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 2015

Land and water are like matter and antimatter, solid and fluid. They exist in complementary opposition, one defined by the absence of the other. In some parts of the country the land wins, aided by the sun, and rivers dry out into playas before making it to the sea. In other parts, the rivers compound and grow, flooding great plains and thundering over cataracts before splaying into the ocean. Humans live on the edge, between desiccation and inundation, striving for stability by reactively manipulating and responding to the forces of water. -Damon Farrugut

UNITED DIVIDE

THE CLUI LOOKS AT THE USA/CANADA BORDER

The exhibition *United Divide* at CLUI Los Angeles featured more than 1,100 captioned images divided into five regional chapters and shown on five touchscreens, as well as printed and digital maps and graphics, and an official stainless steel border monument on loan from the International Boundary Commission. CLUI photo

AN EXAMINATION OF THE EDGE of an object reveals its shape, and the CLUI is often drawn to the periphery in order to understand spaces and places as a whole. Much attention is given to the USA/Mexico border. But what about the longer, and more complicated line separating us from our largest trading partner, Canada?

Over the course of 2014, the CLUI developed an exhibition about the USA/Canada border, from coast to coast. Titled *United Divide: A Linear Portrait of the USA/Canada Border,* the exhibit presents the nation's northern boundary as a kind of continental cross-section, and describes the relationship between these two countries by considering the incidental and intentional cultural objects that the boundary line creates.

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Editor's Note

Welcome to the 38th issue of the *Lay of the Land*. Inside we discuss CLUI activities conducted over the last year, which we hope you find compelling, in one way or another. Many of our recent programs address the not-unrelated subjects of perimeters, energy, and water. These, we feel, are fundamental aspects of the contemporary landscape. Edges define spaces, water shapes them, and energy propels change. Change they say is in the air, and indeed it is. But it is also everywhere else, all connected through the dynamics of terrestrial and intergalactic ecology. We do what we can to try to figure it out, hoping this has some positive effect on the future. We are forever grateful to you, dear reader, as even though we might exist without you, that existence would have no meaning or bearing on the future. You are the ultimate interpreter and executor of our work. So thanks, truly, for *being there*.

AMERICAN FALLS

URBAN WATERFALLS SUBJECT OF CLUI EXHIBIT

Overlook at Pawtucket Falls, Lowell, Massachusetts. CLUI photo

WATERFALLS ARE UNSURPASSED AS SYMBOLS of the drama of nature, yet many of them are now reconstructed relics, whose controlled flow is often a balance between the economies of tourism and energy production. This does not make them any less beautiful but adds an evocative layer of complexity that compounds their significance and raises their stature as meaningful landmarks of our post-industrial age. Urban waterfalls represent a technological fall from the garden, blending natural nostalgia with hubristic industriousness.

The CLUI presented an exhibition about urban waterfalls in the USA at its main office and exhibit space in Los Angeles in 2014.

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UNITED DIVIDE

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The U.S. Commissioner of the International Boundary Commission, Kyle Hipsley, discussed the border at the CLUI in December 2014. CLUI photo

The USA/Canada border is an international interpretive corridor, passing through rivers, lakes, islands, bridges, airports, parks, towns, farms, pipelines, backyards, and the occasional living room.

Discussed in the CLUI exhibit are structures that are bisected by the line, and the interesting inter-border spaces they create. Also examined are the exclaves and other anomalies of the line, including Indian reservations on the border that make complicated, three-nation zones. The exhibit doggedly follows the line across the continent, from Maine to Washington state, the longest shared international boundary in the world (we left out the Alaska portion, as it is wilderness, mostly, pretty much).

The USA and Canada are the biggest trading partners in the world, with around $300 billion in commerce going over the border each way every year–nearly half of it over a single bridge, the Ambassador Bridge in Detroit/Windsor. 100 million people and 50 million vehicles cross the border every year through 115 ports of entry on the continental border.

On the Canadian side the facilities are manned by the Canada Border Services Agency (CBSA), with surveillance and field enforcement by the Royal Canadian Mounted Police (RCMP). On the USA side, the Customs and Border Protection Agency (CBP), part of the Department of Homeland Security, operates the ports of entry, and its Border Patrol division conducts surveillance and enforcement beyond the port. CBP has more than 60,000 employees, making it one of the largest law enforcement agencies in the world. While the majority work on the USA/Mexico border, at least 5,000 CBP officers, including 2,100 Border Patrol agents, work the USA/Canada border.

While law enforcement agencies prominently and aggressively manage movement north and south over the line, the boundary itself is an east/west structure, running perpendicular to the flow across it. When it is not following a waterway, like the St. Lawrence River or the Great Lakes, it is a 20 foot-wide, monument-studded corridor, marked, cleared, and maintained by the International Boundary Commission (IBC). The IBC, composed equally of Canadian and American representatives, exists to make sure the boundary is fixed,

The international boundary passes through towns, like Derby Line, Vermont, where it grazes structures including this garage, and goes through several buildings directly. CLUI photo

The international boundary passes through a few commercial buildings, like the Halfway House, in Fort Covington, New York, which has seperate entrances on either side of the border. CLUI photo

Dozens of bridges span the international boundary, such as this one in Baudette, Minnesota. Often the change in paint or maintenance schedules is reflected on the bridge's structure. CLUI photo

The international boundary is marked as it crosses the midpoint of the Detroit Windsor Tunnel, 75-feet under the surface of the Detroit River. This is the only subaqueous international vehicular tunnel in the nation, if not the world.CLUI photo

At the International Peace Garden in North Dakota, the international boundary is celebrated and manifested physically in a multiplicity of forms, from pools to towers, and even runs through the middle of an organ keyboard. CLUI photo

Several ports of entry were built on the border itself, such as this one in Danville, Washington, with Canadian customs and immigration on one side, and American customs and immigration on the other. CLUI photo

visible, and uncontested. Their job has little to do with enforcing the immigration and customs laws of either country, but rather with bringing attention to the line itself, and to making sure people know where it is, exactly.

Early surveys marking the boundary, of course, were inaccurate, without the benefit of more advanced technologies, but it was agreed that the boundary would be accepted *as surveyed*. The result is that even the apparently big straight lines on the boundary, like the 49th Parallel, are not completely straight at all. The border zigs and zags.

The border is made up of more than 11,000 straight lines, ranging from a few feet to many miles in length. 5,700 of these lines are over water, including many meandering streams, and are recorded as turning points, marked by reference monuments on shore. Over land there are more than 5,300 fixed points, between which are the straight lines that make up the terrestrial border. Most of these points are marked with a monument, which range from a small brass medallion to a tall stone obelisk.

With a staff of less than 30 people and an annual budget between $3 million to $30 million, the IBC maintains more than 8,000 monuments along the boundary. It also preserves the cut line, clearing away all bushes and trees for ten feet on either side of the boundary. This, more than any other feature, makes the boundary visible, and creates a swath, 20 feet wide, through more than 1,300 miles of forested land.

Since the 1960s, the IBC has been authorized to regulate all construction that occurs within the 20-foot boundary zone. In the interest of maintaining a clear unobstructed view of the boundary, this generally means saying no to all new construction except for roads and pipelines, and even, in most cases, denying permission to substantially repair existing buildings.

If an old barn that happens to be on the line needs to be rebuilt, the IBC will encourage the owner to tear it down, or rebuild it away from the line. This, along with the complications of dealing with two sets of building codes, two sets of contractors, and two insurance companies, means that most buildings straddling the line are now abandoned and falling down. There once were hundreds of buildings on the line (many of which were used to serve liquor during Prohibition). Now there are less than 40.

On one side, the boundary is the cold, northern edge of the USA, where the population peters out, and the landscape becomes frontier-like. But then, on the other side, it starts all over, as the warm, southern edge of Canada, with some of the best farmland in that country.

The CLUI's mandate is to examine American culture by looking at the ground, and though the exhibit covers international space, it is about the USA's northern boundary, not Canada's southern one. Perhaps it will be combined someday with a similar project, told from the Canadian point of view, creating a North American portrait, united by the dividing line. ♦

See the article about the boundary of Maine on page 21, and view the online exhibit at www.clui.org.

SOLAR BOOM
UTILITY-SCALE SOLAR IN THE USA

The CLUI presented an exhibit, *Solar Boom,* about the current state of industrial-scale solar in the USA at its space in Los Angeles, in 2014. CLUI photo

MORE THAN A DOZEN massive solar power plants, each covering a few square miles and capable of producing 150 megawatts or more, are being built at the moment, or are already in operation, in the southwestern United States. There were only two of this size, ten years ago, in the whole of the USA.

Ranging in projected capacity from 250 to 550 megawatts, each of these new plants, by themselves, would be the largest in the world. And though they are being built in California, Nevada, and Arizona, nearly all of the power they produce is headed to southern California. The legislated mandate to decrease California's dependence on fossil fuels is the primary driver of this boom.

Some people have calculated that it would take 10,000 square miles of solar panels to produce enough electricity to meet the demands of the USA–an area the size of Massachusetts. In the desert southwest, where some military reservations are as large as some New England states, and the sun shines more than 300 days a year, the process seems to be underway.

With so many proposed projects, and so many stalled in the complicated political and regulatory process, it's hard to know where things are really at with large-scale solar, at the moment. So in February 2014, photographers from the CLUI spent two weeks on the road, visiting all the major operating or "under development" solar power projects in the southwest, to verify the situation on the ground.

Every solar project over 50 megawatts was visited, and many others, generating as little as 15 megawatts. The CLUI photographed all projects of 150 megawatts or more from the air, primarily with a drone. These images were featured in the exhibition *Solar Boom: Sun-Powered Electrical Plants in the USA*, held at CLUI Los Angeles in March 2014. An online resource, with a map locating all of the major solar power plants in the country, was also produced as part of this program. ♦

See the online map of Solar Boom sites at www.clui.org.

Imperial Valley, California

CLUI photo

The Centinela Solar Energy Project is one of a few large photovoltaic power plants in the Imperial Valley, built on agricultural land near the Mexican border, over the last three years. The Imperial Valley now produces around 1,000 megawatts of solar power, similar to what a large gas or coal-fired power plant produces, and what around 350,000 homes consume. This amount is produced only at peak output, of course, and when the sun is shining.

Central Mojave Desert, California

CLUI photo

The Desert Sunlight Solar Plant will be tied as the largest solar power plant in the world if it is built out to its expected 550 megawatts. Construction started in 2011, north of the remote Mojave town of Desert Center, and it is expected to be complete in 2015. Built by First Solar, Nextera, GE, and Sumitomo, the plant is likely to cost more than $2 billion, cover 3,800 acres, and use 8,800,000 photovoltaic panels. It is one of two large plants nearly completed along the Interstate 10 corridor, between Joshua Tree National Park and the Colorado River. Other large plants have been permitted for this area as well.

Gila River Valley, Arizona

CLUI photo

The Agua Caliente Solar Project produces more than 250 megawatts, and is expected to produce as much as 397 megawatts when it is complete. It will have 5,200,000 photovoltaic panels, covering close to four square miles (2,400 acres). It is the westernmost of a chain of several utility-scale solar plants following the Gila River Valley, west of Phoenix, which collectively produce close to 1,000 megawatts. With expansions and new plants proposed for the region, this amount could double in a few years.

Carrizo Plain, California

CLUI photo

The Topaz Solar Plant is the larger of two major solar power plants in the remote Carrizo Plain of California, in the Temblor Range, west of Bakersfield. Construction started in 2011, and by early 2014 it was producing 360 megawatts, more than any other solar plant in the country. By the time it is complete, sometime in 2015 it will have over 9 million photovoltaic panels, producing 550 megawatts, likely making it the largest solar power plant in the world. The nearby California Solar Ranch produces 250 megawatts, and was completed in 2013. Together the scattered clusters of solar panels at these plants cover close to ten square miles.

Antelope Valley, California

CLUI photo

The first phase of the Antelope Valley Solar Ranch went online with 150 megawatts in 2013, and is expected to produce more than 230 megawatts when it is complete. The Antelope Valley, north of Los Angeles, has a dozen utility-scale solar plants fully online or soon to be, capable of supplying more than 1,100 megawatts at the end of 2014. At the eastern end of the valley are three solar thermal plants, built in the late 1980s, which until ten years ago, were the only large utility-scale solar plants in the USA. One of them, at Harper Lake, is tripling in size at the moment.

Southern Nevada

CLUI photo

Construction started on the Copper Mountain 3 Solar Plant, a 250-megawatt photovoltaic power plant, in 2013, and it is expected to be completed in 2015. It is located in the El Dorado Valley, south of Las Vegas, near some other, smaller solar plants that are already online. This area, south of Las Vegas, has a half dozen utility-scale solar plants under construction or online, together capable of providing close to 800 megawatts. This includes the 392-megawatt Ivanpah Solar Plant, built by BrightSource, Bechtel, NRG, and Google, which opened in 2014, just over the state line in California. At least another 1,000 megawatts of solar is planned for the area.

EXTRACTIONINGS AND DEFLATIONSCAPES

A SURVEY OF SALT DOMES OF THE GULF COAST

The Spindletop salt dome near Beaumont, Texas, is the site of the 1901 gusher that brought in the modern petrochemical age, and established the Gulf coast as its epicenter. It also started the search for salt domes as most likely sited to find oil. Today the Spindletop oil field is largely depleted, and the salt dome is used as an underground storage site for oil and gas, and waste injection. CLUI photo

SALT DOMES, NATURALLY OCCURRING geological formations, have attracted dramatic transformations. Though they exist in other parts of the USA, they are mostly found in the Gulf region of the southeast, where hundreds of them are scattered in a great arc from Texas to Louisiana. Many linger unmolested, deep underground. Others approach the surface (or the surface erodes down to them), revealing themselves and the opportunities they offer. Others have been sought out, detected by subsurface imaging technologies, and been bored and excavated remotely, while remaining thousands of feet below the surface.

To understand how salt domes form, imagine a lava lamp, where a less dense fluid moves upward within a more dense one, forming a bulbous bulge, like a giant raindrop falling upwards, in slow motion. In geology, this occurs when subsurface pressure forces less dense material, like salt, upwards through a crack in strata, forming an intrusive column of the material, surrounded by rock. The salt domes of the Gulf are pressed upwards from a *mother layer* of bedded salt much deeper underground.

Continuously forming in geologic time, these underground columnar bubbles can be thousands of feet across, and their heights can extend for miles. When the tops of these structures get within range of human access, at least a few thousand feet below the surface, they become useful to us.

When they near the surface, salt domes can form a bulge that is perceptible as a low, round hill, often the only topography in the flat marshlands of the Gulf. With erosion they can breach the surface, and become a circular mix of salty earth and water, a subtle topographically anomalous zone, covered over by whatever foliage is indigenous to the region. Generally the surface features of the salt domes in the Gulf are contained within a circle a mile or two in diameter.

A significant effect of these monolithic geologic intrusions, especially in the Gulf, is that oil can flow through the pierced rock layers, collecting in pools around the edges of the formations. This was quickly discovered at Spindletop–the discovery well of the Texas oil boom. After that, salt domes were sought out and drilled out, the low hanging fruit of the oil patch.

Part of the Sour Lake Dome, west of Beaumont, Texas, has collapsed into a lake, which is still growing. This was the birthplace of Texaco, and some call it the oldest continuously producing oil field in the world. There are several surface operations here still, including an olefins plant operated by Flint Hills, and storage operations by Motiva. CLUI photo

The result is that many salt dome landscapes are beat-up old oil fields with spent wells, old collection ponds, pipelines and machinery. With all that extraction, they often deflate and subside, forming ring-like lakes around the edge of the dome. Waste products from the oil industry are often disposed of by injecting them into the ground through spent oil wells. In this way salt domes become waste sites below the surface as well.

The salt is hardy though, and drillers have found another way to use these domes, now linked by pipelines and roads. Injecting water into them through a drilled hole dissolves the salt. Using the force of the injected water to push the saltwater out another drilled hole leaves a watery cavity inside the salt. This is called solution mining, or salt cavern leaching, and it leaves a hole that can be filled with anything you want to put in there. And around here, that means, mostly, natural and petroleum gas, which is usually found or produced with oil products, but often has to be vented or burned off if it doesn't have a way to get to market immediately. Unless you have a way to store it.

Petroleum gas (mostly propane and butane produced in large quantities as a byproduct of refining, and a major source of heating energy) and natural gas (which is mostly methane, and is less processed, coming out of oil producing regions "naturally") has been stored in salt domes in this way now for decades. The chambers are often around 1,500 feet tall and 300 feet wide, and their shape, vertical and irregular, resembles an upside-down carrot. A cavern like this can hold more fluid than a supertanker. Some domes have dozens of these cavities in them, clusters of upended buried carrot/supertankers. Most of the gas stored in these cavities is liquefied petroleum gas, (LPG) meaning it is compressed or chilled to the point where it becomes fluid, taking up a fraction of the volume that gas in gaseous form takes.

SALT DOMES

All over the country, natural gas is stored underground, especially in the Midwest and Northeast, where it is used in great quantity to heat homes in the winter. In these places it is usually pumped into storage in the ground itself, in wells drilled into rock formations, most often in depleted gas or oil fields, where gas was extracted already, and flows back into cracks and fissures and porous rock around the well. Some of it is not recovered when it is extracted; it gets lost in the rock, or leaked to the surface. This is a problem.

In salt domes, however, the sides of the salt cavities are dense, and all of what is put into them, comes out–plus a little extra salt, which has to be washed out of the gas. Over time, though, this little bit of salt, eroding from the walls of the cavity, slowly enlarges the cavity, sometimes by as much as 2% per year. As the cavities grow, they deform, sometimes developing unstable, bulbous shapes. Pieces can even break off inside the cavities, hitting pipes that, with erosion, have become suspended in open space. If you have too many cavities close together, full of pressurized gas, and the walls between them is thinning, this, too, can be a problem.

Given the range and volume of liquid and gas products produced in the Gulf region–more than half of the nation's petrochemicals are produced there–the industry's storage needs are large and diverse. Cavities in salt domes contain primarily liquefied petroleum gas products such as propane and butane, but also other hydrocarbons like ethane (a feedstock for ethylene), ethylene, and even gasoline and crude oil.

The Cote Blanche Dome, also known as White Castle, is one of five in a row along Louisiana's coast which have been mechanically mined for salt, including the Tabasco plant at Avery Island. This one is mined by the North American Salt Company. CLUI photo

Salt domes also contain useful minerals themselves–salt, mostly, which is mined directly from them in excavated underground caverns, with trucks, bucket loaders and railcars, or by solution mining with water, which is then removed to produce dry salt. Most of the salt consumed with food comes from mined salt, some from the domes in the Gulf region, and from underground salt mines in the northeast, and elsewhere.

Many of the solution mining operations in salt domes in the Gulf, like those performed by the Texas Brine Company, are to supply liquid brine for industrial and chemical operations, such as water treatment in petrochemical plants, or for oil field operations, which use a lot of water. Brine is also a by-product of salt cavity formation, and is often stored in ponds or in cavities on site to push other stored fluids out of cavities.

Just a few of the houses from the company town of Newgulf remain at the Boling Dome, southeast of Houston, which for a time was the site of the largest sulphur production plant in the country, operated by Texasgulf Company. 8,000 sulphur wells and 12,000 gas wells have been drilled here, and a number of sinkholes have formed, one swallowing a road in 1983. Ruins of the plant remain on site, and portions of the dome are used for gas storage, where underground caverns have a capacity of at least 7 million barrels. CLUI photo

Sulphur, used in great quantities for fertilizers and other industrial products, can also be found at salt domes, generally in the caprock above the top of the dome. The once-dominant process for extracting sulphur, known as the Frasch Process, originated in the Gulf, and involves injecting steam into the ground to liquefy the sulphur and extract it as a fluid for processing. This involved a lot of wells, and a major heat plant to produce the steam.

Gulf coast salt domes were one of the leading sources of sulphur in the world through the middle of the 20th century, until a more economical way to produce it from natural gas and oil was developed. The last Gulf-area sulphur plant closed in 2000, though the remains of this brimstone industry can be found at many locations in the form of ponds, pools, foundations, and a deflated topography.

Though underground, and in a sense invisible, salt domes are a key feature for understanding the current patterns of development and transformation of the Gulf region. Their submerged monolithic simplicity belies the complexity that their existence engendered, through industry. ♦

The Hull Salt Dome in Daisetta, northeast of Houston, is a major gas storage facility operated by ExxonMobil. In 2008, a 600 foot-wide sinkhole formed suddenly at the north end of town, swallowing trucks and some buildings. The hole, now stabilized, is a round lake. CLUI photo

See the online map of salt domes at www.clui.org.

LAKES OF THE MOJAVE
ISLANDS OF WATER ALONG A RIVER OF SAND

The CLUI conducts many research and documentation programs in the Mojave Desert, a region of national importance, that harbors many extremes of American technology, industry, and culture. An ongoing research program concerning the lakes of this arid environment, was presented as a public lecture by CLUI director Matthew Coolidge, during an event at the CSU Desert Studies Center, in Zzyzx, California, sponsored by High Desert Test Sites, out of Joshua Tree, California.

THERE ARE TWO KINDS OF lakes in the Mojave, wet ones, and dry ones. Depending on how far you stretch "Mojave" and how small you measure the lakes, there are maybe as many as a hundred of the dry variety, each at the bottom of their localized drainage basins, indigenous creatures of the desert–and each is interesting in its own way.

The wet lakes, however, are another matter. There are a few dozen of them and they stand out anomalously, perilous products of pumping along an artificially recharged aquifer. Their connective tissue, in this most dry land, is sometimes hard to see, but is very much there. Despite all appearances to the contrary, a river runs through it: the Mojave River, running through the Mojave Desert.

The very name of the place, Mojave, comes from a native word meaning "beside the water," suggesting both that there is water to be next to, and that there is something besides water–dryness. The Mojave River, therefore, is a river beside the water of the river, which is very much the case.

The Mojave River begins in the San Bernardino Mountains, the range that divides the Inland Empire of the Los Angeles region from the eastern Antelope Valley, and the desert communities to the north (Hesperia, Apple Valley, and Lucerne). Its origins thus appropriately are in the fulcrum between urban and rural, wet and dry, and flowing decidedly northbound, into the latter.

These are the origins of the river, but this is not the source of the water. The primary reservoir for the river's water is Silverwood Lake, in the San Bernardinos. It was constructed in 1971 to hold water coming down the California Aqueduct from northern California.

A headwaters of the Mojave River is Silverwood Lake, a reservoir in the San Bernardino Mountains. CLUI photo

The source for the Mojave River is therefore more than 450 miles away, in the northern Sierra Mountains. The water is pumped out of a canal up to Silverwood Lake, the highest reservoir in the State Water Project. Water flows downhill–yet again–from here into municipal water supplies and local agriculture, and, some of it, into the Mojave.

The riverbed itself though is dry, mostly. The river flows slowly, through groundwater, underground. This groundwater is enhanced by injections of Northern California water from buried pipelines at seven points along the river, starting at the base of the hills below Silverwood Lake. Downstream the intravenous pipeline follows along the river bed all the way to Newberry Springs, more than 60 miles away.

Consistent surface water appears first, pumped into the ponds around Jess Ranch and its golf course/housing development. The first true lake along the Mojave River is Spring Valley Lake, constructed from scratch in the middle of an eponymous housing development in Hesperia. This is the largest lake in the Mojave, and on the Mojave, a development with 4,000 house lots, hundreds with water frontage on constructed promontories that look like gloved fingers, or saguaro branches.

From there the river enters a parkland, where it comes close enough to the surface to produce some greenery, then gets pinched to the surface for real in the Mojave Narrows next to Victorville, one of two places on the river where the river flows like a river.

Along old Route 66 north of Victorville, the underground river passes cement plants that pull water from it, and sewage treatments plants that put water back in. Then there is the second of the big lakes of the Mojave, Silver Lakes, another housing development built around two artificial lakes of pumped water, North Lake and South Lake, at Helendale.

The dry river flows onward, arcing eastward through Barstow and Yermo, then kind of splays out in a V-shaped valley, bounded by Interstate 15 on the north, and Interstate 40 on the south, as the highways radiate outwards from their convergence in Barstow.

This valley, around Daggett and Newberry Springs, is where most of the wet lakes of the Mojave can be found, among sporadic central pivot alfalfa farms and desiccating ranch ruins. The lakes are all

All of the lakes of the Mojave in the Newberry Springs area are privately owned. CLUI photo

private constructions, part of small developments, or single private homes. Most are intended to be recreated upon, and not to simply be ornamental.

The lakes fall generally into two types, linear and nonlinear. Both types usually have small islands and are just a few acres in size. Most have names, and are behind gates.

Lake Jodie, one of the larger lakes in the Newberry Springs area. CLUI photo

On linear lakes, the islands tend to be on either end, as these lakes are mostly constructed for waterskiing behind motorboats, and the islands serve as turning points on either end of what is essentially a wet track.

There are about a dozen of these types of lakes in the region, most with more than ten homes along the shores, usually with docks, including: Silver Dunes Lakes, on Dune Road, set diagonally within its square property perimeter; Great Lakes, a water ski tournament lake with two parallel adjacent lakes; Wet Set Village, a single lake, with a waterski jump; and Cheyenne Lake, which is similar and next to the twin Sundown Lakes.

The second type of lake is more irregular in shape, and often has islands in the middle. They are meant to be used for a wider variety of watersports, in the middle of larger settlements (up to maybe 50 homes), such as at Lake Jodie, where counter-clockwise rotations are the rule, and a 35-mph speed limit, and only 5 boats at a time, please.

Most of the man-made lakes and ponds in the Newberry Springs area have been allowed to dry out once their owners stopped maintaining them. CLUI photo

All told there are around 20 wet lakes in this valley, though many more have been abandoned, and have dried out. The lakes are inherently unstable, and need to be continuously maintained to ward off the desiccation that dominates the Mojave.

One notable victim of the forces of desiccation is Lake Dolores, on the north side of Interstate 15. It was developed into a recreational water park in the 1960s, with water slides and cement-lined ponds in addition to its large artificial water ski lake. Known over the years as the Discovery Water Park and the Rock-A-Hoola Water Park, it closed for the last time in 2004, and much of its recreational apparatus was sold and shipped off. After the security guards left, the park's remains were transformed by passers-by, on this the "desperado highway" between Los Angeles and Las Vegas, into a blasted theme park ruin, a spray-painted skateboarder's paradise, and a kind of anything goes open space, a manufactured and deconstructed dry lake.

The former Rock-A-Hoola Water Park at Lake Dolores is now a dry lake and a battered abandoned amusement park. CLUI photo

The Mojave River, meanwhile, continues eastward, between the interstates, a riverbed of dry sand above the pumped out aquifer. It enters Afton Canyon, a mountain pass, the second place where rocks squeeze the underground river to the surface, briefly.

On the other side of the canyon, the river splays out into a wide valley, at the bottom of which is the vast plain of Soda Lake, a dry lake bed that, during occasional flood events, serves as the terminal lake at the end of the Mojave River. There is little in the way of development on Soda Lake, just a few dirt roads across it, and the town of Baker, on Interstate 15 near its northern tip. On its western shore is Zzyzx, at the end of the alphabet, and the end of the Mojave River. ♦

The Mojave River, a river of sand through the desert. CLUI photo

WINDOWS ON ROCKS
DEVELOPING VIEWS OF MONUMENT VALLEY

MONUMENT VALLEY IS SO ICONIC that to arrive there is to enter a photograph as much as it is to arrive at a place, like being there and not being there at the same time. This duality is reflected in the two gift shop/restaurant/hotel/tourist complexes there, each representing a different point of view of the place. One, of it as imagery, brought about by non-Native Americans over the last century, while the other confronts its physicality head-on, representing the management of the site by Native Americans.

View 1: Gouldings's Lodge

A few miles to the west of the monuments is Goulding's Lodge, where movie crews and tour buses have been coming for years. There is an airstrip bringing A-list tourists by charter planes from Las Vegas, a restaurant that can handle hundreds of people at once, and a hotel with 70+ rooms.

The history of Goulding's is that of an old modern American version of the west, the cinematic, and the romantic. Monument Valley was off the beaten path historically, there were no trains anywhere near it, nor settlements of any size, no mineral resources, no crossroads. It had been left out of the national discussion, kind of overlooked. When white man finally settled here, the barbarous wars with the natives were over, and this land was still mostly untouched.

Harry Goulding, a sheep-herder and trader from Durango, Colorado, first visited the valley in 1921, loved the drama of the landscape, and figured it would be good place to set up a trading post. The land, however, belonged to the Paiutes, who did not encourage white settlement. In 1923 the state of Utah offered the Paiutes some arable land in the northeast part of the state, at what is now the Uintah Reservation, and Monument Valley became state and federal property again.

Goulding and his wife "Mike" moved to the valley in 1925 and bought a square mile of land from the state for fifty cents an acre –$320. When the Navajo Nation expanded into this area, known as the Paiute Strip, in 1933, the Gouldings were able to hold on to their land, and it remains a private island surrounded by the largest Indian reservation in the country. An island of white.

During the last years of the Great Depression, desperate for ways to bring revenue to the region, the Gouldings struck upon the idea of marketing the dramatic landscapes of the valley to Hollywood. Legend has it that they went to Los Angeles with their last $60 and armed with panoramic photos of the valley taken by Josef Muench, a German photographer who had befriended them on his roaming forays into the desert. The Gouldings went to the studios of United Artists and told the uninterested receptionist that they would camp in the lobby until someone talked to them. An executive who was summoned to throw them out was allegedly struck by the images, and they were soon showing them to the director John Ford. The Gouldings went home with $5,000 to make arrangements for the arrival of a film crew at their trading post, including accommodations, provisions, and organizing local Navajos to play marauding Apaches. The film, when it came out in 1939, was called *Stagecoach*, and it

Goulding's Lodge is the earlier of the two establishments built to overlook Monument Valley, and is set back a few miles from the rocks, on privately owned land, surrounded by the Navajo Reservation. CLUI photo

introduced John Wayne as a leading man to the world, as well as Monument Valley as a leading place.

Ford shot six more films in the valley, including 1956's *The Searchers*, one of the most influential Hollywood movies of all time. By then their small trading post had expanded into a lodge, with dozens of guest cabins and a dining room. The Gouldings invited the Seventh Day Adventists to build a heath clinic and a mission there to serve the local community, and houses were built up Rock Door Canyon, past the lodge. Tourism continued to rise in the post-war years, and Monument Valley, so well-known internationally through films, became one of the great American destinations–and Goulding's was the only commercial establishment around.

With Harry's health declining, the couple moved away in 1962, living in Page, and then more suburban Sun City, Arizona. The Gouldings gave the land, the lodge, and the trading post to Knox College in Galesburg, Illinois, whose president they knew, with the hope of establishing scholarships for local Navajos to attend school there (which happened only once).

The college did not manage the place well, and they angered the locals, causing the Goulding's reputation and legacy to suffer. In 1981, a sale was arranged to the LaFont family, who operated a respected tourist business at Canyon de Chelly, Arizona. Harry died that year, not living to see the successful restoration, marketing, and expansions undertaken by the LaFonts in the following years. Harry's widow, Mike, was even persuaded to move back into a house they built for her at Goulding's.

By 1989, the old trading post building, which included the Goulding's original home, was under-utilized and in disrepair. A cousin of the LaFonts, with art and construction experience, was tasked with turning the old building into a museum, in three months. With the guidance of Mike Goulding and donations of photographs, furniture, and memorabilia, the building was gutted and rebuilt to resemble how it was in the old days, when John Ford was a dinner guest, and the trading counter, known as the Bull Pen, was the place of business for a broad and remote region, and a point of contact between the natives and the world brought in by the white man's movies.

The View Hotel and Restaurant was built by the tribe a few years ago, greatly expanding the footprint of the visitor center that overlooks the rock formations of the Valley. CLUI photo

View 2: The View

Head east off the highway that leads into the valley, instead of west towards Goulding's, and you soon enter the Monument Valley Tribal Park, and a very different kind of visitor experience.

To most Americans hitting the road with their families in the post war boom of the 1950s, the valley and its distinctive buttes was the setting for the affirmation of the Cowboy and Indian myth as told by Karl May, John Ford, and others. To the Navajo, of course, the landforms were the walls of their home and the spires of their church, which was increasingly overrun by tourists. Limiting access to the valley became critical to the Navajo, and so the Monument Valley Tribal Park was created in 1958.

Initially, it covered 30,000 acres around the primary landmarks, but was later expanded to 92,000 acres. Public access to the park was restricted to people who had contracted with licensed and registered guides. Though the park was unfenced, and people could find their way in, side roads were increasingly posted, and blocked. Signs along the highways directed visitors to an overlook and parking lot at the end of a four-mile dead-end road off Highway 163. This was, and continues to be, the only public access point into Monument Valley.

At the parking lot were trailers and shade structures housing vendors of native artifacts, fry bread, and guides who could be hired to take visitors into the park by horse, foot, or jeep. 17-Mile Drive left from here, and became the main road through the valley, and flatbed trucks with benches and other forms of customized high-clearance trucks amassed to carry tourists into the park. A campground was developed next to the lot, and a visitor center and gift shop was built, with overlooks framing the view. It was a pretty chaotic and unregulated operation, with vendors and tour guides often aggressively competing for business, a refreshing change from the stoic rigor of the National Park Service.

Though the vendors were eventually moved to the service road outside the gates of the park, that is pretty much how it was for nearly 50 years, until 2008, when a new hotel opened next to the visitor center.

The controversial project, supported by the Navajo Nation Resources Committee and Navajo Nation Parks and Recreation Department, was conceived and built by ARTSCO, a non-native company owned by Art Ortega, whose family, over a few generations, had developed a regional trading post empire, with real estate, gas stations, and jewelry stores along the highways in Arizona and New Mexico.

The hotel is managed by his daughter, Armanda Ortega-Gordon, who is a Dine/Navajo on her mother's side (a member, fittingly, of the Towering House Clan), and who her father credits as having come up with the idea of the hotel here when she was a teenager, several years ago.

The $14 million project, called The View, has 96 rooms, each with a balcony facing the classic view of Monument Valley. The rooms are often sold out by Japanese and European tour companies. There is a restaurant, with stepped levels to maximize the views from the tables. It is attached to a new $10 million visitor center and gift shop/trading post, which opened a year later, the first major remodeling of the Monument Valley Visitor Center since it was originally built in 1960.

The park remains remote: hard to get to from other places, and, once there, hard to get into. 350,000 people visit every year, less than the big National Parks get in a month. Though 17 Mile Drive is open to private vehicles, after passing through the fee station to get into the park, it is still unpaved and very bumpy. The 3.2-mile Wildcat Trail leaves from next to the hotel, and makes a loop around West Mitten Butte. It is still the only trail in the park accessible without a guide. All other access to the park, as well as the rest of the back-country on the 26,000 square-mile Navajo Reservation requires a special permit. These restrictions help to limit visitation and alteration inside the park's interior.

The new hotel and overlook focus attention and traffic where it should be, on the view, something that can only be had from the margin. The new development affirms that this is a park that is about a view, and not really a place to be visited. A destination to see, rather than experience. Not so much a place at all, even, but a perspective. Come here if you must, or just watch it in the movie myths, which is where it actually resides, for most of us. ♦

The view from The View. CLUI photo

CLUI CONDUCTS HIGH VOLTAGE BUS TOUR

DWP HISTORY IS STILL *CURRENT*

The CLUI High Voltage Bus Tour at Power Plant Number One. CLUI photo

THE ELECTRICAL SUPPLY AND DISTRIBUTION network of the Los Angeles Department of Water and Power (DWP) was examined in a bus tour the CLUI organized and led as part of the exhibit *DWP Power*. The DWP was kind enough to allow us to visit some of the ordinary and extraordinary elements of the electrical infrastructure that exists behind their gates.

Taking place on February 7, 2014, the tour left from the CLUI office in Los Angeles, where participants had a chance to view the extensive exhibit about the DWP electrical system that was on view in the CLUI exhibit space.

The bus headed west on Venice Boulevard, then north on the 405 and into the San Fernando Valley, going up river in a sense, up the flow of water and power that enters into the city from its portal at the north end of the valley. An on-going narration by CLUI director Matthew Coolidge provided an overview of the system, pointing out some of its features along the way, such as Distributing Station Number 28 at Cotner and Nebraska, a handsome Art Deco-style building built in 1935, and Distributing Station Number 135 at Sunset Boulevard and the 405, built in 1989 and thus more postmodern in appearance. These are some of the 150 Distributing Stations operated by the DWP to step down the high voltage from receiving stations to the feeder line level found on the wooden utility poles that bring the last-mile of power to businesses and homes.

The bus turned east on Highway 118, south on I-5, exited at Shelton, then crossed over San Fernando Road to our first stop, the Valley Generating Station. We had to wait awhile at the gate while DWP worked out their security issues. Weeks before we had given them a list of names and driver's license or passport numbers for everyone coming on the tour so they could run it through their security screening process. And, as instructed, everybody on board had brought identification with them, and we provided a printed list they could use to check everyone off. But a recent article in the *Wall Street Journal* about people shooting out a substation in Northern California might have put some at the utility on high alert.

Once we worked all this out, the manager of the facility came on board and guided us around the plant. We first did a loop around Receiving Station M, one of a couple dozen receiving stations operated by the DWP, where high voltage comes in directly from power sources, whether by high tension lines crossing hundreds of miles from power plants in the desert, or by local power plants like this one, immediately adjacent.

Receiving stations are high voltage electrical yards, with switchgear outside in rows. At these facilities the output of the plant is cleaned, regulated, and processed, then sent out to other receiving stations and distributing stations, usually at around 230,000 or 138,000 volts.

The first stop on the tour, the Valley Generating Station. CLUI photo

The site is dominated by the looming smokestacks, boilers and cooling systems of the Valley Electrical Generating Station. This is one of four gas-fired power plants operated by the DWP, which collectively provide around 25% of the department's power (around 50% comes from two out-of-state coal plants and nuclear plants, and the rest is from hydro, wind, and solar).

Built in 1953, Valley Electrical Generating Station is the oldest of the four. The total output for the plant is around 600 megawatts. By comparison, the other gas plants provide as much as 800 megawatts (Scattergood), 1,600 megawatts (Haynes), and 450 megawatts (Harbor). These three are all on the coast. Valley is the only inland plant, and uses groundwater and piped water to cool its generators.

A briefing in the Operations Training Center at Truesdale. CLUI photo

The two oldest units have been shut down (#1 and #2), and two others have been upgraded (#3 and #4). There are also three new, more efficient units that were added around ten years ago. The bus runs down the row, where the units are all laid out, from oldest to newest. We then loop around the plant to enter the other side, at the Truesdale Training Center, where we are met by a new group of briefers, who are much better prepared, and even seem happy to see us.

We enter a room for a briefing, and then split into groups to tour the grounds by foot. Truesdale is the facility where the DWP trains its workers. Its an anatomical display of their operations, intended to instruct people about how it works. A perfect place to get an understanding of an urban electrical distribution system.

There is a control room training center with a wall-sized diagrammatic switchboard of a system similar to the actual DWP network, that lights up and responds to provide realistic and interactive training scenarios. There is a yard full of switchgear equipment and underground vaults that is off-line and labeled, so maintenance crews can safely interact with them. And there is a display showing different types of cabling, splices, fuses, and couplings, along with benches for people to practice splicing techniques and other common activities of electrical mechanics and line workers.

Pole climbing briefing at Truesdale. **CLUI photo**

Then there are the pole yards. Truesdale has dense forests of wooden utility poles, some topped with transformers and other appurtenances, set up to practice climbing and doing line work. Truesdale is also the site where the lineman's rodeo is held every year, a regional competition held for electrical workers and their families.

After our visit, we head out the gates and back on the streets of Sun Valley and the eastern San Fernando Valley, a landscape of gravel pits, scrap yards, landfills, and power plants–all very useful things. We pass the recharge ponds for Tujunga Creek, a once-wild wash that is now managed nearly out of existence, and the base of the Hansen Dam, a terrestrial fortification holding back the onslaught of erosion coming out of the chaotic hills, sparing the urban grids. The earthen dam itself is huge, and is largely covered over by a golf course's sea of green. Behind the dam is a sacrificial provisional recreational zone with ponds and streams, calm dribbling preludes to Tujunga's potentially catastrophic surge.

As we curve around the basin damspace on Foothill Boulevard, we pass the unmarked landmark where Rodney King was videotaped while being beaten by the LAPD in 1991, triggering events that would change the sense of the city. The anonymous walled compound of town homes in the background above the curb is strangely evocative, and somehow familiar. Then onto the Foothill Freeway.

Passing over Pacoima Wash, we are just few hundred yards downstream from the site of an often forgotten Los Angeles infrastructure disaster, the Sylmar Tunnel explosion of 1971, where 17 miners building a water supply tunnel for the city were killed. But we are looking at power and not water on this trip, so we pass by the tunnel portal site without stopping. Besides, that was a Metropolitan Water District project, not a DWP one.

Our next stop is up the road at the Sylmar Converter Station, a unique but vital facility supplying the region's electrical circulatory system. This is where the high voltage DC line from the Bonneville Power Administration plants along the Columbia River comes into Los Angeles. Known as the Pacific Intertie, this is one of the longest DC lines in the world, carrying as much as 3,000 megawatts at 500,000 volts DC over 800 miles of the west.

The use of DC instead of AC in long distance lines occurs only in a few cases, when a power source is far from its market, and there are no stops in between, where the current is converted from AC to DC on one end, then from DC to AC on the other, to reduce loss of current along the line.

The longest one in North America runs from northern Quebec to the suburbs of Boston (HydroQuebec is a major source of power for the northeastern USA). The Pacific Intertie, terminating here at Sylmar, is the second longest. The third longest one connects the Intermountain Power Plant in Utah to Adelanto, north of Los Angeles, and was also built by DWP.

Our bus enters the Sylmar Converter Station, escorted by a DWP car, and trailed by a DWP security truck. We pass through the forest of outdoor switchgear, with peg-legged smoothing reactors, and other exotic forms, resembling an extraterrestrial sculpture park. These structures guide and filter the flood of electrons arriving through the wires from its sister site, the Celilo Converter Station, 800 miles north.

The bus heading through the high voltage jungle at the Sylmar Converter Station. **CLUI photo**

The tour getting a briefing in the control room in the Sylmar Converter Station. CLUI photo

We are met by our briefers, the operators of the facility, who are generously taking time out from their day to explain their workplace to us. After stopping in at the control room, the group goes into the catwalk gallery between the two valve halls, visible behind reinforced glass, part of the Faraday cage insulating us from the energy inside. Inside each highbay hall are thyristors, high voltage converters, suspended from the ceiling. Made by the Swiss engineering company ABB, they are massive, organic, and futuristic, caged in their halls, like the lungs of a futuristic landscape alien machine.

Power leaves the facility at 230,000 volts AC and is distributed to the Sylmar Switching Station, and then to the Rinaldi Receiving Station, and Receiving Station J, in Northridge.

We depart, energized too, out the gate, and up Interstate 5, passing the Cascades, where the DWP reenacted the 1913 opening of the Los Angeles Aqueduct on its centennial, two months before the tour. We pass the Sunshine Canyon Landfill, a home for LA's waste for nearly half a century, then pull over under the spaghetti of the I-5/Highway 14 interchange, for an infrastructural moment, at Newhall Pass, an *axis mundi* of LA conveyance.

Looking up is one of the most complicated freeway exchanges in the city, with flyways soaring this way and that (which collapsed in the Northridge earthquake 20 years ago). Looking down is a canyon with a hundred year-old rail tunnel portal, the train coming into the city from the north. Just out of sight to the northwest is Beale's Cut, a trough dug in a canyon in the 1860s as a way to pass in and out of the city. At the surface, where the bus is pulled over to look this over, is the old road through the pass, built after Beale's Cut, officially called The Old Road.

We stop for a picnic lunch just north of the pass, at the entrance of Towsley Canyon Park, next to an abandoned visitors center, vacant for twenty years, and made obsolete when they opened a new one further up the road in the park. We stretch our legs in the ruins of old stables that resemble Donald Judd boxes, across from a surprising collection of movie prop artifacts and sculptures at Calgrove Kennels, where you can also board your dog.

Then onward, upstream, closer to the source, Colonel Kurtz, the Wizard of Oz, and Chinatown, Jake. Or, just along the interstate some more, through the Newhall's Valencia, exit at Magic Mountain, then up San Francisquito Canyon Road to our next stop, Power Plant Number One.

The group entering Power Plant Number One, an infrastructural temple atop the LA Aqueduct. CLUI photo

The windy road up the canyon leads to a little DWP village, with old cottages and a community center, though few workers live there anymore. We meet our briefers here for our visit at this plant, which, when it was built in 1917, provided nearly all of the electricity supplied by the City of Los Angeles, now more than 40 miles away, downstream. We are at the apogee of the tour.

The plant sits on top of the Los Angeles Aqueduct, which provides the falling water to run its turbines. When DWP watermaster William Mulholland designed the aqueduct, his associate on the power side, Ezra Scattergood, designed the electrical generation system to feed off of it. Both take advantage of the difference in elevation between the Owens Valley and the ocean, a 3,500-foot waterfall extending over 235 miles. Fueled by gravity, one creates the flow, the other extracts the energy from the flow. A symbiotic manmade cascade of water and power.

Inside the control room at Power Plant Number One. CLUI photo

Though nearly a century old, Power Plant Number One is still online, one of several power plants pulling power from the aqueduct and shipping it to the city. Our briefers here are tremendously generous and easygoing, a stark contrast to the security state we experienced earlier in the day. Here, in this old industrial idyll, the old-timers rule, and DWP history is still current.

Henry "Hoppy" Hopkinton, with 45 years at DWP, explains the system of electrical generation along the aqueduct, from the Owens Valley to Los Angeles, diagrammed above his desk in the control room at Power Plant Number One. CLUI photo

It is hard to leave the DWP village at the end of the day, but we have one more stop to make on the way back, before it gets dark. A few miles back down San Francisquito Canyon Road, the road itself runs through what was, 80 years ago, the bottom of a reservoir. In 1928, holding back this reservoir, the St. Francis Dam failed, hours after Mulholland inspected it and declared it safe. Its failure was one of the worst industrial accidents in American history, with at least 450 people killed, some say a lot more.

We park the bus where the road turns and the old road surface continues past a gate into the trees. We walk down the crumbling asphalt to the remains of the dam, still very much there, a jumbled pile of earth and stepped concrete, reminding us of the ruins at the end of Thomas Cole's *Course of Empire*.

Back on the bus we pass Power Plant Number Two, which was destroyed in the flood of 1928, but quickly rebuilt. On the way out of the canyon we listen to a song about the St. Francis Dam Disaster by Frank Black, who tells how water seeks its own, all the way to the ocean. Then we drop back towards sea level, into Los Angeles. ♦

CLUI photo

See the online DWP Power exhibit, and more images from the tour, at www.clui.org.

AMERICAN FALLS

continued from page one

The *American Falls* exhibit at CLUI featured videos of selected waterfalls viewed from a raised wooden platform with angled interpretive plaques, similar to how many waterfalls are viewed in the field. CLUI photo

continued from page one

The exhibit was as much about romantic portraiture as it was about industrial infrastructure, and was distilled from ongoing research and documentation being conducted by the CLUI into the ways in which water is managed across the nation.

Most of the major waterfalls of early America were drowned by dams, or dried out by diversions, as they were among the first places to go to capture kinetic energy for commercial use. They were also obstacles to movement, and were submerged as rivers were flattened, dammed and locked for navigation and flood control. A few specimens, however, remain in the middle of the urban and industrial nation that formed around them, where they are still, slowly and resiliently, at work, eroding.

The CLUI exhibit, titled *American Falls: Overlooking Urban Water Falls*, featured seven waterfalls, representing different regions of the USA, and their respective relevance to local and national industrial history. ♦

Though used to generate electricity, and controlled by a dam at the top of the falls, Shoshone Falls, Idaho, known as the Niagara of the West, is not urban like its eastern counterpart. Like Niagara though, it is often a backdrop for weddings, attesting to the extreme romanticism that waterfalls elict. CLUI photo

CLUI photo

Spokane Falls - Spokane, Washington
The eastern Washington city of Spokane, originally called Spokane Falls, has dramatic waterfalls running through its central business district. The city grew up around these falls, which forced a portage or a conversion to land travel, when the town started as a fur-trading center on the Spokane River in the early 19th century. Dams were constructed in the lower falls in 1890 to divert water to industry, and an early hydro-electric plant was built soon afterwards, which is one of two still in service at the falls. In 1974 the blighted industrial land around the falls was transformed into a fairground, and Spokane became the smallest city to host a World's Fair. A gondola ride over the lower falls, left from the fair, remains in operation.

CLUI photo

St. Anthony Falls - Minneapolis, Minnesota
These falls were the only major waterfall on the nation's great river, the Mississippi, and until locks opened in the 1960s, were the limit of travel on the river. The falls, altered by dams, spillways, locks, and other control structures, are the reason why Minneapolis is there, and why the Twin Cities emerged as one of the economic centers of the nation (home to the headquarters for General Mills, Cargill, 3M, and more recently retailers like Target and Best Buy). Grain silos and flour milling plants are still visible on either side of the falls, remaining from the city's role as the processor for the wheat fields of the upper Midwest. The large Gold Medal flour mill on the west side of the falls is now a museum, and the General Mills complex on the east side of the river is being turned into condominiums.

CLUI photo

Willamette Falls - Oregon City, Oregon
Willamette Falls is the largest waterfall in the Pacific Northwest, and is heavily altered and industrialized. The community of Oregon City was established at the falls in 1842, when the falls were the limit for traffic coming up the Willamette River from the Columbia River and the Pacific Ocean. Locks were created around the falls thirty years later. The first power plant was built at the falls in 1889, including a dam to divert water from the top of the falls, and larger industry soon followed. Today two large paper plants dominate the banks of the river, though one is shuttered. Oregon City lost its prominence to Portland, 15 miles downstream, closer to the confluence with the Columbia. Without economic incentives to maintain them, the locks around the falls closed in 2011, once again isolating the Willamette Valley from river traffic.

Americ
Major Waterfalls at the

CLUI photo

Black Eagle Falls - Great Falls, Montana
Great Falls Montana gets its name from five nearby waterfalls along the Missouri River, all of which have been drowned or altered by dams and power plants, including the one closest to town, at Black Eagle Falls. In the 19th century, this was the upper limit for steamships on the Missouri River, and a famous historic portage point, dating back to the 1806 visit by Lewis and Clark. In the late 1880s investors were drawn to the location, due to the potential for electrical generation and industry, leading to the construction of the Black Eagle Dam in 1890, followed by the others. In the early 1900s the Anaconda Copper Company built a massive smelter here to process copper from the mine in Butte,150 miles away. The plant, next to the river, and its 500 foot-tall smokestack, was a major landmark, until it was torn down in the 1980s.

CLUI photo

Sioux Falls - Sioux Falls, South Dakota
The city of Sioux Falls developed at the waterfalls on the Big Sioux River, a tributary to the Missouri River, 50 miles south. Mills and a mill race were built at the site as early as the 1880s, and a 500kw power plant was constructed in 1908. Close to downtown, the Falls area was a warehouse and industrial zone for much of the 20th century. In the 1970s, a major effort to clean up the area began and led to the creation of Falls Park. Today the old Queen Bee Mill building is a rebuilt ruin in the park, and the Light and Power Company hydro plant has been converted into the Falls Overlook Café.

CLUI photo

American Falls - Niagara Falls, New York
Niagara Falls is composed of two primary falls, American Falls on the New York side, and the larger Horseshoe Falls on the Canadian side. They have long been a focus for industry and power generation, attracting visionary industrialists like King Gillette, George Westinghouse, J.P. Morgan, and Nikola Tesla. Several canals, tunnels, and turbine halls have been constructed to capture the energy of the falling water, culminating in New York State's Niagara Hydroelectric Project, built by Robert Moses in the 1960s, and one of the largest hydropower projects in the world. American Falls was dammed and shut off entirely for several months in 1969 to construct underwater channels and to bolt faults and fissures, in order to slow erosion at the rim of the falls. While the flow over the falls can be reduced to a trickle by diversion to power plants, minimum flow rates are maintained by treaty with the Canadians, balancing the demands for energy production, and the visual needs of tourism.

CLUI photo

High Falls - Rochester, New York
High Falls, on the Genesee River, is in the middle of downtown Rochester. Though there are a few other waterfalls at industrial cities in upstate New York, such as Glens Falls, Hudson Falls, and Cohoes Falls, none are as urban as those in Rochester. The city was the home of Kodak (as well as other pioneering imaging companies Bausch and Lomb, and Xerox), which grew up there using power captured from the river and its falls. Perhaps it is not entirely coincidental that the premier photographic company of the world emerged in a city with a waterfall at its core.

an Falls
Heart of American Cities

CLUI photo

Pawtucket Falls - Lowell, Massachusetts
These low falls and rapids on the Merrimack River were altered by the dam here that diverts water at the top of the falls into the canal raceways running downstream through the town of Lowell. The first dam at the falls was built in 1820, and Lowell grew to be one of the earliest and largest planned factory cities in the USA. Its dozens of red brick mill buildings are an impressive sight, and recur in other New England mill cities like Lawrence, Manchester, Chicopee, and Holyoke. These falls were named after the small falls in Pawtucket, Rhode Island, where America's industrial revolution is said to have begun, in 1793, with the construction of the Slater Mill.

CLUI photo

Reedy Falls - Greenville, South Carolina
These falls on the Reedy River are located in downtown Greenville, which around 1917 was referred to as the Textile Center of the World, when the falling water powered several mill complexes around town. At the time, Greenville was one of dozens of growing mill cities in the South that captured the industry from the older mill towns of the northeast, with cheap labor close to the source of cotton. While most southern mill towns simply dammed the region's small rivers for power, Greenville was unique in that it had a natural waterfall. By the 1960s, though, the falls were a reed-covered ruin, along the industrial drain for the city, with a road bridge built over them. Restoration efforts were completed in 2004, with a reconstructed and reconditioned falls in the middle of the new Falls Park, anchoring one end of a redeveloped and rediscovered main street.

CLUI photo

Great Falls - Paterson, New Jersey
Great Falls is on the Passaic River, in the heart of the city of Paterson, which is one of the earliest planned industrial cities in the USA. Founding father Alexander Hamilton recognized the importance of the falls as an energy source, and in 1792 established the Society for Useful Manufactures, an industrial investment group to develop industries there. Canal raceways starting at the top of the falls soon snaked through the area, which became a major industrial center in the 19th century, producing locomotives, firearms, silks, and chemicals. Many of the mills powered by the falls remain, though they have been converted for other uses. The falls site itself is a historic park, since 2011 administered by the National Park Service.

WENDOVER REPORT

FROM THE CLUI COMPLEX IN THE GREAT SALT LAKE DESERT

A class from the University of Montana at CLUI Wendover talking to members of New York's Smudge Studio about their display in Exhibit Hall Two. CLUI photo

2014 WAS ANOTHER BUSY YEAR at the Center's interpretive compound at Wendover, on the edge of the Salt Flats of northwest Utah. The Wendover Residence Program continued with new residents including Marget Long, a New York-based artist who researched the optical phenomenon of mirages, which occur with unsurpassed voracity on the Bonneville Salt Flats. Also in residence this season was Jason Metcalf, a Los Angeles-based artist born and raised in Salt Lake City, who established a physical archive in one of the CLUI buildings for the Historical Society of Deseret, an ongoing project that explores and documents disputed historical sites in the state. And David Robertson, a Professor Emeritus of English at the University of California, Davis, produced an experiential tour book of his time based in Wendover.

Occasionally we get groups in residence, and such was the case this year with a class from the Pacific Northwest College of Art, who stayed for a few weeks, responding to the environment, and producing work, some of which was exhibited on site, but most of which will be shown in Portland, Oregon, when they present an exhibition about the Wendover Residence Program there.

Chris Taylor's Land Arts class from Texas Tech spent a week in Wendover in September, working in the region, as they have done for the past decade or so, and a class from the University of Montana came through as well. At least two international classes stopped in, one from the University of Fine Arts in Vienna, Austria, and another from the Bartlett School of Architecture in London.

Besides the general public, which comes through town to see exhibits on their own, visitors in 2014 who got in touch and involved include the filmmaker Sam Douglas, who is working on a film about land art; a French dancer named Rémy Héritier who recorded a performance entitled *Percée Persée* at a few sites around Wendover; and Esther Polak and Ivar van Bekkum, a Dutch art duo, working on a commission from the University City Science Center in Philadelphia. Greg Smoak and Jared Farmer from the American West Center at the University of Utah also visited Wendover, and conducted some interviews for their oral history archives.

Several former residents returned to continue projects at Wendover, including William Lamson, who set up a couple of rooms in CLUI buildings to allow time and salt to transform objects. Smudge Studio also returned to install their exhibit *Look Only at the Movement*, which was on view through 2014. Bryon Darby, a resident from 2013, had his work installed in Exhibit Hall 1 for the season as well.

Speed Week was cancelled twice this year, due to standing rainwater on the flats. Other events were luckier with the weather, like the rocket club meeting, funny cars gatherings, and commercial advertising events, which were able to occur as scheduled.

A group from an unspecified German car company brought some new "secret" cars to test out the flats, as they sometimes do, though in this case they sported an unusual vinyl wrap. The pattern, explained the heavily accented engineers testing the cars, is meant to make digital images harder to render into CAD files, it's a kind of digital camouflage. CLUI photo

Tragically, the artist Nancy Holt died after a battle with leukemia in February of 2014. She was a frequent visitor to Wendover and a supporter of the CLUI. Members of the organization helped coordinate a public memorial at her sculpture *Sun Tunnels*, located on an empty plain in Lucin, north of Wendover.

At a memorial to the artist Nancy Holt held on the Summer Solstice, more than a hundred people gathered to watch the setting sun line up in her sculpture *Sun Tunnels*, a large viewing device. CLUI photo

The annual Wendover Work Party brought a couple dozen people to Wendover again to help with large construction and maintenance tasks. This year the final touches were put on Exhibit Hall 3, whose 22 display rooms began to be used this year. Thanks to all the work partiers for their summer sweat: Lauren Allen, Matthew Coolidge, Helki Frantzen, Oswaldo Gonzalez, Jen Hofer, John Hogan, Mark Koven, Jed Lackritz, Ben Loescher, John Mack, Sohrab Mohebbi, Ian Page, Rich Pell, Rob Ray, Aurora Tang, Dan Torop, Jesse Vogler, and Wendy Wischer. ♦

DESERT RESEARCH STATION REPORT
FROM THE CLUI COMPLEX IN THE MOJAVE DESERT

Visitors to the CLUI Desert Research Station Open House in November 2014, looking at and listening to Deborah Stratman's *Desert Resonator* on the walking trail. CLUI photo

THE CLUI DESERT RESEARCH STATION, near Barstow, continues its function as a support base for regional projects, and as a destination and exhibition site for the public. Over the last year, we made a few more additions to the walking trail, installed some new exhibits, and made some upgrades to the physical plant.

The DRS also hosts creative landscape projects on and about the region, such as an artist/research team from Chicago composed of Meghan Moe Beitiks, Marissa Lee Benedict, and Lindsey French, who visited in early 2014 then returned in January 2015 to continue their interactions with the desert environs.

The thematic research focus for the DRS is primarily phenomenology related to the relationship of sound, radar, and other waves and electronic emissions, to the physicality of the ground, issues of visibility and invisibility, of evasion, detection, monitoring, and remote sensing.

Specially tuned sonic metal detectors "see" a buried metal sculpture made by LeRoy Stevens, which is another attraction on the Walking Trail. CLUI photo

Two open houses were held at the DRS in 2014, in March and November, where the public was invited to come visit, and CLUI staff was on hand to answer questions and show people around.

As part of the open house this November, Lucy Raven and Steve Rowell showed their work about local radar emissions in the region, in displays inside the DRS Visitor Center. Also on display there is *Down to Earth: Experimental Aircraft Crash Sites of the Mojave*,

Moritz Fehr, an artist from Berlin, installed his film in the isolation chamber, a soundspace cut off from the rest of the grounds and reached by a bridge. His stereoscopic film, entitled *Mojave (A Person Was Here)*, is composed of kinetic images of sites in the area, and the spatially rendered sounds they emit and elicit. CLUI photo

the Center's exhibit about experimental aircraft crash sites in the region. Also on view at the DRS is the CLUI exhibit *Solar Boom: Sun-Powered Electrical Plants in the USA,* about the current surge in the construction of solar power plants in the desert, including one a few miles away at Harper Lake, which is tripling in size.

Meanwhile, the community of Hinkley continues to disappear. PG&E, the company responsible for groundwater contamination in the region (made famous by the film *Erin Brockovich*), continues to buy out property owners in the area, even if no hexavalent chromium has been detected in their wells.

The result is that Hinkley becomes, more and more, a modern, post-contamination ghost town. With a lack of students, the school shut down last year, and more than a hundred homesteads bought out over the past few years have been erased. The post office remains open, though they're not sure for how long.

The property adjacent to the DRS was purchased by PG&E last year, and its two dwellings, nearly a mile away, have been removed. Only a stand of trees remain, and they are dying from lack of irrigation. The well at the DRS is tested regularly, like hundreds of other wells in the region. It is currently free of chromium. ♦

According to some residents, hexavalent chromium isn't the only groundwater issue in Hinkley. CLUI photo

THE NAVIGABLE WATERS OF OWENS LAKE

A BRIEF HISTORY OF BOATING ON EASTERN SIERRA'S INLAND SEA

The electrically powered boat on Owens Lake. CLUI photo

MARKING POSSIBLY THE FIRST TIME a powered vessel has plied the waters of the lake for more than a century, members of the CLUI and Simparch launched a boat on Owens Lake in the eastern Sierras of California, in late December 2014, testing the waters for future navigations.

The craft was a 17 foot-long pontoon boat, built by Steve Badgett of Simparch, and powered by an electric motor. The boat is a prototype for a vessel that is being developed for arid and fringe water bodies, with limited shoreline access. Though capable of holding nearly a ton of gear, the boat floats on pontoons that can be carried to the location in packs, and inflated on shore. Simparch is developing a larger version with Texas architect and Land Arts professor Chris Taylor, for protracted expeditions on the north arm of the Great Salt Lake.

This smaller version was dubbed "Bessie Brady II" after the first steamship based on the lake. The original Bessie Brady was built locally in 1872 to haul silver bullion from the smelter at Swansea to the teamster depot at Cartago, on the southwestern shore of Owens Lake.

Swansea, named after the Welsh mining port, was established in 1869, to process silver and lead from the mines at Cerro Gordo, atop the Inyo Mountains, to the east. A long and arduous haul road connected the mines to the smelter near the shore, from which, for the first couple of years, bullion was hauled to the other side of the lake by wagon, and from there on a larger road, 200 miles south, to the port at Los Angeles.

The output of the mine proved significant, and the roads to the other side of the lake were slow, so the superintendent of the Owens Lake Silver-Lead Company, James Brady, who laid out the town of Swansea, commissioned a boat, named it after his daughter, and built a wharf extending into the lake for it to berth.

According to the historian Richard E. Ligenfelter's 1962 article in *Journal of the West*, the keel for the boat was laid a few miles north, in the Owens River, where most of it was assembled, then it was floated to Swansea to have its boiler and engines installed. It was 85 feet long, 16 feet wide, and capable of hauling 100 tons.

On its maiden voyage, on June 27, 1872, it hauled 700 bars of silver (weighing 30 tons), to the still unnamed port at the southwest side of the lake, later named Cartago, after Carthage, the ancient port city on the Mediterranean Sea.

The Bessie Brady proved very effective in getting the fruits of the smelter to wagons on the other side of the lake, and in hauling coal from the kilns at the base of Cottonwood Canyon across the lake, to fuel the smelter. So much so, that in just a few months, 181,000 bars of silver had piled up at Cartago, awaiting shipment south by the too few and slow-in-coming wagon trains. Production was scaled back as a result of the bottleneck, and the Bessie Brady was idled for much of the next year. Remi Nadeau, a French Canadian pioneer and oxen team driver based in Los Angeles, developed a company to move the bullion to market more quickly, eventually driving more than 50 teams on the route back and forth from Cartago to Los Angeles.

A second port was established six miles south of Swansea in 1873, at the base of the Yellow Grade Road, a more direct route from the Cerro Gordo mines. This site, later named Keeler, became the main smelter and port for the mines after Swansea was damaged in a flash flood in 1874. With production and transportation thus improved, the Bessie Brady was back at work for another few years. In May 1877 a second, smaller boat, the Mollie Stevens, was launched on the lake by the owner of the Cottonwood Canyon sawmill to move lumber and coal to Keeler. It sank in a storm a few days later, and was recovered by the Bessie Brady and put back into service.

By 1879, the mine's output was decreasing, and transportation methods were changing, so the Bessie Brady was idled and hauled ashore at Ferguson's Landing in the northwest corner of the lake, the fifth of the five ports on the lake, where its engine and boiler were removed.

That year Julius Keeler arrived, and built a large stamp mill, in 1880, at the town that now bears his name. He put the Mollie Stevens back to work hauling wood from across the lake, but soon found it to be too small. So he had Bessie Brady towed to Keeler, and was in the process of fixing it up and putting the more powerful engines from Mollie Stevens in it, when a fire broke out on the hull and burned the Bessie Brady to ashes on May 11, 1882.

This, by most accounts, was the end of shipping on Owens Lake. By then bullion from the stamp mill was so concentrated that its volume was reduced, and it was hauled by cart. And the railways were coming, arriving eventually even at Keeler, and what was left of Swansea. There was no longer any need for boats.

In 1913, the Los Angeles Aqueduct opened, sending the water that once kept the lake filled to Los Angeles, and in a few years the lake dried up. The dust blowing off the exposed lake bed led to lawsuits, which eventually compelled the Department of Water and Power to figure out ways to reduce the dust. After nearly 20 years and $1.2 billion, the answer includes putting part of the lake back. Though water will cover less than a third of the original 100 square miles of lake, and it is divided into dozens of shallow flooding ponds, this is as lake-like as it will be, for the foreseeable future. But wet or dry, Owens Lake will always be a lake. It was a navigable waterway at the time of statehood, and it remains one, publicly accessible, one way or another.

The launching of the boat on Owens Lake is the first project to come out of the new CLUI outpost at the former townsite of Swansea. A grant from the Metabolic Studio of Los Angeles enabled the CLUI to secure the property after its previous owner, Mike Patterson, passed away a few years ago. People who came on the Center's tour of the region in 2004 may remember Mike as the local briefer who joined us on the bus to talk about Cerro Gordo, Swansea, and Keeler, and life as a downwinder on Owens Lake.

The CLUI is preserving the historic and marginally habitable portions of the remote property, and is developing a programming site in the dunes on the lake side of the property. The focus will be on desiccation, inundation, and other applicable themes. The site also serves as a gateway for examination and exploration of this uniquely terraformed landscape, a byproduct of the urban space 200 miles away. ♦

CLUI PROGRAMMING ON THE ROAD

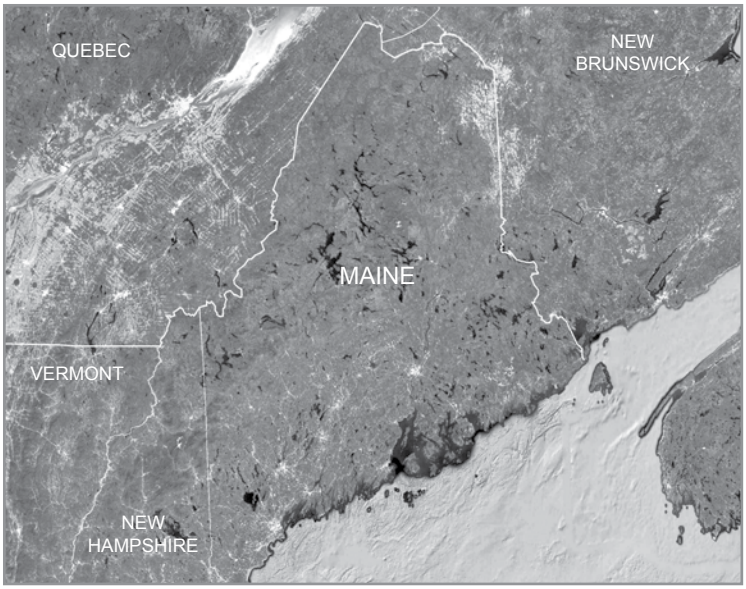
The CLUI/Simparch boat screened movies at Pontchartrain Landing, at the edge of the Industrial Canal in New Orleans. The backdrop was the new Seabrook Floodgate structure, connecting Lake Pontchartrain to the Mississippi River, through the Industrial Canal. It was the levees at the southern end of the canal that failed during Katrina, flooding the Lower Ninth Ward. CLUI photo

IN ADDITION TO ITS OWN exhibitions, tours, and programming related events, the CLUI circulates its programs to other exhibition venues, domestically and overseas. This year, CLUI images and other programs were featured in exhibitions including at the Newlyn Art Gallery, in Penzance, UK; de Appel Arts Center, in Amsterdam; The Hart House at the University of Toronto; the Actual Size Gallery, Los Angeles; Utah Museum of Fine Arts; Utah Museum of Contemporary Art; and the Fairview Museum of History and Art, in Fairview, Utah.

As part of *DredgeFest,* a unique symposium held in New Orleans in early 2014, the CLUI/Simparch vessel Tex Hex was brought out of its base in Morgan City to host a public screening on the water. As we have done in other places along the waterways of the Gulf, the audience sat on the shore, while the audio and video was presented to them from the boat. Films included the premier of *The Fluid and the Solid*, by Ben Mendelsohn and Alex Chohlas-Wood, a film about dredging, and Pare Lorentz's classic film about the Mississippi River, *The River* (1938). Tex Hex has been based in Morgan City, Louisiana for 2014, supporting CLUI ongoing research into the Atchafalaya Floodway, the Intracoastal Waterway, and other lower Mississippi water issues. ♦

UNITED DIVIDE PART 1

A JOURNEY ALONG THE USA/CANADA BORDER OF MAINE



MAINE IS THE STATE WITH the most complex border with Canada. The line begins in the Atlantic Ocean and follows rivers, streams, mountain ridges, and straight lines, for 611 miles and through 24 manned border crossings, more than any other state. A dozen rail bridges and dams cross the line, and even paper plants span the border, in a state so dominated by wood-products industries.

Maine's Eastern Watery Boundary

From the east, the international boundary comes towards the shore, passes by West Quoddy Head, the easternmost point of land in the USA, and enters the interior waters of the continent at Lubec Channel and Passamaquoddy Bay.

The easternmost manifestation of the USA/Canada boundary line is a plaque (with the change in paint color), in the middle of the Lubec/Campobello bridge. CLUI photo

The first physical structure encountered by the boundary is the Franklin Delano Roosevelt Bridge, which connects the town of Lubec, Maine, and Campobello Island, part of New Brunswick, Canada. Campobello is a kind of an exclave of Canada, an island connected by land only to the USA, by this bridge. There is a customs and immigration port of entry building on either side of the bridge, the easternmost of the 24 official border crossing points

in the state, and the 115 crossings along the line between the east and west coasts.

Campobello Island has a visitor center for the Roosevelt Campobello International Park, one of the few parks in the world administered jointly by two national governments. Inside is a gift shop and a small bilingual display about the openness of the border. The park exists because Franklin Roosevelt had a summer home here, which he came to mostly as a child. He only stayed overnight here once as president. Originally built by the Kuhn family of Boston, the 34-room cottage was later owned by Armand Hammer, the head of Occidental Petroleum, who continued to allow Eleanor Roosevelt to visit until 1963, when it became a park.

At the other end of the bridge is the small community of Lubec, Maine, the easternmost town in the United States. There is a small downtown, a hotel, and a boat ramp at a small fishing harbor. The boundary runs past town through Lubec Narrows, where range markers on shore, and located on nautical charts, can be lined up to help boaters know where they are in relation to the border. Boats can cross the watery boundary without getting into trouble, so long as they check in with customs and immigration if they land in the other country. But fishermen and lobstermen need to know where the boundary is, so they don't catch fish from the other side of the line.

North of Lubec, the zig-zagging water boundary enters the Friar Roads portion of Passamaquoddy Bay, and approaches Moose Island, home of the city of Eastport, Maine, the easternmost city in the USA (because Lubec, though slightly further east, is officially a town, not a city). After the war of 1812, the island was claimed by the British, who believed it to be on their side of the water boundary. They returned it to the United States in 1818, making this "the last place in the country occupied by a foreign nation" (besides two islands in Alaska occupied by the Japanese in World War II).

In 1833, Eastport was the second largest trading port in the USA, after New York City. Today it is a small and run-down village with old brick storefronts that are slowly being restored, by organizations such as the Tides Institute which operates a residence program and a gallery downtown.

Eastport's Moose Island is connected now to the mainland by causeways that travel through the Point Pleasant Passamaquoddy Indian Reservation. The Jay Treaty of 1794 allowed natives to freely travel between their territory on either side of the newly established international boundary. But because the tribe is not recognized by Canada, the local Indians here are not permitted to land on the other side of the bay without reporting to customs.

North of Point Pleasant, the international boundary heads north northwest through Passamaquoddy Bay and into the channel of the St. Croix River. Along the way it crosses the 45th Parallel, the half way point between the Equator and the North Pole.

This first, watery portion of the border, Passamaquoddy Bay and up the St. Croix River, was defined by the Treaty of Paris, in 1783, the treaty that ended the war with Great Britain. It describes the northern border of the USA from the Atlantic to Prairies as from the "mouth of the St. Croix River to the northwesternmost point of the Lake of the Woods," which is now in western Minnesota.

Soon afterwards, the Jay Treaty of 1794 was convened to establish just what the "St. Croix River" was, as the name was drawn from a vague 17th-century map, and nobody really referred to any specific river around there by that name. This was settled by locating the remains of French colonialist Samuel Champlain's camp, built on the river when he first visited in 1604.

The remains of that camp are still there on St. Croix Island, in the middle of the channel. This was the earliest European settlement in what is now the USA, north of Florida (where the village of St. Augustine was founded by the Spanish in 1565).

Champlain went on to establish Quebec in 1608, and is considered one of the founders of what would become Canada. Since this was where he first arrived in the new world, many think of it as the birthplace of Canada, even though now it is in the United States.

Samuel Champlain greets visitors along the walking trail at a park on the USA side of the St. Croix River, adjacent to the island where he landed in 1604, which is off limits to the public. CLUI photo

The settlement built there was burned down by English raiders on their way to Nova Scotia, in 1613. The seven-acre island became a National Monument in 1949, and is administered by the US National Park Service. Though there are public interpretive facilities on shore, the island itself remains off-limits to the public, to protect the historic remains buried there, and eroding into the river.

North of St. Croix Island, the river channel narrows and turns westward towards the community of Calais, Maine. With the city of St. Stephen, New Brunswick, on the other side of the river, Calais is a true border town, a community of nearly 10,000 people, divided by the international boundary, which follows the middle of the river.

There are three road crossings connecting the two cities, each with customs and immigration ports of entry on either side of the bridge. The Ferry Point Bridge connects the two downtowns. Nearby, a park on the USA side has interpretive plaques that describe the importance of the community as a logging industry shipping center, using the river, throughout the 19th century, and into the 20th. Upstream the river has a few rapids, which is why the town developed here. Dams were built on the rapids, spanning the international boundary, to capture energy for the mills, and to flatten the water to float logs.

The Milltown Bridge is the second road crossing the river and the boundary in town. It is a very small crossing, used by locals, and no commercial traffic. The third and busiest crossing is the International Avenue Bridge, on the west end of town, where, on the Canadian side, a divided highway has been built connecting St. Stephen to the big New Brunswick city of St. John and to the Trans-Canada Highway. This commercial crossing opened in 2009, and was the first new crossing between the two countries to be built in more than 35 years.

Upstream of Calais, the river and the border bend southwest, then northwest. The boundary was originally described as the middle of the channel, but by 1909, was changed to the line following the deepest point of the main channel, known as the *thalweg*.

Whether following land or water, the border is made up of thousands of straight lines, with official turning points at either end. On water these points are referenced by survey markers on shore, set by the International Boundary Commission.

The next physical crossing of the river/international boundary is a dam that provides power and water for the adjacent pulp and paper plant at the town of Woodland, which opened in 1906, providing paper for the Boston *Globe*.

North of the plant a major utility right of way crosses the river and the international boundary, where gas and electric lines come in from the Canadian side. This part of Maine is remote and off the ISO New England grid, so most of eastern Maine gets its electricity from Canadian sources, such as New Brunswick Power, and Hydro Quebec, or from small hydro plants built along the rivers.

The international boundary passes through the middle of Grand Falls Dam.
CLUI photo

A little further upstream is the Grand Falls Dam and a power plant built by the Woodland paper company in 1915, on top of a former waterfall. Hydro stations like this provide energy primarily for their builders, the local paper plants. Paper company dams throughout the state make flooded valleys of artificial lakes and widened rivers called *flowage*, used for floating logs, and providing power. Most of the lakes in Maine are artificial byproducts of the paper industry.

The international boundary continues north through the flowage, following the now flooded St. Croix River through remote logging country, until the next border crossing, the old rail bridge at Vanceboro, Maine.

The rail bridge was on an important line connecting the northeastern USA and the Maritimes from 1871 to the early 20th century. In 1915 the bridge was bombed by a German spy, who was attempting to limit routes for troops that he suspected might be coming through Canada to fight the Germans (as the USA was still neutral in World War I, at that time). The spy was caught, convicted, and after serving six years in prison, was considered insane, and sent back to Germany. The bridge, though quickly repaired after the bombing, fell into disuse over the following years, with more expedient shipping methods and routes, roads and rail, developed through the region.

North of the bridge, the river boundary heads through the small remote town of Vanceboro, passing under a road bridge, with a port of entry on either side, known as the Vanceboro/Ste. Croix crossing. Upstream of Vanceboro the boundary line passes through the middle of the Vanceboro Dam, and into the lake on the other side. The boundary zigs and zags invisibly over the open water of the lake, following the original river channel, now flooded by the flowage, known as the Chiputneticook Lakes.

The lakes extend northward for 25 miles until the small remote community of Forest City, and the next official border crossing, on a road over the river. In 2010, Homeland Security proposed upgrading their current port of entry here with a new $15 million facility, with detention cells and an impound lot. All for a port that averages less than seven cars per day, and is open from 8am to 4pm. Media attention, including coverage by John Stossel's "Gimme a Break!" TV program, caused a rethink. Instead, after some delay, a new $5.4 million facility opened in 2012.

The international boundary follows the river past the new port of entry, through the Grand Lake Dam at the west end of town, and through the middle of the lake to its northern end, where there is another bridge and border crossing. This, the Orient/Fosterville crossing, on Boundary Road, between Orient, Maine, and Fosterville, New Brunswick, open 8am-midnight, is the last border crossing over the St. Croix River.

From here the boundary follows Monument Brook, considered the headwaters of the St. Croix, with its increasingly minute meanders through remote forest, towards its origin in a wooded swamp.

In the middle of the swamp is a tall stone obelisk, known as Monument 1, installed in 1843 to mark the source of the St. Croix. From east to west, Monument 1 is the first dry land monument, marking the border exactly on the ground. Up to this point, the boundary has been over water, and though the turning points of the boundary are referenced by survey monuments on shore, the only markers on the line itself have been plaques on bridges.

Though it is a functional survey point, Monument 1 is an ornamental monument, larger than most boundary monuments, because of its significance as the first land monument on the east end of the border. It is one of only five such monumental monuments on the line. There is another at the west end of the boundary, on a bluff overlooking the Pacific Ocean, 3,500 miles down the line.

The view up the cut line from Monument 1. CLUI photo

The old port of entry at Houlton, Maine. CLUI photo

The North Line

Monument 1 marks both the source of the St. Croix, and the southern end of the North Line portion of the boundary, a straight line running north from the monument, over hill and dale, until it hits the middle of the St. John River, 78 miles away.

The North Line has around 230 monuments along its path, each marked by one or more nearby and less prominent reference markers. To maintain visibility along the border as it travels over land, a swath is cut through the trees and brush, for a distance of ten feet on either side of the boundary. This results in a 20 foot wide clearing known as a cut line.

The line is also known as the vista line, as its function is to make the boundary visible, so people don't accidentally cross it. The vista line is maintained by the International Boundary Commission, and its upkeep and condition depends on the priorities and limited resources of the commission. The IBC, with a USA and Canadian Commissioner, also maintains the border monuments, of which there are more than 8,000 across the line.

A few miles north of Monument 1, a road from the USA side curves southward and travels directly on the boundary for nearly a mile, next to a field in Canada. There are a couple of steel monuments marking the line on the side of the road, but the road and the field serve as the vista line. As is typical, and usually the case, the open space is monitored by powerful cameras mounted on poles, along with movement sensors that alert the Border Patrol, who watch the system from a regional field station. Once triggered, the cameras begin recording, and can be zoomed in on suspects to see if anyone crosses the line, or moves any goods over it. If so, they have documentation, and they can dispatch the nearest agent to the scene.

There are more than a thousand of these pole-mounted cameras along the border, and dozens of regional Border Patrol field stations. The Canadian RCMP also operate cameras on the line and share information with their USA counterparts.

Along the road is a former USA port of entry building. This once was the East Hodgdon/Union Corners crossing, one of half a dozen manned crossings that have been permanently closed along the North Line since the late 1950s. The port of entry building was sold off and became a private home that has since been abandoned.

The first official and open crossing on the North Line is a few miles further north, at Houlton, Maine. This is the north end of Interstate 95, the principal interstate of the East Coast, extending south to Florida. When the Interstate was opened in the 1970s, they abandoned the old port of entry building and closed the two-lane highway next to it, diverting traffic onto the interstate, with its new and larger port of entry. The road surface at the old crossing has a mound of dirt piled on the actual borderline. The building itself has peeling paint and old furniture still inside, forty years later. A time capsule of the old style of border crossings.

Nearby is another relic in Houlton, the former Army airport, where German POWs were kept in World War II. The ruins of the camp is in the woods against the border, next to a police shooting range and a fire department training area. It is common to find these kinds of land uses pushed out of the way, to the margins.

A few miles further up the North Line is another closed crossing, Starkey's Corners, on Foxcroft Road east of Littleton. The paved road is blocked at the borderline, and the port of entry is now a private home.

The Monitcello/Bloomfield crossing is a few miles north of Starkey's Corner, and is still open, though it has limited hours, is closed on Sundays, and the gates are shut when no one is there. A few miles further north is the Bridgewater/Centreville crossing, which is open around the clock, every day.

After that the North Line continues north, passing behind Mars Hill, a prominent landmark, and a ski area topped by a wind farm. This is potato farming country, where several large processing plants bag, cut, and freeze the product for nationwide distribution.

A few miles west of the boundary, near Sprague ville, is where the Double Eagle II hot air balloon took off for its historic flight in 1978, when it became the first hot air balloon to cross the Atlantic. The northeastern edge of the nation, closer to Europe and Russia, is a strategic location for military aviation as well. In the 1960s, nearby Presque Isle Airport was a Strategic Air Command base, with Snark nuclear missiles pointed at the Soviet Union.

North of Mars Hill is another formerly manned border crossing, on

East Ridge Road. The USA port of entry operated out of a trailer before it closed in 1976. The Canadian port of entry is still there, now a private home. The road is blocked with a barricade.

The next open crossing on the North Line is the Easton/River de Chute crossing, on Smugglers Road, which is open every day, but has limited hours. Gates block the road when it is closed. It has about 4,000 crossings a year, an average of less than 11 per day.

A few miles further up the North Line is the busier Fort Fairfield/ Perth-Andover crossing, which is open continuously, and is a rare example of a crossing where the Canadian port of entry building is larger than the USA one.

On the USA side there is a road that heads south between the ports of entry, with some homes on the Canadian side which are only accessible by the road on the USA side of the line. Leaving the driveway or coming home is thus an international trip. Since they have to pass through either of the ports of entry to get anywhere else, though, they are not too inconvenienced (unless there is a line at the port). And since the access road is between the ports, they don't have to pass the port of entry when returning home, from either direction, even though, technically, they might have goods to declare, such as groceries. This condition occurs at a number of places along the border, and though it can be very inconvenient for the residents (sometimes referred to as "'tweenies" by border officials, as they live between the ports of entry), generally they are known to the officials, their car is recognized, and in some cases they are trusted enough not to have to stop if they are just making a quick trip to town.

North of Fairfield the boundary line passes through the Aroostook River. On the southern shore is the former Aroostook Falls crossing. It was barricaded and permanently closed in 1994 after the river flooded and killed two Canadian customs agents who were trapped in their car.

On the north side of the river is the Aroostook Valley Country Club, with a golf course on the New Brunswick side, mostly–a truly international "country club." The parking lot for the club is in the USA, but most of the buildings are in Canada, including the clubhouse. The golf course was built in the late 1920s, during Prohibition, which is likely why the clubhouse was placed in Canada.

At the Aroostook Valley Country Club the parking lot is in the USA, but the clubhouse and the golf course are in Canada. CLUI photo

The pro shop, however, sits, just barely, on the USA side of the line, easing transactions, both wholesale and retail, at least for the American suppliers and members of the club. Most of the course itself is in Canada, only part of the tee area for the par four ninth hole is in the USA, and part of a sand trap on the first hole, perhaps the world's only international sand trap. The Boundary Commission has asked that a row of trees on the edge of the course be replaced, as they block the vista line. The club may remove them when a new row, planted outside the 20 foot-wide boundary zone, matures sufficiently.

In the old days, visitors to the club from either country came and went on back roads without reporting to Customs and Immigration. After 9/11, things along the border tightened up. Visitors to the club coming from Canada must now travel through manned ports of entry, several miles away, and follow normal procedures.

Since access to the club is through roads on the USA side, American visitors do not have to report, even though they may spend the day golfing and drinking in Canada. The golf club is one of the gray zones on the border, where, in a sense, USA territory extends into Canada.

Russell Road, the road heading north on the border from the club, curves east into Canada, and used to be the most direct route for Canadian visitors to the club. But the road has no port of entry on the USA side (it closed in the 1960s), effectively, but not physically closing the road to USA-bound traffic. Strong warning signs, with threats of arrest, try to keep people away, though by the time you are close enough to read the signs, you have already transgressed.

A trailer serves as a temporary Canadian port of entry, known as Four Falls, open mostly during the summer season to make it easier for Canadian golfers to go home. For anybody who approaches the trailer from the USA side, to discover that it is closed, or who decide they don't want to enter Canada after all, turning around seems like a good option. However, since you have already crossed the line to get to the trailer, even though only by a 100 yards or so, technically you have to drive to the nearest manned USA port of entry and report your re-entry into the nation. Either way, your visit will have been recorded by the video cameras trained on the road, so your actions can be verified. But mostly people just turn around and head back to the USA, without incident.

The international imbalance of boundary enforcement along Russell Road has been especially hard on the Pedersen family, who have lived on the road since 1950, and whose driveway is in the USA, but whose house is in Canada. For half a century this wasn't a problem, and officials let them come and go, as if they lived in the USA.

In 2003, the elderly owners were threatened with arrest by the US Border Patrol, simply for pulling out of their driveway. Some say acrimony developed because the owners were opposing a road that the country club and border officials wanted to build through their back field, to provide access through Canada to the country club. Either way, although some concessions were eventually made, visitors and family members had a hard time negotiating the newly enforced rules, and having to drive up to 15 miles out of their way to go through the port of entry. The house has recently been abandoned, and its future is uncertain.

The Pedersen home is in Canada, but the driveway meets the road in the USA. CLUI photo

The North Line continues northward from the Pedersen's house, cutting its swath across farmland, woods, and streams for another eight miles, to the next official crossing, Limestone/Gillespie-Portage, a small crossing on Highway 229. South of the small crossing is a former Nike Missile launch site a hundred yards from the border. The facility has been turned into a home and car repair business, with old vehicles and equipment covering the former launch pad.

This was one of four Nike Missile stations protecting Loring Air Force Base, located nearby in Limestone. Loring was a major Strategic Air Command base, with heavy bombers based out of there in continuous flight, ready to bomb Russia at a moment's notice. The base ceased usual operations in 1994, but some reserve and military operations continue there. The rest of the base is mostly unused and is in disrepair. Empty buildings include hangars capable of holding six B-52s at once. The nuclear weapons assembly and storage area, known as the North River Depot, was emptied, but remains off limits to the public. Loring is another example of how defensive (and offensive) installations developed along the northern edges of the country, to be that much closer to the rest of the world.

The North Line continues north for another ten miles to the Hamlin/Grand Falls crossing on Boundary Road, next to the St. John River. After passing through the crossing and Monument 117 on the shore, the North Line hits the water, and ends, midstream. From here, it heads west along the center of the channel of the St. John River. The boundary is, again, a water boundary, at least for the next 100 miles.

The Hamlin/Grand Falls crossing at the north end of the North Line. CLUI photo

The St. John to the Top of Maine

Westward, the water boundary along the St. John meets its first physical crossing ten miles upstream: the international bridge connecting the adjacent communities of Van Buren, Maine, and St. Leonard, New Brunswick. The USA port of entry was upgraded in 2013, like many others, taking advantage of federal stimulus funds.

After Van Buren, its another 25 miles to the next crossing of the line, at Madawaska. This part of Maine is rich in Acadian culture. French-speaking Acadians arrived in the New World in the 17th century, distinct from the French colonists who established Quebec.

Acadians spread out in a region extending from present-day Nova Scotia to northern Maine. Some of them left the region to settle in Louisiana, where they became known as Cajuns. The present day Acadians of northern Maine are proudly independent, and assert their border-spanning cultural heritage at places like the Acadian Village Historic Site, west of Van Buren.

Further up river is Thibodeau Island, an unoccupied evolving sand bar which now has portions in each country. There are dozens of such internationally dynamic islands in rivers and lakes that are split by the boundary. In flowing water the border remains fixed while the land moves around it.

The next large settlement on the river, and the next road bridge crossing it, is at Madawaska, Maine, where the Madawaska River enters the St. John from the New Brunswick side. Two bridges span the boundary here, one a road bridge, and the other carrying pipelines that connect two paper plants, on either side of the line. The Twin Rivers Paper Plant is really one facility, split by the boundary.

Pulp is made on the Canadian side and pumped to the USA side to be turned into paper, a system that avoided the tariff for importing paper into the USA. Steam is also generated on the Canadian side, where fuel costs used to be lower, and pumped to the USA plant. A total of seven pipelines connect the plants in lines running over and under the river.

The bridge is hemmed in by the plant on the USA side and is limited to one lane each side, coming and going. Traffic is bad, and studies are underway to expand the crossing, somehow, likely with a new bridge nearby.

Four Corners Park in Madawaska. CLUI photo

As the most northeasterly town in the nation, Madawaska considers itself one of the Four Corners of the USA. This fact is promoted especially at Four Corners Park. The park opened in 2007, primarily to celebrate motorcyclists who do a four corners trip, visiting each corner of the USA in as little as 21 days. (The other corners of course are Key West, Florida; San Ysidro, California; and Blaine, Washington, at the other end of the US/Canada border).

The river boundary continues westward another 21 miles to its next crossing, at Fort Kent. The Fort Kent/Clair crossing is open around the clock, with around 2,000 cars passing through every day. In 2014, a new bridge opened next to the old one, which had grown rickety, and a new USA port of entry opened. Highway 1 originates here, a two-lane highway that goes all the way to the bottom of Florida. A small park makes note of this fact.

The Fort Kent bridge and USA port of entry next to the northern terminus of US Highway 1. CLUI photo

The St. John River at Fort Kent was the site for a few pioneering art projects about the international boundary done by the artist Dennis Oppenheim in 1968. He came to this northern boundary town to make the conceptual borderline visible in different ways. One work drew a three-mile long line on the river with a snow mobile. Of course that was in the winter, when the river was covered in ice and snow.

There is an old blockhouse at Fort Kent, an historic landmark, left from the Aroostook War, which raged locally for decades. The conflict reached its peak in 1839, when militia were mobilized by both sides, and the blockhouse was built as a fortification by the Americans seeking to maintain this territory, with its rich reserves of timber, and the river to float it on. Federal officials on both sides negotiated a truce before any shots were fired, and a compromised boundary was agreed upon. The restored blockhouse contains relics from the period, but mostly displays images of itself, in various media, and from various points of view.

The bridge at Fort Kent is the last border crossing on the St. John River. The border continues on the river westward for another 16 miles, then transitions to the smaller St. Francis River, heading north.

The St. John River, meanwhile, continues through northern Maine for another 90 miles, flowing from the southwest. It becomes the boundary again on the west side of the state. But before that, the boundary heads north, up the St. Francis River, towards the very top of the state. The boundary follows the twisting St. Francis for 43 miles, with 485 official turning points and 122 reference monuments, until its terminus at Pohenegamook Lake.

This territory, at the top of Maine, is known as the North Maine Woods. Though it is heavily logged, in other ways it is one of the least developed regions of the continental United States. Extending north from Moosehead Lake and Baxter State Park to the Canadian border, the 3.5 million acre tract has no towns or paved roads. Access to the North Woods is controlled, with manned and unmanned gates at its dozen or so entry points. The roads within it are considered private, built by and for logging companies, and a fee is charged for access. The land is mostly owned by a few companies, including the Irving Company, the New Brunswick-based oil and paper company, and the Seven Islands Land Company, which manages a million acres owned by the Pingree family.

The international boundary follows the St. Francis River around the extreme northeast corner of Maine, and around the North Maine Woods. It is a tight meandering stream, with occasional lakes, and there are no roads, railways, or even dams that cross it.

The stream terminates a few yards shy of Pohenegamook Lake, in Canada, next to the communities of Sully and St. Eleuthere, also in Canada, and a small community just barely inside the USA, called Estcourt. Though it is in the USA, Estcourt is only accessible by roads from the Canadian side, or via the private logging roads of the North Maine Woods.

There is a USA port of entry at the southern end of town, just before the road from the North Maine Woods meets the pavement on the Canadian side. It is meant for people coming from Canada, southbound into the North Woods, something that happens only occasionally, and mostly when logging trucks go back and forth, hauling logs from the Woods into Quebec (there is a log yard across from the station on the Canadian side).

However, the USA port of entry is very busy with another function: attending to a nearly continuous stream of cars coming to the USA side of Estcourt to buy cheap American gasoline. After checking in at the USA point of entry, Canadian gas buyers drive back up the same road they came in on, Rue de la Frontiere, which is entirely in Canada, towards the *gas bar*, as such places are called by Canadians.

Sign and boundary monument at the gas bar. CLUI photo

Turning south off the main road to get to gas bar, you re-enter the USA through an open gate and approach the gas pumps. After filling up, the cars drive out the gate, back into Canada, and go northeast on Rue de la Frontiere, and stop to report at the Canadian port of entry, before heading back under the railway bridge into the rest of Canada.

The gas bar is the only business on the USA side of the line in Estcourt, and might be the only gas station in the USA that displays its rate in Canadian dollars per liter. A sign, in French, says "Before entering the United States all vehicles crossing the border have to register at American customs before filling up. Thanks!"

Rue de la Frontiere, known to Americans as Estcourt Road, runs along the northwest side of the boundary, separated from the rest of the Canadian community of Pohenegamook by a raised railroad roadbed with only one tunnel under it. In addition to the gas bar, this isolated part of town has several homes on the Quebec side, and several homes, barns and sheds on the Maine side. It also has several homesteads right on the line.

The front of a small house at 1183 Estcourt Road, in Pohenegamook, Quebec, is in Canada, but the back bit, including the porch and the vegetable garden, is in Estcourt, Maine. The International Boundary Commission has placed a plaque on the house, at the precise point where the line hits the house. CLUI photo

The international boundary passes directly through five houses in town, and through more than a dozen backyards, sheds, and porches. There are several IBC monuments in this stretch, making it quite clear where the line falls. People who own these line homes are well aware of where the line is on their property, as they pay taxes proportionally to each government, though there appears to be no physical manifestation of the line on their interiors or exteriors, other than one IBC plaque on one of them. Nearly everyone in town, no matter how much of their house is in the USA, is distinctly Francophone.

At the end of Rue de la Frontiere/Estcourt Road is a small park, Parc de la Frontiere/Border Park, which is the very top of the northern tip of Maine. The boundary following the St. Francis River, coming up from the southeast, makes a turn in the river, next to the park, where it meets the top of the Southwest Line, which heads, as expected, southwestward. The intersection is between two bridges, a footbridge that spans the border over the St. Francis, and a rail bridge that is entirely in Canada. Beyond the rail bridge is Pohenegamook Lake, the source of the St. Francis River, defined in the treaty as the northern turning point for the boundary. The fact that the turning point occurs a hundred yards before the lake is the result of later landfilling on the Canadian side to build roadbeds for the train and highway.

The footbridge leaves the park from the USA side and travels over the river into Canada. The bridge was washed away in a flood years ago, and there was some uncertainty about rebuilding it, as it enables people to cross the border at a place where there is no port of entry. However, it was rebuilt, for pedestrians only, and enables people from the cut-off part of Estcourt to get to church and other places in the main part of town more directly, even if they are doing so by entering the USA, briefly.

The international boundary makes a turn from northbound to southwestbound in the water a few yards in front of this bridge. CLUI photo

The Western Side of Maine

A prominent boundary marker in the park is the first one on the Southwest Line, a straight line heading southwest through Estcourt and onward for 85 miles. After Estcourt, the only official border crossing on the Southwest Line is 45 miles away at a logging yard in St. Pamphile, Quebec. It is on a dirt road, and is used by logging trucks bringing logs out of the North Maine Woods. After the USA port of entry at the boundary is the company check station for the Woods, where permits are issued to enter.

The St. Pamphile crossing, the only crossing on the Southwest Line. CLUI photo

The boundary line here, on the northwest edge of Maine, reflects one of the fundamental paradoxes of this border. On one hand, this region is a remote logging wilderness and the cold northern edge of the USA. On the other hand it is the warm southern edge of Canada, and some of the best farm country in that nation, along the fertile St. Lawrence basin. On the USA side are the woods, accessible from below only by dirt roads. On the Canadian side, the land is divided

into long narrow farms within a dense network of evenly spaced public roads.

20 miles further down the line is a settlement on the Canadian side and a lake, both called Lac Frontiere. The Northwest Branch of the St. John River comes out of this lake, and crosses the boundary. This was the point where, according to the Webster-Ashburton Treaty, the Southwest Line ends and becomes a more southerly line, known as the South Line.

Concerning this point, the specific and convoluted language of the treaty reads: "[from the] outlet of the Lake Pohenagamook; thence, southwesterly, in a straight line to a point on the northwest branch of the river St. John, which point shall be ten miles distant from the mainbranch of the St. John, in a straight line, and in the nearest direction; but if the said point shall be found to be less than seven miles from the nearest point of the summit or crest of the highlands that divide those rivers which empty themselves into the river St. Lawrence from those which fall into the river St. John, then the said point shall be made to recede down the said northwest branch of the river St. John, to a point seven miles in a straight line from the said summit or crest; thence, in a straight line, in a course about south eight degrees west, to the point where the parallel of latitude of 46°25' north, intersects the southwest branch of the St. John; thence, southerly, by the said branch…"

The result is that that, from here, the South Line extends for 20 miles until the boundary joins the channel of the Southwest Branch of the St. John River. Along the way is the Daaquam border crossing into the North Maine Woods, closed in 2004, though its port of entry buildings remain. The road is gated and blocked with concrete barriers on the USA side.

A few miles further south is the St. Juste Crossing, which absorbed the limited traffic from Daaquam, open to serve the logging industry, with two log yards on the Canadian side. Like the four other official crossings on this remote western side of northern Maine, the crossing is open during business hours only, and there is a checkpoint for entering the North Maine Woods beyond the USA port of entry.

Once the South Line intersects the Southwest Branch of the St. John River, the international boundary becomes watery again and follows the river for 35 meandering miles. This is the upstream reaches of the same St. John which serves as the boundary in northeastern Maine, through Fort Kent, Madawaska, and Van Buren.

This upper Southwestern Branch of the St. John is a much smaller river, becoming a stream with considerable meanders. Much of it is narrow and shallow enough to walk across, which, no doubt, some people do.

The straight cut lines along the hundred miles of the Southwest and South Lines are studded with camera stations (some of which are mounted on moose hunting platforms), which enable border patrols to monitor that part of the boundary nearly completely, in theory, if not in practice (details about coverage is kept secret). The meanders of the upper St. John and the Highlands make remote monitoring very difficult. Here border patrols rely more on motion sensors and agents in the field, on foot and in ATVs.

The St. Aurelie crossing is the only crossing on the southeast branch of the St. John River. CLUI photo

There is only one open crossing on the 35 miles of the Southwest Branch of the St. John portion of the boundary, at St. Aurelie, another entrance into the North Maine Woods, used for logging. There is also a closed crossing at Gilbert Road with an unmaintained bridge over the river boundary.

A few miles further south is Little St. John Lake, considered to be the source of the Southwest Branch of the St. John River. From this point, according to the Webster-Ashburton Treaty, the international boundary leaves the river, and follows the Highlands.

The Highlands is the divide between watersheds, where on one side water flows to the St. Lawrence River through Quebec, and on the other side to the Gulf of Maine and Atlantic Ocean.

Traveling over the top of the ridge line for more than 120 meandering miles, this section of boundary is among the most remote and unmonitored on the whole continental line. Because it meanders, like a river, but is on dry land, it has more monuments than any other section of the boundary.

The St. Zacharie crossing is the last of the logging company crossings on the boundary. CLUI photo

There are four official crossings along the Highlands. The first, the St. Zacharie border crossing, just two miles south of Little St. John Lake, is the last of the dirt road logging industry ports of entry into and out of the North Maine Woods. From there the boundary meanders for 35 miles before the next crossing, the Jackman/ Armstrong Border Crossing on Highway 201. This, the first paved crossing over the border since Fort Kent, is the busiest crossing on the western side of Maine.

Just north of the station is a hunting camp on the Canadian side, where the line goes through one of the cabins. This is the sixth inhabited structure with the international boundary running through it, so far.

From the Jackman/Armstrong Border Crossing its another nearly 50 miles of remote Highlands terrain until the border meets another official road crossing, the Coburn Gore/Woburn crossing, the second of two paved road crossing points on the western side of Maine. As at many of the remote ports of entry along the boundary, there is a small row of government housing for customs officers.

After this last crossing in Maine, the border meanders through the Highlands for another 25 miles, where it meets the state line for New Hampshire. The international boundary at the top of New Hampshire is 58 miles of meandering, mostly following the drainage divide between the St. Lawrence River and the Connecticut River. Along the way is just one official border crossing point, the Pittsburg/Chartierville crossing on Route 3. Despite the fact that it is the only crossing in New Hampshire, only around 10,000 vehicles pass through here a year.

The Highlands boundary continues along the ridge past the crossing, dividing the rugged wooded mountains of northern New Hampshire, from the flat arable plains of Quebec's Eastern Townships, for another 20 miles, where it ends at its westernmost point, at the upper reaches of Halls Stream, considered to be the northwestern-most headwaters

There is an unusual double monument on the border at New Hampshire's only crossing, with two obelisks, 18 inches apart, emerging from a single concrete base. The explanation is an often told tale where two 19th century boundary surveying teams, coming from either direction, one Canadian and one American, met here, and found their lines differed by 18 inches. Rather than split the difference, two monuments were installed, #483 and #484. Eventually the bases of the monuments were cemented together, forming one official marker, surrounded by a fence, which further unites them. This story of precision and international camaraderie turns out to be apocryphal. The more accurate version, according to an IBC Commissioner, is that they had an extra monument, and thought it would make a nice story. CLUI photo

Halls Stream, nearing its widest point, at its meeting with the Connecticut River. CLUI photo

of the Connecticut River. The boundary becomes a watery one again, following the stream for the next 25 miles.

Marking the border along this tiny meandering stream is another challenge for the International Boundary Commission. The 1842 treaty identifies "the middle of Halls Stream" as the boundary. By the time it was resurveyed in 1908, the river had shifted more than 600 feet in some places. By 1979, more than half of the 467 turning points logged and marked with shoreline reference points along the stream were now on land.

Along Halls Stream, the border is a double set of meanders. One is the boundary as a recording of the stream made in the 1909 survey, the other is the stream as it is now. The recorded boundary meanders through what are now fields and meadows, often unmarked, and possibly even unknown to landowners, who assume that the boundary is the stream, not in the middle of their lawn.

The stream finally meets its end as the international boundary when it intersects the 45th Parallel near Beecher Falls, Vermont. This point was established by the 1783 Treaty of Paris, which declared that the boundary will be located where the "northwesternmost head of the Connecticut River meets the 45th Parallel." The boundary westward from here continues along the 45th Parallel along the top of Vermont, which begins on the west bank of Halls Stream, next to the first Ethan Allen furniture factory.

The first Ethan Allen furniture factory anchors the eastern end of the 45th Parallel portion of the international boundary, along the top of Vermont. CLUI photo

For a complete journey along the border, see www.clui.org.

BOOK REVIEWS
BOOKS NEW TO THE SHELVES OF THE CLUI LIBRARY

Bad Luck, Hot Rocks: Conscience Letters and Photographs from the Petrified Forest, Edited by Ryan Thompson and Phil Orr, 2014
Visitors to the Petrified Forest National Park in northern Arizona are not supposed to take any of the unusual rocks home with them, but of course many do, and there is no way, really, to stop them. But, for some perpetrators, guilt, a sense of a karmic imbalance, and even bad luck attributed to the rocks in their possession, compel them to return the rocks by mail, usually accompanied by an apologetic note or letter. Since 1934, the park has been saving these conscience letters, and putting the returned stones in a pile. This book presents some of the letters, and some of the rocks, along with an interview with a park curator. Published by our friends at Ice Plant, its like Letters to Mount Wilson, CLUI-style.

Memorial Mania: Public Feeling in America, by Erika Doss, 2010
Monuments constructed to commemorate tragedy and triumph are all over the place, and in America they are part of the national fabric. They are symbolic interpretive mushrooms popping out of ground that has been culturally or politically soaked by the events that transpired there. Each is an expression, as well as a claim, of the moments they represent, and as such they can be volatile, tense, and fraught. This book examines this highly charged terrain, navigating a veritable minefield of memorials that is spreading across the landscape.

Trees in Paradise: A California History, by Jared Farmer, 2013
Trees are big in California, and despite their natural look, they are products of commerce and industry. This book examines this state of trees and its four principal tree-doms: palm trees (Los Angeles/urban real estate/romanticism); eucalyptus (San Francisco, railroads); redwoods (logging, Sierras and North Coast); and oranges (agriculture, the Southland's suburban arc, and more romanticism). California's major economic and cultural regions do indeed seem to have their roots in trees.

Lasting Impressions: A Glimpse into the Legacy of Surveying, Rhonda L. Rushing, 2006
This is a commemorative and corporate picture book, a celebration of the trade of surveying, written by the president of Bernsten International, the largest manufacturer of survey markers. Though it seems intended for people in the industry, and to sit on the waiting room coffee tables of field engineering firms, it is full of fantastic, functional, historical, and overlooked observations of the American Land. The parallel universe of surveying, after all, holds everything in its clutches.

Undermining: A Wild Ride Through Land Use, Politics, and Art in the Changing West, by Lucy R. Lippard, 2014
This book is proof that big things (like "the West"!) can come in small packages. It might be a new kind of book, though a form she has explored before, but not to this degree, a metadatic indexical "romp" (her word), where the style follows function, using a small form factor, but, somehow, with hundreds of color images, streaming by legibly, on recycled stock, with captions (hers), along the bottom (attribution, cable news style), and a central text threading it all together. The subject is broad, focused on contemporary issues that she thinks are important, and if we agree, its because her idiosyncracies are ours too, and the fact that she is a refined cultural curator critic who despite more than half a century of doing so behind her, is always looking forward. And we are not just saying that because she says kind things about the CLUI.

Learning by Doing at the Farm, by Robert J. Kett and Anna Kryczka, 2014
The Farm discussed in this book was at UC Irvine as it was forming in Orange County, California, in the late 1960s. The Farm was a remarkable and short-lived experimental academic happenstance that fused emerging notions of earthiness, modernism, and globalism, into a new form, suggesting a possibly unprecedented trajectory, that was cut short by circumstance. The book is mostly archival images taken of the Farm in formation and action at the time, like photos from an anthropological field session among the bulldozers building the concrete campus. A modernist hippie dream bubble that popped.

Damage Control: Art and Destruction Since 1950, edited by Deborah E. Horowitz, 2014
A large format catalog of an exhibit arranged by the Hirshhorn Museum. The curators, Kerry Brougher and Russell Ferguson, rise to the challenge of such a broad subject, and manage to pull it off on the scale required for a museum on the National Mall.

Mass Destruction: The Men and Giant Mines That Wired America and Scarred the Planet, by Timothy J. LeCain, 2009
This book focuses on the big copper holes in Bingham and Butte, and the man that engineered large scale open pit mining, Daniel Jackling. Though we have made the connection between the Guggenheim Museum's spiral interior void and that of the pit where much of the family's wealth came from (via Jackling), the author makes another interesting connection: Jackling built his mansion in the West Coast robber barons' enclaves south of San Francisco, and it was later purchased by Steve Jobs, a technology baron of the post-copper age. He tore it down in 2011, months before he passed away.

City Water, City Life: Water and the Infrastructure of Ideas in Urbanizing Philadelphia, Boston, and Chicago, by Carl Smith, 2013
A cultural study of the idea of municipal water in these three early American cities, as they developed their waterworks in the late 18th and early 19th-century. Large-scale water systems for water supply and waste are functional public works, but are also collective expressions of the relationship between urban and natural worlds. The historic rhetoric of selling a water plan, of building it, celebrating its opening, and ultimately acknowledging its obsolescence, are revealed here as a compelling story arc of our developing nation.

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Desert Sunlight Solar Plant, Mojave Desert, California. CLUI photo

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