 feet, half its capacity, after supplying water for irrigation over the summer and fall, and in preparation for impending winter rains and spring snowmelt. CLUI photo

Kings River

The Kings River is the northernmost of the four principal rivers that once naturally drained into the Tulare Basin, and it supplies more surface flow to the valley than any of the other rivers. The reservoir was created by the Pine Flat Dam, completed in 1954, after years of controversy over who would ultimately build the dam, and control the allocation of water it held back.

Originally planned as a Bureau of Reclamation project, like the Friant Dam, the Bureau's plan expressed New Deal ideals, and would favor small farmers, with operations of 160 acres or less. Larger downstream farmers lobbied hard for a different plan, that would allow them to grow even larger still—a plan that engaged the Army Corps of Engineers as the builder and operator of the dam. Large farm interests eventually won, and the Pine Flat Dam was built and managed by the Army Corps, as were the dams built later on the other rivers flowing into the Tulare Basin.

The Pine Flat Dam is a concrete dam 440 feet tall, by far the largest dam in the Tulare Basin. The reservoir behind it, Pine Flat Lake, has a capacity of one million acre-feet, almost twice that of the next largest reservoir in the basin. Like the others, it was built for flood control, as limiting floods enabled development to take place along the river, including farming along its watershed, especially at the terminus, Tulare Lake. As a storage reservoir, water can be let out in a measured, anticipated way, helping farmers mitigate the normal uncertainty of the weather.

The Kings River originates at the crest of the Sierra Nevada, in Kings Canyon National Park, and flows through one of the largest pumped storage hydroelectric plants in the nation. After settling in the reservoir, the river flows out the bottom of the dam, and in just four miles the river hits Cobbles Weir, the first of dozens of diversion structures that deflect their water into

canals and irrigation ditches, along a complicated course to Tulare Lake.

A few miles further, another weir diverts some flow into the Enterprise Canal, at the Kings River Packing Company plant, a large citrus packing plant. Agriculture along the eastern foothills of the valley primarily includes citrus, and primarily oranges. California produces more than half of the nation's citrus, and most of that comes from the Central Valley.

Eight miles downstream from the dam, the Kings River meets the Friant-Kern Canal, which carries most of the San Joaquin River's water, heading south to Bakersfield, under the Kings River through a half-mile-long underground siphon. Water can be diverted from the canal into the Kings River here, too, further mixing up the region's watersheds.

The river continues to meander west, east, and south, bifurcating and re-forming to spread its waters around, flowing past more fruit packing houses in Reedley, then heading southwest past Kingsburg, with its Swedish-themed downtown, and the largest Sun-Maid raisin box, outside what may be the largest raisin plant in the nation.

After passing under Highway 99, the Central Valley's thoroughfare, the Kings River meets the People's Weir and Pool, the largest of the weirs on the river. Water from the pool can be diverted into the People's Ditch, which heads to Hanford, or the Lakeland Canal, which heads south towards Corcoran and Tulare Lake.

The larger river channel heads west as the North Fork of the Kings River, which meanders and bifurcates its way west for another 20 miles or so, until it hits another crucial diversion at the Crescent Weir. Here the river can be steered north, towards the Fresno Slough, and from there into the San Joaquin River Basin.

This rarely happens though. The bulk of the river heads south, between the Lemoore Naval Air Station, a busy Navy fighter jet training base, and the Leprino Foods West Lemoore facility, one of the largest cheese plants in the nation, which makes mozzarella for the national pizzascap out of milk made by cows, from Kings River water.

A few miles south, near the town of Stratford, this branch of the Kings River meets Empire Weir Number 2, at the north end of the Tulare lakebed, where it is split into a number of canals that flow to different parts of the lakebed. The largest channel, in the middle, is the Kings River-South Fork Canal, which heads due south for a few miles into the middle of the lakebed, where it meets a canal coming in from the east, that contains the remains of the Tule River.

This point marks the end of both the Tule and the Kings Rivers. From here their blended waters are pumped around the lakebed's fields, evaporating into the heat, or absorbed by the likes of cotton, pistachios, and tomatoes.



Lake Kaweah is the reservoir on the Kaweah River. In July 2023, after heavy rains and snowmelt, the lake was at capacity, 185,000 acre-feet. Then it was drained to supply water to the valley and to prepare for winter rain and snow. By early October, the level was 112 feet lower, after dropping at a rate of around two feet per day.

CLUI photo

Kaweah River

The Kaweah River once drained directly into Tulare Lake, in high water. Though its main channel is only 33 miles long, and its flow much smaller than that of the Kings and the Kern, it remains an important contributor to the Tulare Basin. It was the last of the four principal Tulare Basin rivers to be dammed. The Terminus Dam was completed in 1962, by the Army Corps of Engineers. The 255-foot-high earthfill dam has six large fuse gates on top of it, which were added to the dam in 2004 to increase its capacity.

The river forms from tributaries inside Sequoia National Park, where the snowmelt waters the world's biggest trees. The river is very steep, dropping more than two miles in less than 20 miles, before being impounded by the Terminus Dam.

The Mount Whitney Power Company, now operated by Southern California Edison, has six small dams and three small powerhouses along the river, dating back to the early 1900s, with many miles of flumes that flow as a kind of separate parallel river to feed the penstocks.

Downstream of the Terminus Dam is the Sierra gateway community of Lemon Grove, where the Kaweah River splits into two channels at the MacKay Point, with the St. Johns River going northwest around Visalia, and the main channel heading southwest.

Ten miles further, the main channel splits again, into Mill Creek and Packwood Creek, officially ending the named Kaweah River. Mill Creek, the larger of the two channels, continues on through Visalia, but is usually dry. Mill Creek ends north of Corcoran, when it meets Cross Creek, a channel that heads south towards Tulare Lake.



Success Lake is the reservoir on the Tule River. In July 2023, the reservoir was at capacity, after the winter's heavy snows. To prepare for the next winter's storms, Success Lake was lowered 60 feet by November. The reservoir holds up to 82,000 acre-feet of water, much less than the million held by the largest of the four Tulare Basin reservoirs, Pine Flat.

CLUI photo

Tule River

The Tule River has the smallest watershed and the lowest discharge of the four principal rivers of the Tulare Basin, but it is the one most directly linked to Tulare Lake, in both name and its historical flow directly into the lake.

The R.L. Schafer Dam, the earthen embankment dam that holds back the reservoir, was constructed by the Army Corps of Engineers, and completed in 1961. There is a recreation area on the lake, with a number of boat ramps and a small marina.

Downstream of the dam, the Tule River flows west along the southern edge of Porterville, until it splits into a north branch and a south branch, aided by a concrete divider, a few miles west of town. The two branches follow close to one another through the farmland, then rejoin into one channel again west of the roadside rest area on Highway 99, between Tipton and Tulare.

After another ten miles of westward meandering, the Tule River passes under Highway 43, where a viaduct is being constructed for California's high-speed rail project. The high-speed train tracks will pass over the existing highway and the busy BNSF freight rail line here, as well as the Tule River channel.

Two miles west of the viaduct, the Tule River ceases to meander at a kind of backwater, which connects to a canal that runs across the north part of the Tulare lakebed.



The dam at Success Lake.

CLUI photo



Lake Isabella is the reservoir on the Kern River. The lake has a capacity of 568,000 acre-feet, the second largest of the four reservoirs feeding the Tulare Basin. In November 2023, storage was at 210,000 acre-feet, and the reservoir was ready for whatever would be coming to it in the winter and spring. CLUI photo

Kern River

The Kern River is the southernmost of the four principal rivers feeding the Tulare Basin, and the most complex in its long and circuitous path to Tulare Lake. Its dam and reservoir were built at the southern end of the Sierra Nevada, where the river's north and south forks meet, 40 miles northeast of Bakersfield. The dam was completed in 1953, and the lake filled up over the following years, flooding the townsites of Isabella and Kernville, whose residents had been relocated.

The lake's capacity was reduced dramatically in 2006, when the dam was determined to be vulnerable to earthquakes. After a lengthy study and planning process, a reconstruction project began in 2017, including raising the dam by 16 feet, and adding a new emergency spillway. This was completed by 2023, just in time for a wet winter and big spring snowmelt. The reservoir was close to full capacity in July 2023, for the first time in 15 years, before being drawn down through the summer and fall.

Upstream of the dam, the Kern River channels extend northward, deep into the Sierra, draining the western slope of Mount Whitney. Downstream, the river flows through Kern River Canyon, dropping 2,000 feet in 20 miles, to the flatlands of the Central Valley, east of Bakersfield. This dramatic stretch of white water has drowned more than 300 people over the last 50 years, giving the Kern the title of the deadliest river in America. There are a number of old powerhouses, fed by pipelines and flumes along the river, which provided power to Bakersfield, and fueled the former electric Red Car rail system in Los Angeles.

Entering the valley, the Kern River runs for 30 miles through the flat lands of Bakersfield, a region engineered with numerous canals and restoration projects, 6,000 acres of which are known as the Kern River Parkway. The Parkway begins at the Kern River Golf Course, then continues past old and new estates along the river, a belt of green surrounded by dry and barren hills. The river then runs through the Kern River Oil Field, the fifth largest oil field in the nation, by some ways of measuring.

After that, a portion of the river splits off to the south in canals, including the East Side Canal, which roughly follow the former south fork of the Kern's deltaic fan, and irrigate the region southeast of Bakersfield—an expanding suburb, and a major dairy and vegetable growing and packing region.

On the river near downtown Bakersfield, at Chester Avenue, is the point where Frank Lotta, a local teacher and historian, began a journey to San Francisco Bay, in the high flood year of 1938, before dams tamed the rivers of the basin. He, along with three others, traveled downstream in a 15-foot boat equipped with an outboard engine. They followed the drainage to the normally dry Buena Vista Lake, then north through the swollen Buena Vista Slough to the flooded Tulare Lake, then north through Fish Slough and the Kings River channel to the Fresno Slough, and into the San Joaquin River, dragging the boat through swamps and over levees and berms as necessary. They made it to Treasure Island, in the middle of San Francisco Bay, after just ten days.

At Coffee Road, a few miles past downtown, the Friant-Kern Canal brings water from the Friant Dam on the San Joaquin River into the Kern River Basin, at a complex hydrological hub in the mostly dry Kern River riverbed, where several canals that carry water from one end of the basin to the other, converge. From there, with or without water in it, depending on seasonal fluctuations, the Kern River channel continues westward through the Kern River Parkway for another ten miles.

At the end of the Parkway is the 2,800-acre Water Bank, a groundwater recharge and water storage area. The 2,800 acres here were acquired by the City of Bakersfield as part of a package of land, canals, and water rights around the city, including rights to a third of the water from Lake Isabella, purchased from the Tenneco West oil company for \$18 million in 1976. Known as the Kern River Purchase, this was a foundational moment for the City of Bakersfield, where it gained some control of its water resources, helping it to grow to its current form, California's 9th largest city.



Signage along the bikeway at the 2,800-acre Water Bank.

CLUI photo



The gates of the Kern River Intertie, where the Kern River meets the California Aqueduct. CLUI photo

One “End” of the Kern River

The Kern River Parkway ends at Interstate 5, and the river channel passes under the interstate and continues southwest for another three miles, then reaches a pool, which is often dry, next to a gas refinery. This point marks either the “end” of the Kern River, or its continuation into at least three different directions.

Extending north from the pool is the West Side Canal, a channel that follows the course of the former Buena Vista Slough, which can take Kern River floodwater all the way back to the Tulare lakebed, 50 miles away.

At the west side of the pool is a short channel leading to a gate that connects directly to the California Aqueduct, the 400-mile-long canal that brings Northern California water to Southern California. Known as the Kern River Intertie, the control structure here exists to provide an additional outlet for Kern River floodwaters. In May 2023, it was opened for the first time in 17 years, to prevent more floodwaters from reaching the already flooded Tulare Lake, adding Kern River water into the water supply for Los Angeles.

At the south end of the pool is a channel which heads south, allowing the Kern River to drain into Buena Vista Lake, or, conversely, for Buena Vista Lake to drain into the Kern River. The channel splits in two, with one branch becoming an irrigation canal for the lakebed.

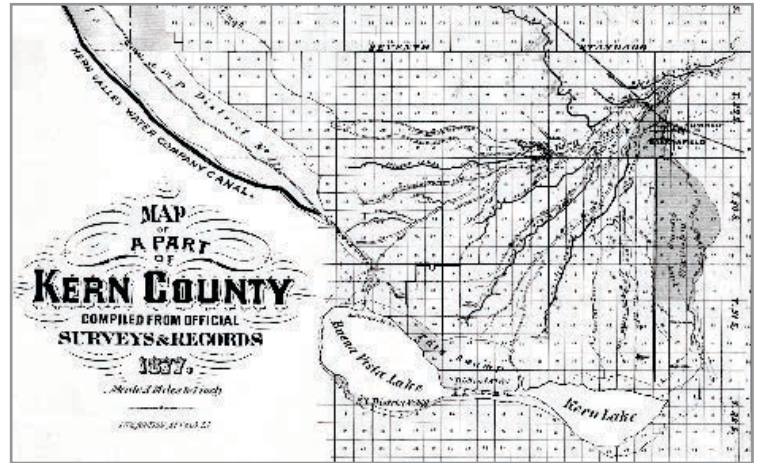
Buena Vista Lake is the second largest of the four historic lakes in the Tulare Basin, which, like Tulare Lake, dried up after irrigation took over the valley. Before that happened, Kern River water flowed here, usually after draining into Kern Lake, before draining north to Tulare Lake. The Buena Vista lakebed is now farmed intensively by its owner, the J.G. Boswell Company, which also farms and owns most of the Tulare lakebed.

The second branch of the channel from the pool connects directly to Lake Evans and Lake Webb, two adjacent lakes constructed at the northern edge of the Buena Vista lakebed, known as the Buena Vista Aquatic Recreation Area, a county

park that provides boating, camping, picnicking, and swimming opportunities for the public.

At the eastern end of Lake Webb, just outside the park, is Buena Vista Ranch, the J.G. Boswell Company’s management center and equipment yard for its operations on the Buena Vista lakebed. Ten miles southeast of it is Boswell’s Kern Lake Ranch, the center for its operations on the Kern Lake lakebed, which is also owned and farmed by the company.

Like Tulare’s, the Kern and Buena Vista lakebeds are intensely flat, uniform, and monolithically farmed—principally planted with cotton, though increasingly with pistachios, almonds, and tomatoes.



Historically, Kern Lake and Buena Vista Lake would fill from the various deltaic strands of the Kern River, then drain north through the Buena Vista Slough and swamps towards Tulare Lake, as depicted on this 1877 map.

Lith, Britton, Rey & Co. map

Deserts vs. Swamps

Boswell’s industrial farming operations on Kern and Buena Vista Lake, and Tulare Lake as well, are based on the heritage of the Miller & Lux Company, which acquired control of these former wetlands in the late 19th century, as part of the government program known as the Swamp Act, which allocated land to people if they “reclaimed” it, by draining the water to make farmable land.

San Francisco-based business partners Henry Miller and Charles Lux owned more than a million acres of farms and ranchland in the west, but the largest contiguous portions were two properties on the west side of the Central Valley. The larger of the two, around 100,000 acres, was along the San Joaquin River, between Modesto and the Fresno Slough. The other, more than 50,000 acres, was the Buena Vista Slough, the swampland between Buena Vista Lake and Tulare Lake.

In the late 1870s, Miller & Lux was at work reclaiming this 50-mile-long swamp by digging a canal through its midst, using massive Fresno Scrapers, pulled by 50-horse teams, creating a new channel for the Kern River. Their channel was running dry, however, as a rival developer upstream, James Haggin’s Kern County Land Company, claimed most of the Kern River water as his, diverting it into hundreds of thousand of acres he acquired around Bakersfield as part of the government’s Desert Land Act (similar to the Swamp Act, but applied to land normally too dry to farm).

This conflict over water rights, and between swamps and deserts, evolved into a precedent-setting court battle that required defining what a “river” actually was. Though the Lux vs. Haggin case was finally settled after many years by the California Supreme Court, both the draining of the swamps and the irrigating of the desert continued on a vast scale, leading to the disappearance of more than 95% of Tulare Basin’s wetlands.



Signs along the West Side Freeway (Interstate 5) advocate for more water for farms. CLUI photo

West Side Freeway and Buena Vista Swamp

Today, motorists on Interstate 5, heading from Los Angeles towards the Bay Area, descend through the deep V of the Grapevine into the Tulare Basin grid of the Central Valley, revealed as if a theatrical curtain was opening to expose an agricultural stage, with a backdrop dissolving into the hazy distance. Highway 99 soon splits off the interstate, northbound towards Bakersfield, and continues on to connect the Central Valley’s agri-towns, while I-5 veers left, up the relatively dry and barren west side of the valley.

In five minutes, the highway passes imperceptibly over the New Rim Ditch that marks the southern edge of Kern Lake, which is otherwise now invisible as such, just part of the grid of dusty fields and mega-dairies. Minutes later the highway passes, exitless, over Millux Road, which runs east-west through what was once the marshland between Kern Lake and Buena Vista Lake. A few miles later the grid dissolves a bit, where the interstate passes over the Kern River, and through the 2,800-acre groundwater recharge area, where in wet times pooled surface water almost laps against the shores of the highway.

After this point, and for dozens of miles more, the interstate travels through what once was the 50-mile-long, eight-mile-wide swamp along the Buena Vista Slough, now long dried out and converted to farmland.

Just west of the Buttonwillow exit, at Highway 58, is a large J.G Boswell tomato processing and packing plant, one of two that the company has in the Tulare Basin. In the other direction, east, past the big steer statue serving as the sign for the Buttonwillow Land & Cattle Company, is Frito-Lay’s Kern facility, one of the largest snack food plants in the nation.

Approaching Lost Hills, Interstate 5 crosses over the Main Drain and West Side Canal, first dug by Miller & Lux, carrying the Kern River northward in times of flood, to Tulare Lake. The

bulk of the drainage shifts from the west side of the interstate to the east side at this point, while the highway continues northwest, eventually following the west shore of Tulare lakebed itself, at Kettleman City.

The dominant grid of farmland squares and rectangles, inside square-mile sections, dissolves after the Kern River drainage crosses the interstate, wiped out by something like a skeletal deltaic fan, spreading out as it merges with the ghost of Tulare Lake. In the middle of this zone is the Kern National Wildlife Refuge, which was established in 1959 to restore some of the wetlands and bird habitats that existed 150 years ago, when this was the largest freshwater wetlands west of the Mississippi.

North of the preserve are leveed floodlands, spreading grounds used to hold water in times of flood, and to provide further bird habitats. The ponds about the Sand Ridge, an eight-mile-long east-west rise in the ground formed by historic sediment deposition. Mostly less than 20 feet high, the ridge is enough to create a barrier to normal flow, and defines the southern shore of the historic Tulare Lake.

During floods, flow from the Kern River, coming from the south, crosses the Sand Ridge into the lake at control gates on canals. Beyond, the lakebed itself is a dense rectilinear network of canals, ditches, levees and roads surrounding fields shaped, watered, planted, and harvested by machines. Portions of which are sometimes underwater.



Corcoran, the city on the shore of Tulare Lake.

CLUI photo

On the Periphery: The Towns of Tulare Lake

If Tulare Lake was at its maximum size, as it was in the 1870s, it would have flooded the communities around it, had they existed at the time. These include Stratford, at the northern end of the lake; Alpaugh, at the southern end of the lake; and the historic African-American community of Allensworth, reconstructed in recent years by preservationists, and now a California State Park.

Nearby Atwell Island would have been the largest of a few islands in the full-sized lake. An overlook at Atwell Island, which was constructed to provide a view over a small piece of pre-agriculture land restored by the Bureau of Land Management, would instead provide a vista across the vast lake, whose distant shores would be too far to see.



The overlook at Atwell Island.

CLUI photo

More drastically in this hypothetical scenario, the city of Corcoran, with a population today of more than 20,000, would be underwater, too. Corcoran is the largest community on the periphery of Tulare Lake, and is the agricultural services hub for the region.

Packing and processing plants for local agricultural products are located here, as are fertilizer and pesticide suppliers and crop research facilities. However, the largest employers in town, by far, are the two adjacent state prisons, where close to half the population of Corcoran lives, incarcerated. Charles Manson was a resident until he died in 2017.

The first prison opened in 1988, and the second, specializing in substance abuse treatment, opened in 1997. During World War II there was a German POW camp at Corcoran, where prisoners were forced to pick cotton.

Corcoran was incorporated in 1914, founded by the developer Hobart Whitley, who purchased more than 3,000 acres and laid out the town. The main street through Corcoran is named after him. Whitley was an early developer of Hollywood, too, and Los Angeles' San Fernando Valley, where he worked with other notable Los Angeles boosters, and land profiteers such as Harrison Gray Otis and Harry Chandler, the successive publishers of the *Los Angeles Times*.

Historians have described Corcoran in its early years as a Southern cotton town meeting the Wild West. From then till now, in the middle of the fray, is the J.G. Boswell Company, Corcoran's second largest employer, which has been based in town and farming the adjacent Tulare lakebed for close to a century.

Cotton has been the main crop for the company, beginning when Colonel James Griffin Boswell moved from Georgia to California, and founded his land and farm company in 1925. Colonel Boswell worked with Harry Chandler, and married his daughter, Ruth. They lived together in a mansion in Pasadena, were part of L.A.'s high society, and spent little time in Corcoran.

After the colonel died in 1952, the company was led by his nephew, J.G. Boswell II, who acquired more land and water rights over the years, including the Miller & Lux land at Buena Vista and Kern Lakes in the 1970s. By 1980, Boswell had almost 200,000 acres under cultivation on an industrial scale, making him the largest farmer in the nation.

The J.G. Boswell Company's cotton gins, storage silos, and processing buildings are on the east side of town, along with the company's private airport, with a 7,000-foot paved runway. Some of the site was acquired when Boswell bought out its chief rival, the Salyer family, whose cotton operation once covered 88,000 acres. The bale yard next to the processing plant covers half a square mile, storing cotton brought in from the fields as large loaves wrapped in plastic.

At a small airport on the west side of town, the J.G. Boswell Company contracts with Lakeland Dusters for its crop dusting needs, delivering chemical growth enhancers, pesticides, and defoliants with its fleet of Air Tractor planes.

In the middle of town, on Whitley Avenue, is the city's park, named after J.G. Boswell II, who died in 2009, passing on management of the company to his son, James W. Boswell.

Next to the park is an unmarked Boswell compound with a swimming pool and a hedge in the shape of the corporate logo. Over the years, this is where family executives would stay when they were in town. Known as the "Lanai" for its shady porch, it is a locally legendary place, where decades of dealmaking, politicking, and entertaining has taken place, across the street from a McDonald's.



The J.G. Boswell corporate Ranch Office on Dairy Avenue. CLUI photo

Dairy Avenue and Beyond

The Lanai is at the intersection of Whitley Avenue and Dairy Avenue, the primary crossroads of town—the Hollywood and Vine of Corcoran, though in this case, at one end of each road is Tulare Lake.

Heading south on Dairy Avenue, at the edge of town, is the official corporate ranch office for J.G. Boswell, where local administrative business for the company takes place. (The headquarters for the company is 175 miles away, in Pasadena, next to the corporate campus of the Parsons Corporation).

TULARE BASIN

Across the street from the Ranch House is one of the two tomato processing plants owned by the company. J.G. Boswell has expanded beyond cotton, and is now one of the nation's largest growers and processors of tomatoes, which are used to make paste for others to integrate into manufactured foods.

Across the street from the tomato plant is the principal maintenance compound for J.G. Boswell farming and pumping equipment, the Paul Althorp Shop, named after a long-serving and inventive manager. Equipment being stored and serviced at the shop fluctuates, depending on the season, and the different machinery used for the various farming operations on the Tulare lakebed.

The lakebed begins, south of the equipment shop, on Dairy Avenue, past the prison, and on the other side of the 14-mile-long levee that protects Corcoran from floods, up to a point.



Intersecting canals at the end of the Kings and Tule Rivers, on Tulare Lake. CLUI photo

Canals of Tulare Lake

Canals bring the water from throughout the Tulare Basin to the hydrological terminus of Tulare Lake, and canals on the lakebed circulate their combined waters through a network of pumps and ditches. The water is then flooded onto fields, to be absorbed by the ground, crops, and atmosphere.

Major canals on the lakebed include the Tule Canal, which originates on the east side of the lake, carrying the last of the waters of the Tule River. The two branches of the Cross Creek Canal, part of the channel network of the Kaweah River drainage, also enter the Tule Canal from the north. Then the canal runs west across the lakebed for 12 miles, until it hits the South Fork Canal, which brings Kings River water south to the lakebed. The two canals meet head on, effectively ending the run of both rivers at a set of gates.

The intersection is near the South Central Levee, also called the "Big Daddy," which is 120 feet wide and runs for seven miles north-south. Tanks for refueling equipment with gas and chemicals are stored here, as this is a busy crossroads at the western end of Boswell's portion of the lake.

The South Fork Canal begins nine miles north of the intersection, on the edge of the lakebed, near Stratford, where the Kings River drainage meets Empire Weir No. 2. A few other canals originate at this pool, including the Tulare Lake Canal, which runs southeast for 12 miles, inscribing the northeast edge of the lakebed, and the Blakely Canal, which runs in an arc southwestward for 25 miles, inscribing the west edge of the modern lakebed.

Water is pumped in and out of the southern end of the Blakely Canal where it meets the Wilbur Ditch at the South Central Number 3 Pump Station on Utica Avenue, the main paved road crossing the lakebed from west to east. The 12-mile-long Wilbur Ditch runs north-south, with its northern half in J.G. Boswell territory, and terminates at the Tule Canal.

Six miles east along the Tule Canal is the northern end of the Great Jones Canal, which runs for 12 miles south to the Homeland Canal, and follows 10th Avenue, one of the few public north-south roads that crosses the lakebed.

The Homeland Canal is another major canal, that inscribes the southeast side of the Tulare lakebed. It runs for nearly 20 miles, from its western end at a pumpstation near the Kern River channel retention ponds at the Sand Ridge, to Highway 43, near Angola, a few miles south of the Tule River.



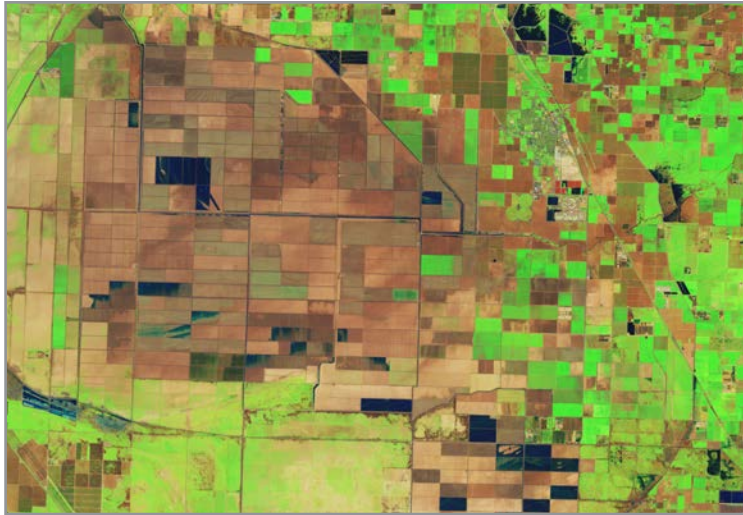
Rolls of harvested cotton on Tulare Lake.

CLUI photo

The Fields of Tulare Lake

These primary canals ring the lakebed, and provide a north-south and east-west grid of flow across it. Feeding off this basic outline are many more canals and ditches, which run along the edges of farming cells that are isolated from one another by levees and canals. The individual fields within the cells are generally one half-mile by one mile in size.

Boswell farms around 130,000 acres of the lakebed. Most of the acres are planted with pima cotton, a soft cotton that is used in the clothing industry. Many other products are made from parts of the cotton plant, too, including animal feed. Boswell has planted as much as 90,000 acres of cotton in as little as nine days, with 65,000 plants per acre. Cotton is harvested starting in late September, a few weeks after the fields are sprayed with defoliants that kill the plants, causing the leaves to fall off. This



A NASA satellite image, taken in February 2023, before the spring floods, shows how the lakebed is divided into rectilinear farming cells, bounded by canals, levees, and roads. NASA image

makes the bolls easier to pick for the dozens of picking machines that run simultaneously and continuously for over a month, finishing before the possible winter rains start.

Other crops are planted on the lakebed too, including tomatoes, safflower, pistachios, wheat, and alfalfa. A variety of equipment is used to plant and harvest the crops, and to engineer the fields, ditches, and pumps, including some specialized machinery devised at the company's shops. Tractors run on roller tracks, towing draglines, discs, rippers, and floaters, and pull land planes that make the ground flat as a tabletop. Fertilizers, insecticides, herbicides, and defoliants are applied by sprayers rigged to tractors on the ground, and by crop duster planes from above.

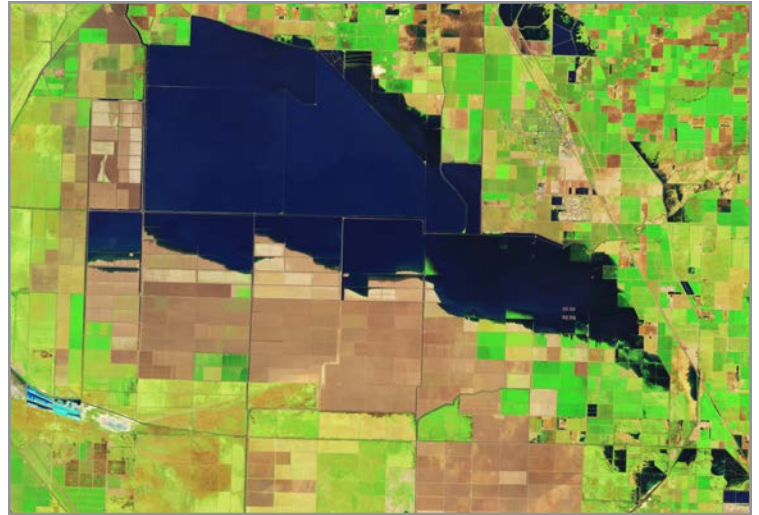
While the heart of the lakebed is owned and farmed by J.G. Boswell, the western end is mostly owned by Westlake Farms and Sandridge Partners, and it is less intensively irrigated and farmed than the Boswell portions of the lake. Los Angeles County also owns a thousand acres on the west side, which it has developed into the Tulare Lake Compost facility, to process dried sewage sludge, trucked from Los Angeles, into fertilizer.

Portions of the east side of the lake are also owned and farmed by other companies, such as Hansen Ranches, and Gilkey Farms, and dozens of small farmers. This part of the lake was flooded for the first time in a long time, in the big Sierra snowmelt of 2023.

The Floods of Tulare Lake

The most flooded parts of the lake in 2023 were generally the lowest parts of the lakebed, moderated somewhat by levees and canals. Most of the flood was on Boswell land, especially in the north end of the lakebed, where the entirety of the company's Loveland and R.D. 749 farm cells were underwater, as well as much of the Basin, North Cousins, and El Rico cells. The floods abutted the levee that protects the town of Corcoran and the state prison, which was on alert for possible evacuation.

The floods extended southeast, following the lowest contours of the lakebed, beyond Boswell land, flooding several equipment



NASA satellite image, taken in late April 2023, shows the spring floods that followed the record-breaking Sierra Nevada winter snows. NASA image

yards and thousands of acres of pistachio orchards. A Foster Farms chicken operation, with 48 500-foot-long sheds, was evacuated before it flooded, and remains vacant, with a bathtub ring at mid-level around all the buildings. Power companies removed transformers and other equipment with helicopters, and constructed a protective dam around an important substation on Dairy Avenue.

The floods peaked in early June 2023, when 120,000 acres of the lakebed were underwater, making a lake of 175 square miles, about the size of Lake Tahoe. The last flood at this scale was in 1983, and before that in 1969. It was worse in 1938, when 220 square miles of Boswell land were flooded. But that was before the dams in the Sierra foothills were built.

By July 2023, the water levels were falling, due primarily to evaporation and pumping, slowly exposing a transformed landscape, both inundated and desiccated. A temporary condition that may persist, perpetually, at this wet dry lake, or this dry wet lake, at the bottom of the basin, and the end of the road. ♦



Pueblo Avenue, one of the few paved east-west roads across Tulare Lake, in November 2023. CLUI photo

BOOK REVIEWS

BOOKS NEW TO THE SHELVES OF THE CLUI LIBRARY

The Lies of the Land: Seeing Rural America for What It Is—and Isn't, by Steven Conn, 2023

Another attempt to try to differentiate the “urban” from the “countryside”? Actually not so much—it’s more about an overall nation constructed by military, agricultural, industrial, and corporate forces. Chapter one, “Engineering the Landscape” begins with the First Transcontinental Army Motor Transport Expedition, in 1919, a coast to coast road trip from DC to San Francisco with 81 vehicles and 300 men, including Dwight Eisenhower, who as President years later would compel the Interstate Highway System into existence: the largest constructed object ever made, and the thing that really turned the nation into a modern, contiguous, uniform place, composed of connected urbs, suburbs, exurbs, and unurbs. The book continues thematically, using exemplary sites, and heads towards a sense that the USA is an interdependent, interconnected, constructed landscape, dense with people in some places and not in others, and that what used to be rural, if it ever was, isn’t any more.

Houseraising, by Ira Wagner, 2017

A photo book with dozens of color images of houses on the New Jersey Shore that have recently been elevated to protect themselves from being flooded in future storms. Presented in a pleasantly loose typological format, mostly but not entirely head-on, each specimen is an essay on adjusted architecture, detached from their foundations, floated upwards, front doors and garages aloft, anticipating the next superstorm. The photographer is Ira Wagner, the current executive director of the Montclair Art Museum, in New Jersey. The book is one of the distinctive dozens produced over the years by Daylight Books, a nonprofit publisher of documentary and conceptual photography that is often very place-based. Some of the other many include *Dammed: Birth to Death of the Colorado River*, by Debbie Bentley; *Aramco: Above the Oil Fields*, by Ayesha Malik; and *Floating Island*, a book of Mike Osborne’s images from his time as a CLUI resident in Wendover, Utah.

How Infrastructure Works, by Deb Chachra, 2023

An expansive and thoughtful set of observations, ruminations, associations, and suggestions on the subject of infrastructure. At times it feels like a podcast, friendly and first person-y, and often returns to fixed points and personal experiences at certain charismatic megastructures, like the Deer Island Sewage Treatment Plant in Boston, and the Dinorwig Power Station in Wales. Chachra is a refreshing new kind of materialist, a materials science professor (at Olin College, a small engineering college in Massachusetts, founded by the fortunes from the Olin Corporation, itself an important and culturally overlooked ammunition and engineering company). Powerplants, ports, water supply, waste management, superhighways, surveying, time-keeping, national defense, internet, electronic codes governing finances and communications . . . it begins to seem like just about everything is infrastructure, meant to be unnoticed, unless it stops working, as they say. Hopefully the new materialism will help us see that infrastructure might actually *be* culture.

The World in a Grain: The Story of Sand and How It Transformed Civilization, by Vince Beiser, 2018

This book asserts that sand is the most important solid substance on earth, and makes its way along interesting paths through the building blocks of civilization that are made mostly of sand: concrete, glass, asphalt, silicone chips (hence computers), and constructed shoreline terrain, made by dredging sand. We learn more about highways, bottles, fracking sand, and the aggregate industry: things like how the aerospace and construction companies Martin and Marietta joined to make missile

bases, and remains one of the largest aggregate companies in the USA today (as the recently rebranded Martin Marietta Materials company). The book concludes by discussing a worsening global sand shortage. Perhaps we’ll see about that.

Gowanus Waters, by Steven Hirsch, 2016

The Gowanus Canal is that short urban waterway in New York City that leads deep into the heart of Brooklyn’s increasingly former industrial darkness. These photographs are ambiguous, suggestive, and silent forensic documents of the water surface only, taken over the span of many years and conditions. In some ways they resemble the enhanced images of NASA space telescopes, but looking downward, scalelessly, into the microcosmic swirls and whorls of addled polluted watery phenomena: the colorful patterns and momentary forms created by that sinewy soup of oily postindustrial emissions in the actively stagnant waters of the canal. Important for posterity, if nothing else, and suitably published by Brooklyn’s powerHouse Books.

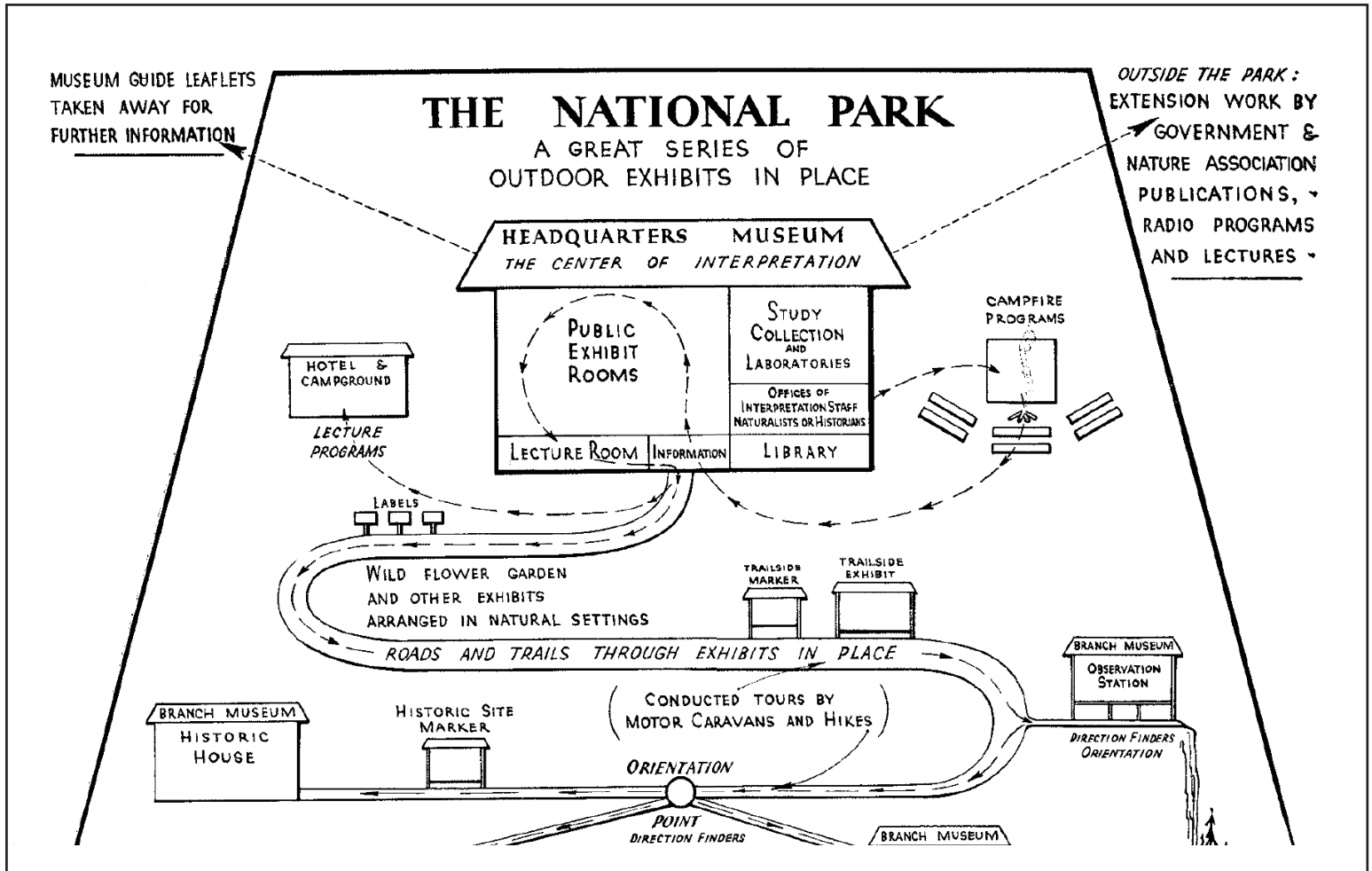
Landscapes of Extraction: The Art of Mining in the American West, by Betsy Fahlman, 2021

The catalog of an eponymous exhibit shown at the Phoenix Art Museum in 2021-2022, curated by Betsy Fahlman. This subject might simply be just too big, even for the largest museum in the state. Extraction, after all, is what begat most of the hard parts of America (besides the more ephemeral consumables that are grown) and the part that lasts: like our mounds of buildings, roads, and the contents of our landfills. The exhibit/book uses dozens of paintings from the 1930s and 1940s, portraying industry in a now distant New Deal and wartime boom, and the present is represented mostly by a few too few photographic aerials and panoramas. A William L. Fox essay does its best to mind the gap and put things in perspective, citing the tools of early hominids, and those of late hominids, like David Maisel, Michael Light, and Ed Burtynsky—the reigning photographers of extraction. The peak, though, might be Erica Osborne’s steamy 4x8-foot painting, *The Chasm of Bingham*, overlooking the backside of the Bingham Pit, and spanning the covers of the book.

Inside the Spiral: The Passions of Robert Smithson, by Suzaan Boettger, 2023

Boettger, an art historian who wrote *Earthworks: Art and the Landscape of the Sixties* has been working on this book a long, long time, and yet it is still the first biography of Smithson. She attempts to decode him, mining his elusive childhood, his early artwork (Christological and occult), and his incisive, oracular writing, concluding that he is chiseled principally from a mix of “replacement child” syndrome (his brother Harold died before Robert was born) and Roman Catholic gloom and doom. Whether this is true, simplistic, or relevant is in the eye of the beholder. His identity was as much a construction as his art, and he dismissed his early work (mostly paintings, prior to 1965) as pre-conscious groping. He breaks the mold irreversibly when he does the *Tour of the Monuments of Passaic*, in 1967; develops the site/nonsite dialectic; partially buries the woodshed at Kent State; and builds *Spiral Jetty*, in 1970. It could have ended there (instead of three years later, crash landing into Stanley Marsh 3’s Amarillo ranch) and that would have done the trick. He seemed to know he was at some kind of apogee at *Spiral Jetty*, running *North by Northwest*-like down the *Jetty*, chased by filming helios-copters, only to face the mirror’s dead end, instead of simply letting himself go, disembarking into the world, off the end of the *Jetty*—as we know now to do. ♦

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Graphic from *The Field Manual for Museums*, an important early National Park Service interpretive style guide, published in 1941.



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