HISTORIC LOSS ASSESSMENT

A report by People of the Sacred Land's Truth, Restoration, and Education Commission (TREC) of Colorado

The People of the Sacred Land and the Truth, Restoration, and Education Commission dedicate this report to Dave Bartecchi. Tragically, Dave lost his life in an accident shortly after completing the Historic Loss Assessment with his team. Dave devoted his work to Village Earth and the Native Lands Information System, uplifting Indigenous communities worldwide. His unwavering commitment to tribal sovereignty made him a true ally to American Indians. His legacy will endure forever.

People of the Sacred Land

Historic Loss Assessment

Loss of life, land, and precious resources for nine Native Nations in Colorado

SEPTEMBER 2023

PREPARED BY:

Village Earth
501(c)3 Nonprofit Organization

PO Box 797
Fort Collins, CO 80522

info@villageearth.org
970-237-3002

FOR:

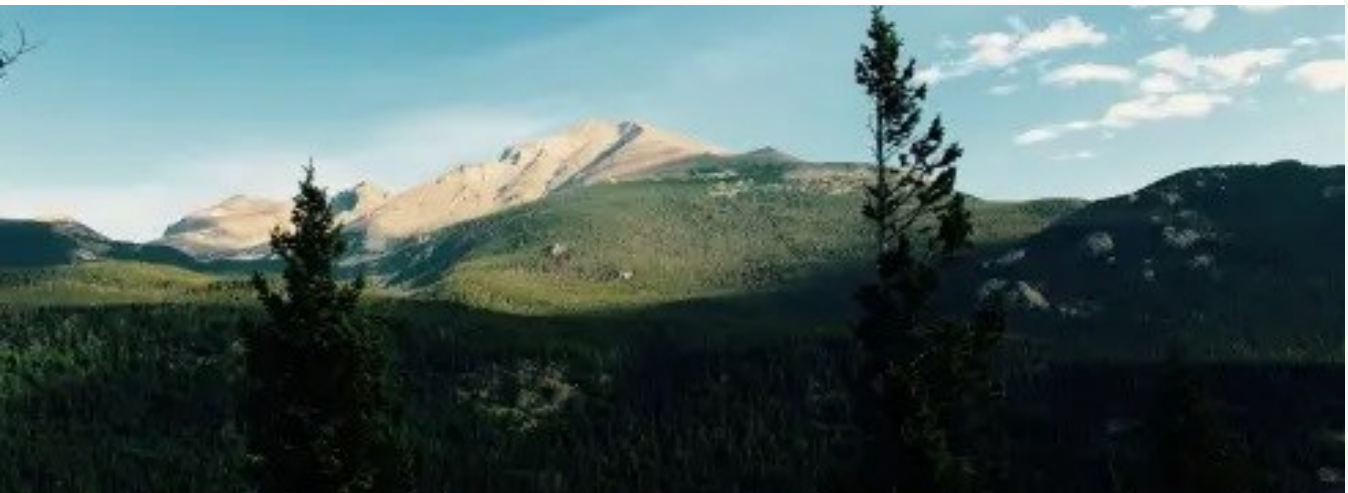
The Truth, Restoration, and Education Commission (TREC)
People of the Sacred Land
peopleofthesacredland.org

VILLAGE EARTH

Executive Summary

In 2022, People of the Sacred Land (PSL) and the Truth, Restoration, and Education Committee (TREC) partnered with Village Earth's Native Lands Advocacy Project to produce this Historic Loss Assessment that articulates economic losses from land dispossession and colonial settlement for nine Native Nations who had ceded treaty lands in Colorado: Southern Ute Indian Tribes, Ute Mountain Ute Indian Tribe, the Indian Tribe of the Uintah and Ouray, Northern and Southern Arapaho, Northern and Southern Cheyenne, Shoshone, and the Kiowa-Apache (not including the Bannock Nation). While we have made every effort to be as accurate and comprehensive as possible within the limited timeframe and budget afforded, we still feel we have only scratched the surface. The more we dug into Colorado's history, the more it seemed like a Russian nesting doll, revealing one injustice inside another, and another, and so on. While not comprehensive, we feel we have at least created a solid basis for future exploration and articulation of the losses experienced by Colorado's Indigenous communities.

By design, this report primarily focuses on the quantitative impacts of euro-American expansion into Colorado. While other researchers in the TREC Commission are focusing more on qualitative impacts, this report is focused on the numbers out of a recognition that in the western way of doing things, sometimes numbers have the most impact. By calculating these totals, this report seeks to not only identify what has been taken from Native peoples but also how this theft became the original source of capital that built Colorado and the West. The truth is that there is no way to quantify the pain and intergenerational trauma experienced by Colorado's Native communities. However, we hope this report inspires dialogue and recommendations for how we can begin to mend all that has been broken between Colorado's original inhabitants and the settler community.



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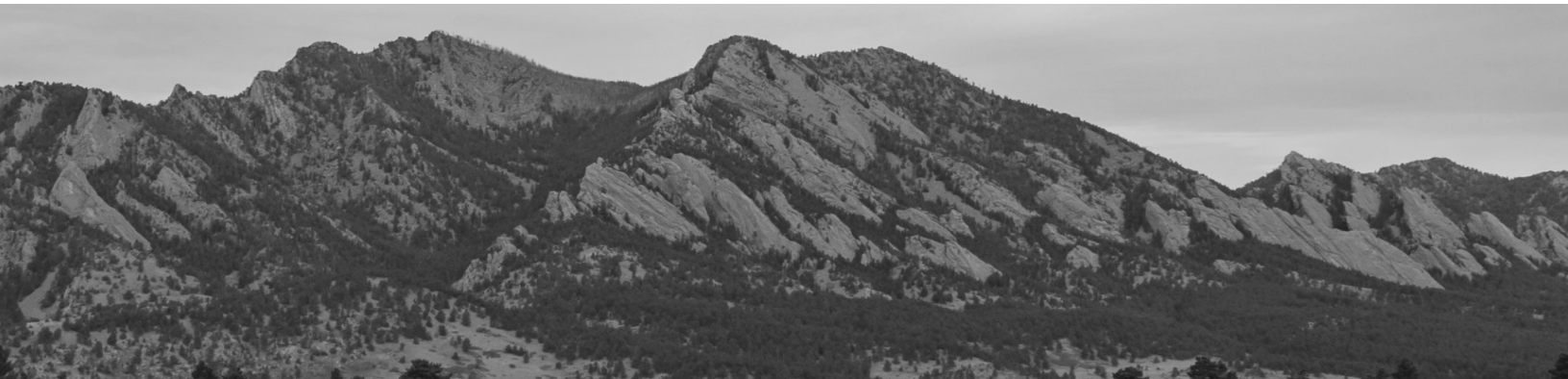


INTRODUCTION

A Long, Indigenous History in Colorado

Traditional ancestral knowledge and stories tell of a steadfast Indigenous presence on Turtle Island **since time immemorial**. In addition to this prior knowledge, modern-day archeological observations confirm the long-lasting presence of Indigenous communities in what is now known as the state of Colorado.

For example, the Lindenmeier Site in present-day Colorado's Soapstone Prairie is home to a Folsom culture archeological site where archeologists have recovered artifacts belonging to Indigenous peoples who had lived within the state's boundaries over 11,000 years ago. These peoples, and the many other Indigenous communities who had called this region home, are the ancestors of present-day Native Nations.

Figure 1. Sue Kennedy. *Fall at Lindenmeier Arroyo*, Photograph, History Colorado, Sept. 25, 2014, www.historycolorado.org/story/preservation/2014/09/25/interpreting-prehistoric-lindenmeier.

Today, the state of Colorado recognizes 48 Native Nations as having their traditional homelands within the state's boundaries. The Indigenous tribes living within the territory have shifted over time during the colonization of North America and Mexico. Therefore, the path to present-day tribal recognition is one of resistance to colonial imposition and violence. Tribal nations have since worked to recover their lands, disrupted relationships, and ways of living.

LAND HISTORY

This history section documents the major periods when European powers and, later, the United States extended dominion over the lands which would eventually become Colorado. Knowing this history is foundational to understanding the extent of the loss of life and resources for the nine tribes included in this assessment.

Much of the area we know today as Colorado was first invaded by the Spanish and French. In the landmark 1823 Johnson v. M'Intosh decision, U.S. Courts reaffirmed and endorsed the "Doctrine of Discovery," a principle that originated from European colonial powers. This doctrine essentially asserted that European nations had the right to claim and control lands inhabited by indigenous peoples based on their "discovery" of those lands.

The Doctrine of Discovery is a racist, historical legal concept that originated from a series of papal bulls issued by various popes during the 15th and 16th centuries. These papal bulls were used to justify the European exploration, colonization, and conquest of non-Christian lands during the Age of Discovery. The doctrine asserted that Christian European powers had the right to claim and control lands and territories that were inhabited by non-Christian peoples, based on the belief that these lands were essentially "discovered" by Christians.

According to Lakota legal scholar Mario Gonzalez,

> **"Under the Doctrine of Discovery, a European nation that 'discovers' a new territory, has the right to extend their dominion over that territory, and that includes their own laws and regulations over that territory. But according to Johnson v McIntosh, the Indian's right of occupation was just as sacred as the fee simple of the Whiteman, so you couldn't just disregard it. Under the Doctrine of Discovery, the discovering nation could not get fee simple title to the land without extinguishing the underlying aboriginal title of the natives. The United States bought the right to extinguish aboriginal title from France [and Spain], and the United States got the right to extend dominion over the area, but they also got the right to extinguish aboriginal title. They didn't actually get possession of the land."**[1]

Colorado Land History Timeline

The land history timeline below provides a broader glimpse into the partitioning of Native lands in the region, coinciding with present-day Colorado's formation. This timeline is not intended to be exhaustive of all land-shaping events in Colorado's history. Instead, this timeline spotlights major territorial shifts within the region and how these shifts disregarded Indigenous peoples' original relationships with the land and each other as distinct nations and linguistics groups.

European Settlers in the Region, 1585

One of the earliest European claims in Colorado's land history dates back to April of 1585 when **Spaniard Juan de Oñate** claimed all waters from the Rio Grande del Norte for the county of Spain.

The Adams-Oñis Treaty, 1819

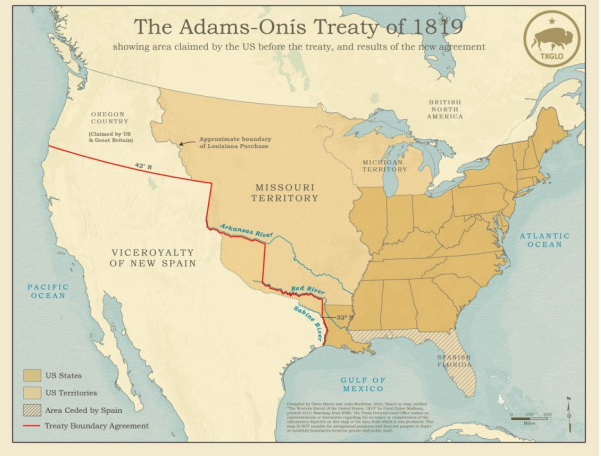


Figure 2. Owen Myers & Julia Bordelon, *The Adams-Onís Treaty of 1819,* Texas GLO Map Database, 2022, https://historictexasmaps.com/collection/search-results/96978-the-adams-onis-treaty-of-1819-general-map-collection.

The **Adams-Oñis Treaty of 1819** defined Spanish Territory in present-day Colorado as "everything south of the Arkansas River and west of a line running due north from the Arkansas River Headwaters on Fremont Pass up to the 102nd parallel."[2]

During this time, these lands in present-day Colorado were under Mexican and New Mexican state government control. Additionally, land grants were established by the Mexican and New Mexican governments, furthering the loss of Indigenous territory within the region.

The Non-Intercourse Act, 1790 - 1834

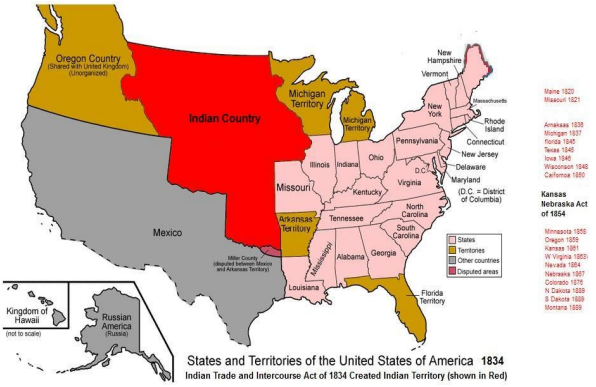


Figure 3. *Non-Intercourse Act,* Wikipedia, www.en.wikipedia.org/wiki/Nonintercourse_Act.

The **Non-Intercourse Act** (25 U.S.C. Sec. 177), also known as the Indian Intercourse Act, refers to the six statutes passed by Congress in 1790, 1793, 1796, 1799, 1802, and 1834 that set forth the boundaries of "Indian Country" and regulated commerce between Natives and settlers. The first four Acts in the late 1700s expired after 4 years. However, the 1802 and 1834 Acts were authorized without expiration.

The 1834 Non-Intercourse Act (as it is currently codified in 25 U.S.C. 177) remains substantially the same today as it was in 1790. The Act prohibits the conveyances of an Indian tribe's interests in land unless the conveyance is negotiated in the presence of a federal commissioner and ratified by Congress.[3] **The Act also provided penalties for U.S. citizens who attempted to purchase or settle in Native lands in noncompliance with the law.**

The Louisiana Purchase Treaty, 1803

Figure 4. Native Lands Advocacy Project (NLAP), *Louisiana Purchase Map Boundaries (in green)*, created using ArcGIS.

In 1682, Robert de La Salle, a French explorer/settler claimed eastern Colorado for France's Louisiana Territory. Through the **Louisiana Purchase Treaty in 1803**, Eastern Colorado was then acquired by the United States from the French. This included lands up the Arkansas River to the Continental Divide and north up the Rocky Mountain Range where the Arapahoe, Cheyenne, and other Ute peoples had already been living.[4] The completion of the Louisiana Purchase marked an unforgettable change for the tribes living in the Great Plains region.

The Annexation of Texas, 1845

Figure 5. NLAP, *Mapped Texas Annexation Boundaries (in orange*), created using ArcGIS.

On December 29, 1845, U.S. President James K. Polk signed the *Joint Resolution for the Admission of the State of Texas into the Union*.[5]

The United States assumed the territorial claims of the Republic of Texas upon the annexation. The Mexican Republic asserted that the annexation violated previous treaty negotiations. This land dispute then led to the Mexican–

The Treaty of Guadalupe Hidalgo, 1848

Figure 6. NLAP, *Mapped Treaty of Guadalupe-Hidalgo Boundaries (in yellow),* created using ArcGIS.

Signed on February 2, 1848, the Treaty of Guadalupe Hidalgo ended the war between the United States and Mexico. Mexico surrendered the lands that were once under Mexican and New Mexican control (as established in the Adams-Onis Treaty of 1819) to the United States. The lands south of the Arkansas River and west of the Rio Grande river were now considered lands belonging to the United States. Tribes within this part of Colorado would soon forcefully lose even more of their Native homelands to European settlers.

Fort Laramie (Horse Creek) Treaty, 1851

The Fort Laramie Treaty, also known as the Treaty of Horse Creek, established Cheyenne and Arapaho territory within the Great Plains in present-day Eastern Colorado, Western Kansas, Southeast Wyoming, and Western Nebraska. The treaty promised annuities and protection to the Cheyenne and Arapaho in exchange for the safe passage of American citizens through tribal lands. However, this treaty ended the 'Permanent Indian

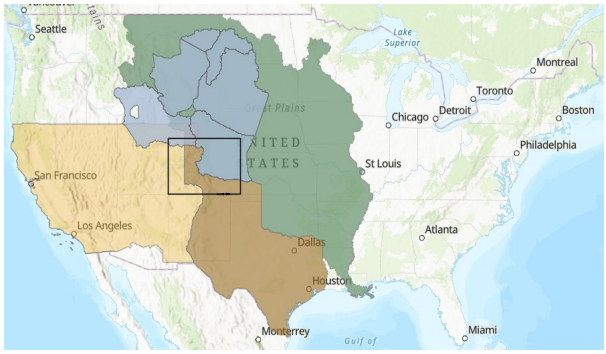


Figure 7. NLAP, *Mapped Fort Laramie Treaty Boundaries (in blue)*, created using ArcGIS.

Frontier' once promised through the Non-Intercourse Act. It also paved the way for further treaties in the 1850s and 1860s that led to greater losses of tribal lands and precious non-human relatives.

The Kansas-Nebraska Act, 1854

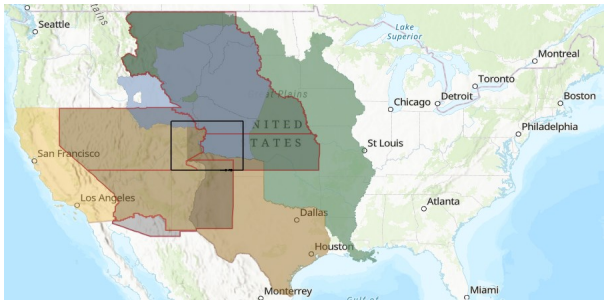


Figure 8. NLAP, *Mapped Kansas-Nebraska Act Territorial Shift (in dark grey)*, ArcGIS, Created March 2023.

The Kansas–Nebraska Act, signed into law on May 30, 1854, repealed the Missouri Compromise and divided the land immediately west of Missouri into two territories, Kansas and Nebraska. The Act provided for the territorial organization of Kansas and Nebraska under the idea of "popular sovereignty," which had been previously applied to New Mexico and Utah in the Compromise of 1850. **In Figure 8, the Kansas and Utah territories are mapped to the northeast of the Colorado boundary**. The territories to the southwest of the Colorado boundary are the Utah and New Mexico territories.

The primary sponsor of the Act, Senator Stephen Douglas of Illinois, argued for the idea that the settlers of the new Kansas and Nebraska territories would determine the legality of slavery in the new territories. Therefore, immediately after the signing of the Act, pro-slavery and anti-slavery settlers quickly moved to Kansas to determine the results of the first election held after the law went into effect.[6]

This Act opened up what had been permanent Indian territory to even more western settlement.

Colorado Native Land Cession Timeline

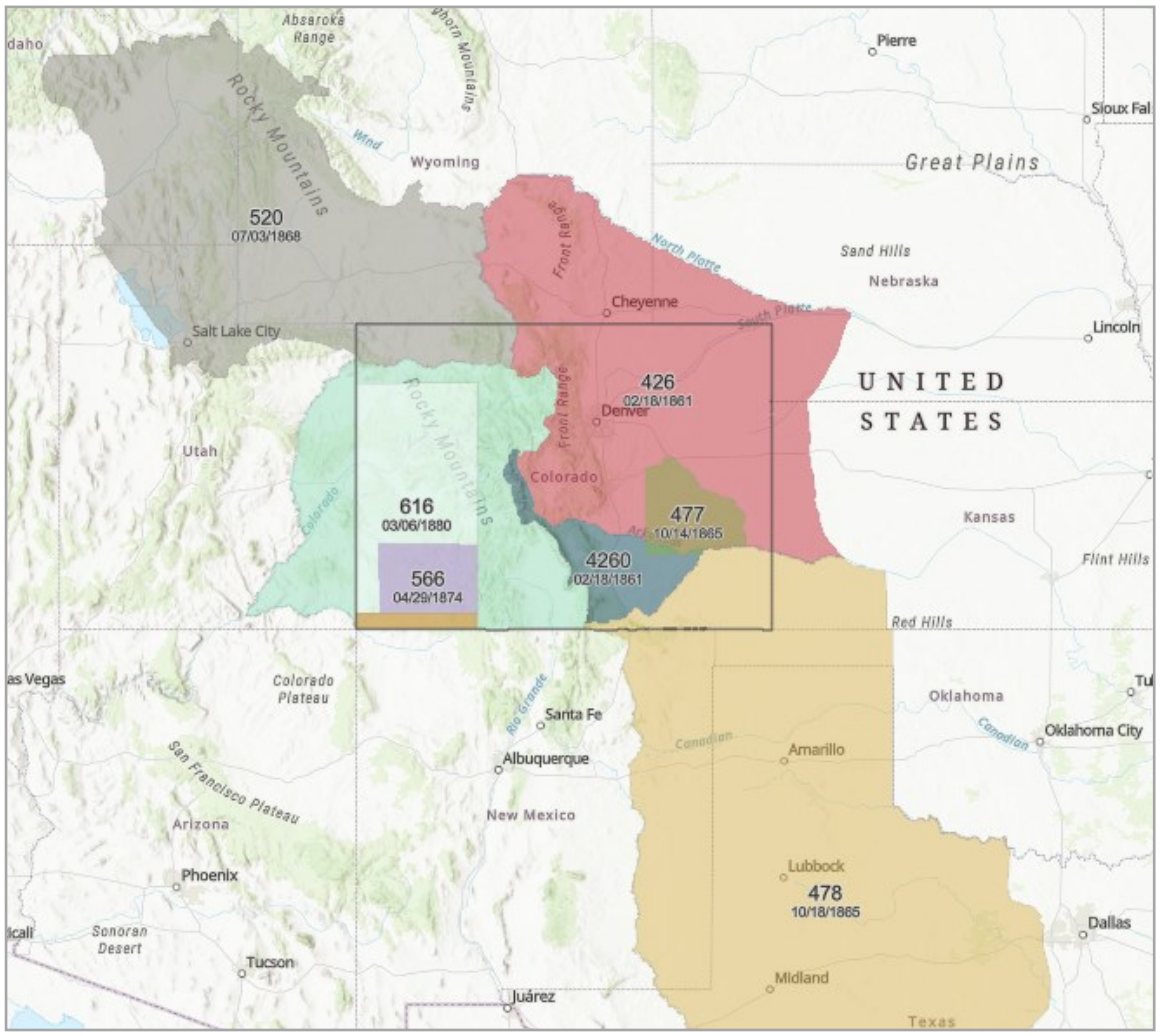


Figure 9. Joseph Robertson Ph.D., *Cession Boundaries Remastered for PSL,* Mato Ohitika Analytics LLC. See **Appendix A** for total acre values for each land cession in Colorado state boundaries.

Extinguishing aboriginal title in Colorado began shortly after the Louisiana Purchase and Adams-Onis Treaty. While detailing the history and numerous legal problems of the various land cessions in Colorado is beyond the scope of our report, we seek to provide a rough timeline in order to create some context for our discussion of the data on land patents, later in this report.

The U.S. Constitution (Article II, Section 2) states that the President "shall have Power, by and with the Advice and Consent of the Senate, to make Treaties, provided two-thirds of the Senators present concur." As a result, private individuals or entities do not have the legal standing to negotiate treaties with tribes. The Non-Intercourse Act (also known as the Indian Intercourse Act) amended and reaffirmed in 1790, 1793, 1796, 1799, 1802, and 1834 states that “no purchase, grant, lease, or other conveyance of land, or of any title or claim thereto, from any Indian nation or

tribe of Indians, shall be of any validity in law or equity, unless the same be made by treaty or convention entered into pursuant the constitution."[7]

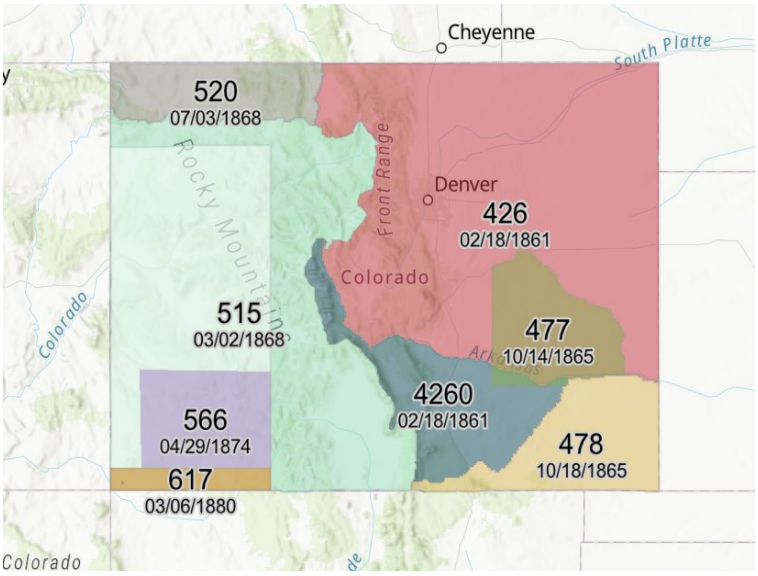


Figure 10. Joseph Robertson Ph.D., Cession Boundaries Clipped to Colorado, Mato Ohitika Analytics LLC.

The following is a timeline of the major Native land cessions in Colorado. The timeline also highlights two additional treaties: the **Fort Laramie Treaty of 1851** and the **1863 Treaty with the Utah-Tabeguache Band of Utes**. Though these two treaties were not directly involved with a particular land cession, they are nonetheless important to the historical context of land cession in Colorado. **The timeline is only intended to provide a brief overview of relevant treaties and the treaties involving land cession.** For each nation's specific treaty history, we also defer to the TREC researchers whose work was dedicated to individual tribes and nations.

Treaty of Fort Laramie (Horse Creek Treaty), 1851

Although this land cession pre-dated the formation of the Colorado Territory in 1861, the provisions outlined in the Treaty of Fort Laramie are still important to this cession history. Article three of the treaty promised annuities in the form of food and supplies to Natives and guaranteed protection against all depredation by U.S. citizens. In exchange for these annuities, the treaty provided for the safe passage of U.S. citizens who were traveling through Native lands, but not settling within them. Today, there is debate over whether this treaty was truly ratified or not as it was ratified by the Senate on May 24, 1852, but was never published as ratified in the U.S. Statutes at Large. The Native Nations (included in this assessment) who signed the treaty were the Cheyenne and Arapaho. The Apache were also invited to the treaty signing but refused to attend.

Royce Cession 426 (Treaty of Fort Wise, 1861)

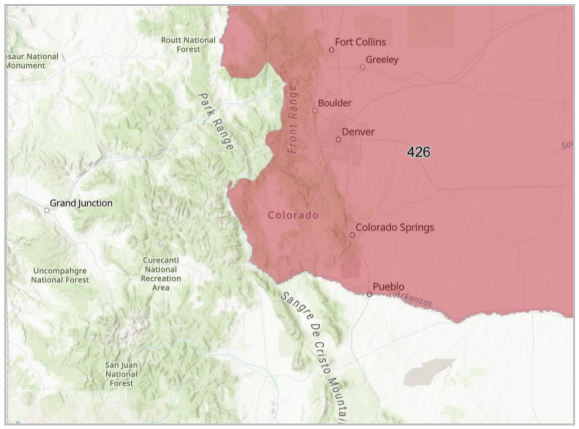


Figure 11. NLAP, *Royce Cession 426 clipped to Colorado state boundary,* created using ArcGIS.

The Treaty of Fort Wise was signed on February 18, 1861, ratified on August. 6, 1861, and proclaimed on December 5, 1861. Miners were settling in gold-rich land that had been promised protection under the 1851 treaty, leading to hostilities between Natives and settlers. This treaty was, therefore, a renegotiation of the 1851 treaty and established the reservations of the Arapaho and Cheyenne of the Upper Arkansas, including the land area of Sand Creek.[8]

Although the Cheyenne and Arapaho were signatories to this treaty, a majority of their leaders did not sign and viewed the treaty as invalid due to their lack of consensus, which was a crucial cultural component of their decision-making. The U.S. officials were told this, but ignored it.

Without the presence of all their leaders (as most had refused to attend the meeting), the Cheyenne protested against signing but were eventually pressured and bribed to sign the treaty regardless. Since the majority of Cheyenne and Arapaho leaders had not agreed to the treaty's provisions, they did not abide by them.

The Cheyenne and Arapaho chiefs in attendance would also later say they did not understand the terms and did not intend to cede the lands granted to them under the 1851 Fort Laramie Treaty. As a result, the majority of the Cheyenne and Arapaho did not move to the reservation, and conflicts between settlers and Indigenous people continued, ultimately culminating to the tragedies at Sand Creek in 1864.[9]

Treaty with the Utah-Tabeguache Band of Utes (Conejos Treaty), 1863

The Treaty with the Utah-Tabeguache Band of Utes was made with only the Band of Utes under Ouray and Colorow. Government officials had the

Tabeguache leaders sign over their claims to most of Middle Park and the Rocky Mountains east of the Continental Divide despite most of Colorado's Ute bands not agreeing to the treaty's terms. The treaty authorized the U.S. government to build military posts and roads on all "unceded" lands, and allowed for the blatant trespassing of Ute lands by U.S. citizens—lands which belonged to Utes who initially rejected treaty provisions.[10]

Royce Cession 477 (Little Arkansas Treaty, 1865)

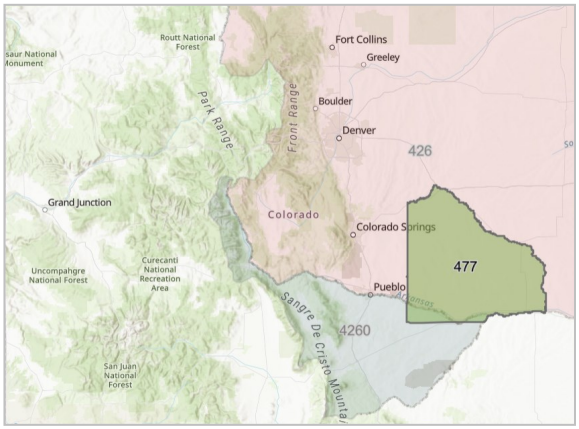


Figure 12. NLAP, *Royce Cession 477 clipped to Colorado state boundary,* created using ArcGIS.

The Little Arkansas Treaty was signed on October 14, 1865 and proclaimed on February 2, 1867 (having accepted amendments the year prior, which included a small number from the Jicarilla Apache). This treaty refers to **two** treaties signed between the U.S. and Indigenous nations: one with the Southern Arapaho and Southern Cheyenne nations and one with the Comanche and Kiowa.[11] Of the two, the treaty signed on October 14 with Native signatories from the Cheyenne and Arapaho, removed the two Native Nations to a new reservation in Indian Territory (present-day Oklahoma) and offered them reparations for the Sand Creek Massacre that did not materialize.[12]

In 1866, Congress appropriated $39,050 to cover the specific reparations outlined in the treaty. Whether this amount was justified as sufficient did not matter; instead of issuing that money to the individuals listed in the treaty, the Interior Department gave some of the money to the tribes and, according to a modern legal assessment, "returned the rest" to the Treasury as "surplus."[13] Additionally, the promised land grants did not materialize, either. Later, the Medicine Lodge Treaties of 1867, which the government saw as a replacement for the Little Arkansas Treaty, did not address the missing Sand Creek reparations.[14]

Royce Cession 478 (Little Arkansas Treaty, 1865)

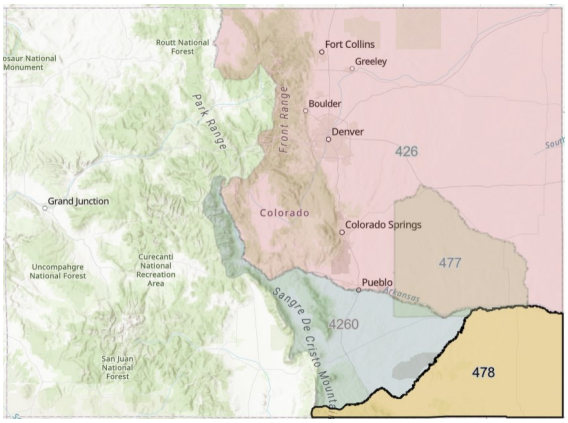


Figure 13. NLAP, *Royce Cession 477 clipped to Colorado state boundary,* created using ArcGIS.

The **second** treaty of the Little Arkansas Treaty was signed on October 18, 1865 and proclaimed on May 26, 1866. Similar to the treaty signed on October 14, this treaty was overruled by the Medicine Lodge Treaty of 1867, which dramatically reduced the size of the promised reservations and removed the reparations for the Sand Creek Massacre. The Native signatories of this treaty were the Kiowa and the Comanche.[15]

Royce Cession 515 (Treaty with the Ute, 1868)

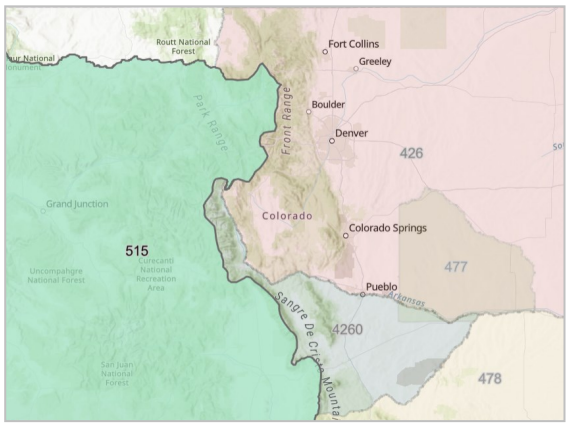


Figure 14. NLAP, *Royce Cession 515 clipped to Colorado state boundary,* created using ArcGIS.

The Treaty with the Ute was signed on March 2, 1868 and ratified on November 6, 1868. This treaty represents the first Ute treaty to cede land in 1868, after settlers flooded into the San Luis Valley upon the signing of the controversial 1863 Treaty with the Tabeguache Band of Utes.

The treaty was negotiated between agents of the U.S. government, including Kit Carson, and leaders of seven bands of Ute peoples living in Colorado and Utah. The treaty created a 16.5 million acre reservation in western Colorado and established two Indian agencies. The Utes were then expected to become stationary agricultural workers and send their children to boarding schools. The failures of these agencies would lead to the Meeker Incident and the eventual expulsion of almost all Utes from Colorado.

According to *Colorado Encyclopedia*, leaders of the Capote, Grand River, Muache, Tabeguache, Weeminuche, and Yampa Ute bands all signed the

treaty, though some signatures were later disputed. Back in Colorado, many Utes resented Ouray and other leaders for signing the treaty, and it soon became clear that most would not accept its "civilizing" dictums.[16]

Royce Cession 520 (Fort Bridger Treaty, 1868)

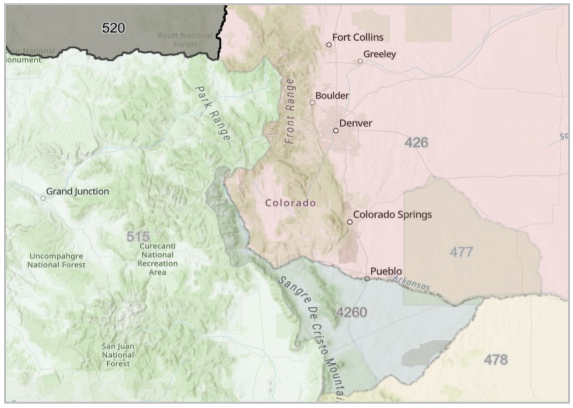


Figure 15. NLAP, *Royce Cession 520 clipped to Colorado state boundary,* created using ArcGIS.

The Fort Bridger Treaty with the Eastern Band Shoshoni and Bannock was signed July 3, 1868, ratified on February 26, 1869, and proclaimed February 24, 1869. One of the major provisions in this treaty was to create a reservation for the Eastern Shoshone within the Wind River Valley.[17] The Bannock band would be assigned a separate reservation at a later time.

Passing of the Indian Appropriations Act, 1871

Though not linked with a specific cession, the Indian Appropriations Act of 1871 included a significant clause declaring that Indigenous people did not belong to "independent" or "sovereign" nations and that they could no longer enter into treaties the United States. Although the treaty promised not to "invalidate or impair the obligation" of previous treaties, it represented a major step toward eliminating Indigenous sovereignty and increasing the power of the federal government over the land.[18]

Royce Cession 566 (Brunot Agreement with the Ute Nation, 1874)

One of the first arrangements to be made after the Indian Appropriations Act ended treaty-making was the Brunot Agreement in 1874. This "agreement" took 3.7 million acres out of the 16.5 million acre Ute reservation and dramatically reduced the southern Utes' land base.[19]

Miners began entering the mineral-rich San Juan Mountains en masse after

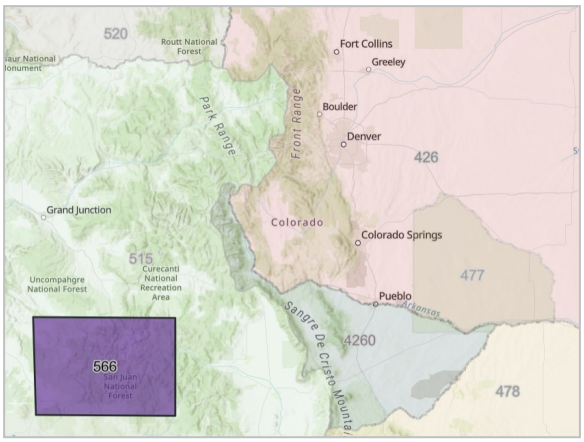


Figure 16. NLAP, *Royce Cession 566 clipped to Colorado state boundary,* created using ArcGIS.

1869. This land was part of the Ute Reservation, established "for the absolute and undisturbed use and occupation of the Indians" under Article 2 of the 1868 Treaty. Bribery of Chief Ouray (Chief of the Tabeguache Ute Band; the U.S. government treated him as the overall leader of the Utes because he was generally amenable to negotiation) was involved in passing this.

Royce Cession 616 & 617 (Agreement with Ute Indians of Colorado, 1880)

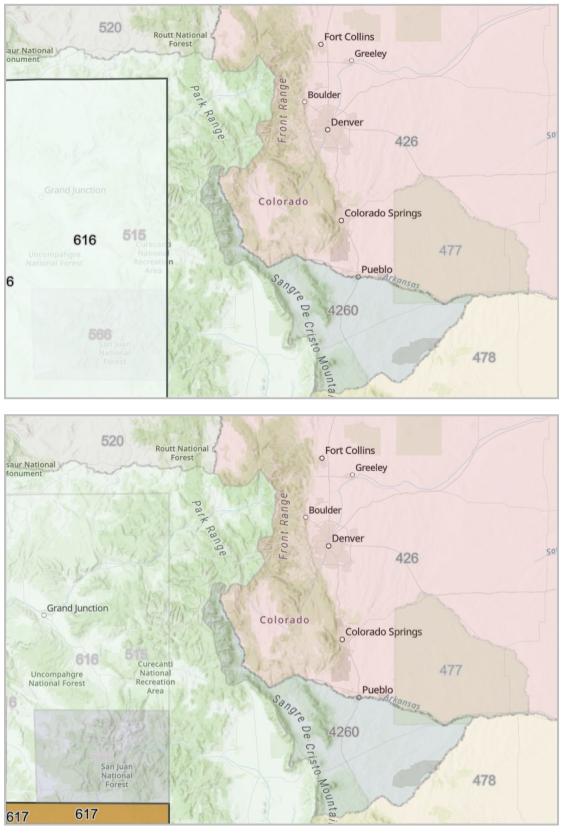


Figure 17. NLAP, *Royce Cession 616 and 617 clipped to Colorado state boundary,* created using ArcGIS.

The Agreement with the Ute Indians of Colorado was approved by Congress on June 15, 1880 and is codified as *21 Stat. 199*. Capitalizing on the violence of the Meeker Incident, this act removed almost all Utes from the state of CO and ceded all but a tiny strip in the southwestern corner.

This agreement also established Cession 617 as the Southern Uta Reservation. In the ensuing years, through the Dawes Act and other policies, the government fractured this land even more, eventually creating the present-day Southern Ute and Ute Mountain reservations. However, this strip of land was **not ceded**.

LAND DISPOSSESSION

A Closer Look at Land Patenting in Colorado

This section thoroughly explores Colorado land patenting, utilizing data from the Bureau of Land Management's (BLM) General Land Office (GLO) Database for Colorado. This database includes 700,972 patents across 118 unique entry classes encompassing 56,926,317 acres of land issued between July 4th, 1776 and July 14th, 2015. In order to map and animate the GLO data, Village Earth partnered with Native scholar Dr. Joshua Meisel, to convert the textual land descriptions for each of the Colorado patents, resulting in a GIS-based vector boundary dataset for 485,742 unique parcels.[20]

The GLO database is an exceptional resource that allows individuals to research the original land patent history of any parcel of land—granted that most of the data is centered in the West. All land ownership claims in the United States can be traced back to land patents (or similar documents) regarding land originally stewarded by Native peoples. Government entities are responsible for granting these patents to individuals, partnerships, trusts, or private companies. Additionally, the U.S. judicial system currently holds land patents as the "highest evidence" of rights to a particular land area.[21]

The purpose of examining these historical land patents is to demonstrate their instrumentality in removing Native peoples from their homelands before and after the 1875 Colorado Enabling Act. The data presented in this section showcases settler irreverence toward the existing relational ties between Indigenous communities and their homelands as they sought to remove Native peoples from Colorado before the state's establishment. Moreover, the dates on which these patents were granted should raise questions about their consistency with the preceding Native land treaties impacting the region.

The Colorado Enabling Act

Before we explore the land patent data, here is a brief history of the Colorado Enabling Act and its impact on Native lands and resources.

On March 3rd, 1875, Congress passed the **Colorado Enabling Act** (18 Stat. 474), which approved a number of measures that had to be met in order for Colorado to be considered a State. Colorado was then admitted by Presidential Proclamation on August 1, 1876. While only one provision mentions Indians (their prohibition from being taxed), there were four provisions that related to land and resources. Specifically, they are:

SEC. 4. "...that the people inhabiting said Territory do agree and declare that they forever disclaim all right and title to the unappropriated public lands lying within said Territory, and that the same shall be and remain at the sole and entire disposition of the United States."

SEC. 7. "...that sections numbered sixteen and thirty-six in every township, and where such sections have been sold or otherwise disposed of by any act of Congress, other lands, equivalent thereto, in legal subdivisions of not more than one quarter-section, and as contiguous as may be, are hereby granted to said State for the support of common schools."

SEC. 14. "...that the two sections of land in each township herein granted for the support of common schools shall be disposed of only at public sale and at a price not less than two dollars and fifty cents per acre, the proceeds to constitute a permanent school fund, the interest of which to be expended in the support of common schools."

SEC. 15. "...that all miner lands shall be excepted from the operation and grants of this act."[22]

Although the Colorado Enabling Act was approved on March 3, 1875, land surveys had been in progress since 1861.[23]

Essentially, all Section 4 lands under the Colorado Enabling Act were open to patenting by the United States, consistent with specific legal authority such as the Homestead Act of 1862, Scrip Warran Act of 1855, Morrill Act of 162, etc.

The Colorado Enabling Act Cont'd

The chart below demonstrates the total acreage of lands patented each year based on the signature date of each patent. According to the GLO database, 1,951,988 acres of land were patented in Colorado prior to the Colorado Enabling Act. As evidenced by the chart, the number of acres patented after the Act increased expeditiously, totaling nearly 55,616,962 acres by 1953 **(a 2749% increase).**

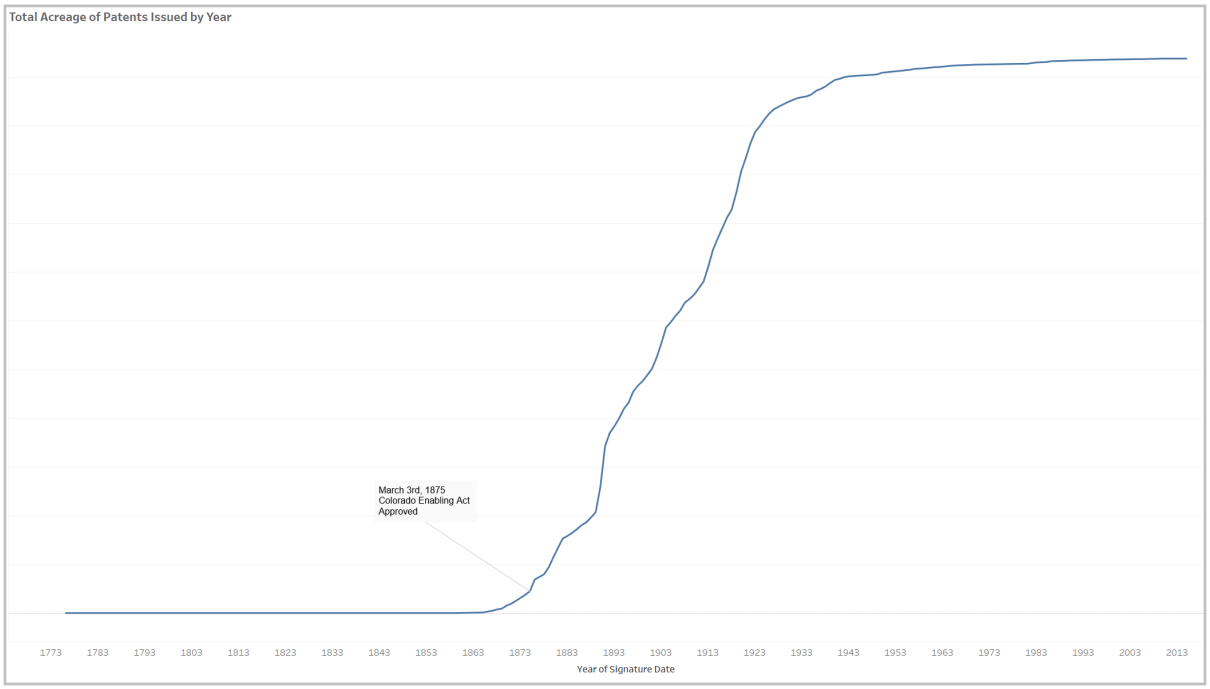


Figure 18. NLAP, *Total acreage of lands patented each year.*

CO Land Patenting: All Entry Classes

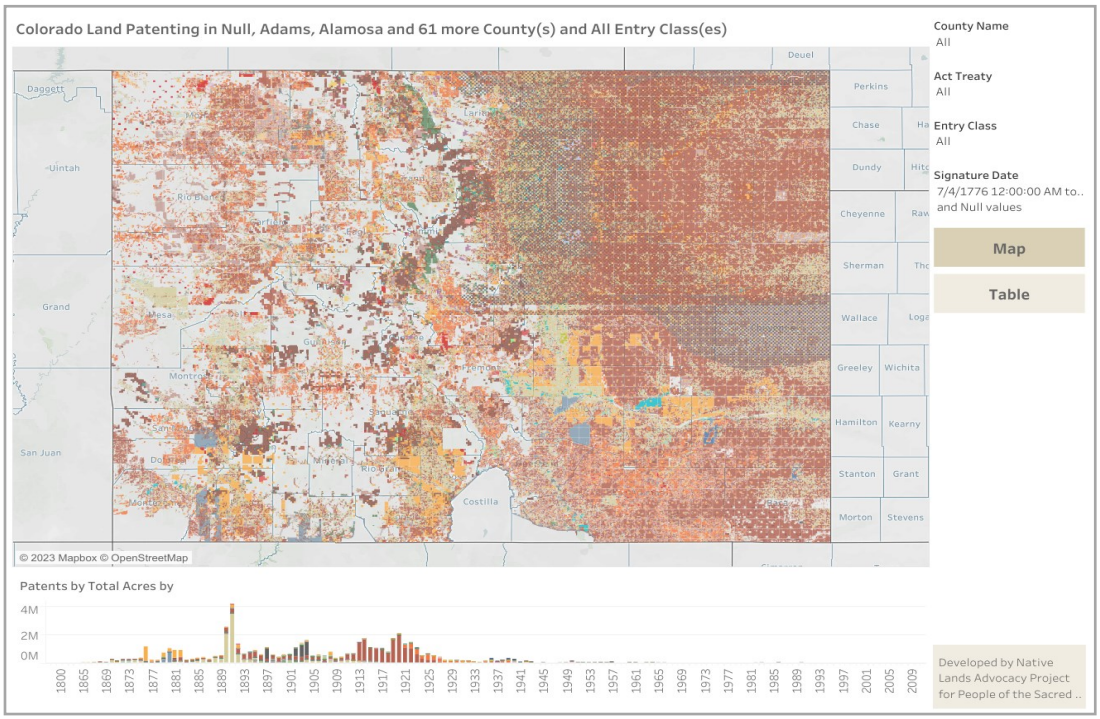


Figure 19. NLAP, *Colorado GLO Patent Data Dashboard,* NLIS.

Access the interactive dashboard: **Click Here**

First, we introduce our Colorado GLO Patent Data Dashboard and the types of land patent classifications covered in this section. The interactive version of this dashboard allows users to explore nearly 1,000 different land patent entry classes from **1776 to 2015**, along with each patent's country, authorization, date, and map distribution. The bar chart below the map also visualizes the number and type of patents granted for each year. Visualizing the GLO data in this type of format is powerful and helps us answer important questions about historical settlement patterns in the state. **In total, there have been 278,977 patents issued in Colorado, totaling 56,926,317 acres.**[24]

To demonstrate the level of detail in which we can view the GLO data, we provide a map image of land patents in Boulder County, CO in 1976. Any individual may visit the GLO database to research the patent history of their property of interest.[25] To view a time-lapse of the GLO data for Boulder County, visit https://youtu.be/Aj1i5xfISnw.

Figure 20. Native Lands Advocacy Project, *GLO Map Data for Boulder County,* NLIS.

CO Land Patenting: Top Ten Patent Entry Classes

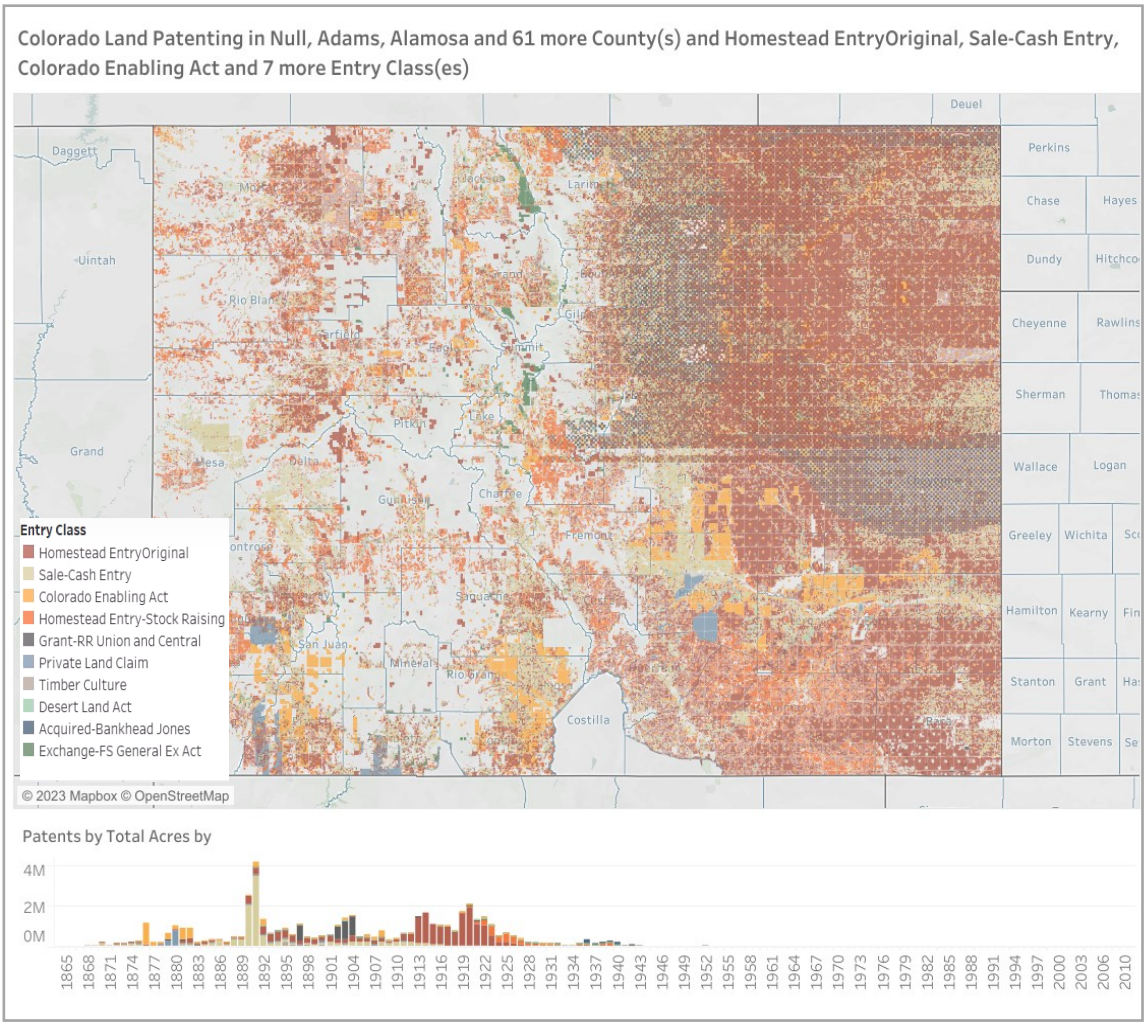


Figure 21. NLAP, *Top 10 Land Patent Entry Classes from 1776 to 2011*, NLIS.

Access the interactive dashboard: **Click Here**

Watch the timelapse video: **Click Here**

To display the patents that have had the most impact on the state's land history, we provide the dashboard image above that **summarizes and maps Colorado's top 10 land patent entry classes** relating to homestead entries, sale-cash entries, the Colorado Enabling Act, homestead entry-stock raising, the Union Pacific and Central Pacific Railroad Grants, private land claims, timber culture, the Desert Land Act, the Bankhead-Jones Farm Tenant Act, and the General Exchange Act. The bar chart below the map displays the running total acres for each patent type.

In total, these ten patent types account for 53,082,542 acres of land in Colorado.

CO Land Patenting: Top Ten Patent Entry Classes

Each patent type, issued by the federal government, furthered settler expansion into Colorado and the broader western region. Moreover, these patents allowed settlers to assert ownership of lands traditionally and originally tied to Native Nations.

According to these entry classes and their total acreages (ranked in Figure 22), Colorado's most common land patent entry class is the homestead patent, totaling approximately 21.8 million acres. Other prevalent land patents derive from sale-cash entries, the Colorado Enabling Act, homestead entry-stock raising, and the Union and Pacific Railroad Grants.

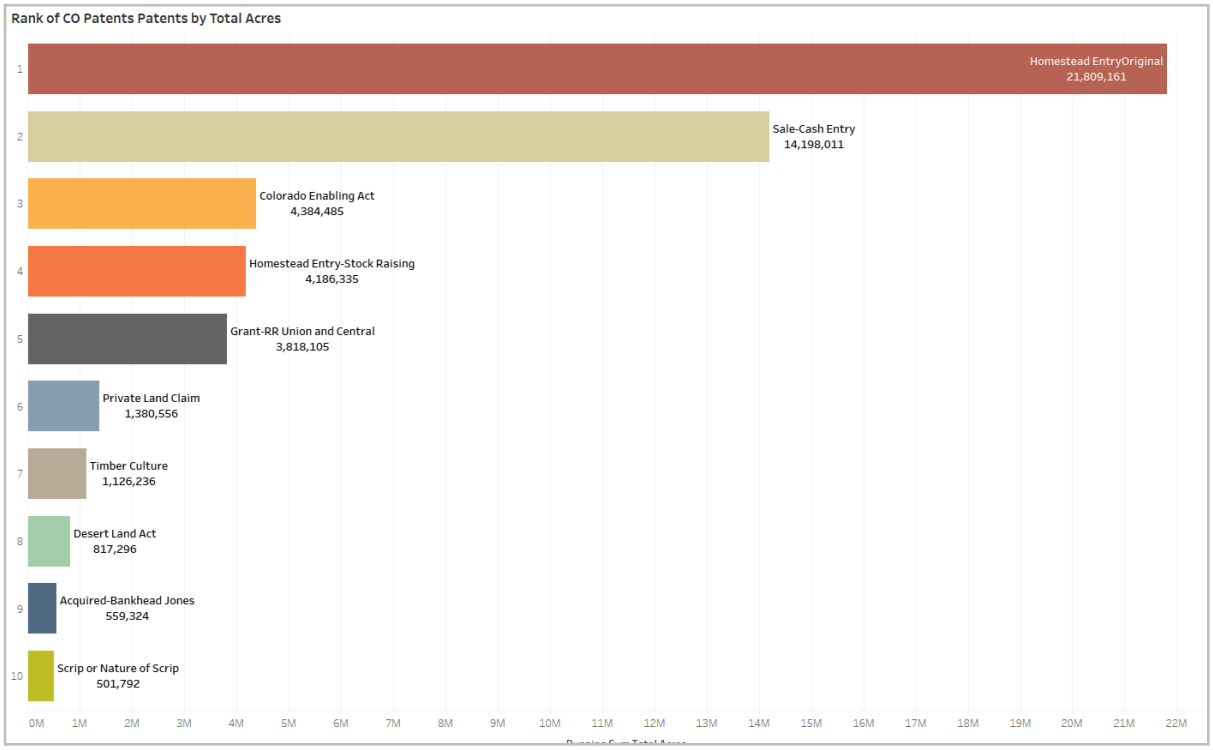


Figure 22. NLAP, *Total Acres by Entry Class for the Top 10 Entry Classes*, NLIS. See **Appendix C** to view the full spreadsheet for all Colorado land patents.

Homestead Entry Patents

The **Homestead Act of 1862** allowed individuals to claim a federal land grant of up to 160 acres in exchange for living on and "improving" the land for five years. This act applied to all states, including Colorado. In Colorado, homestead patents were issued by the federal government to individuals who completed the requirements of the Homestead Act. After the application was filed, the land would be surveyed, and a certificate of eligibility would be issued. The homesteader then had to live on the land and improve it for at least five years, at which point they could apply for a patent, giving them ownership of the land.

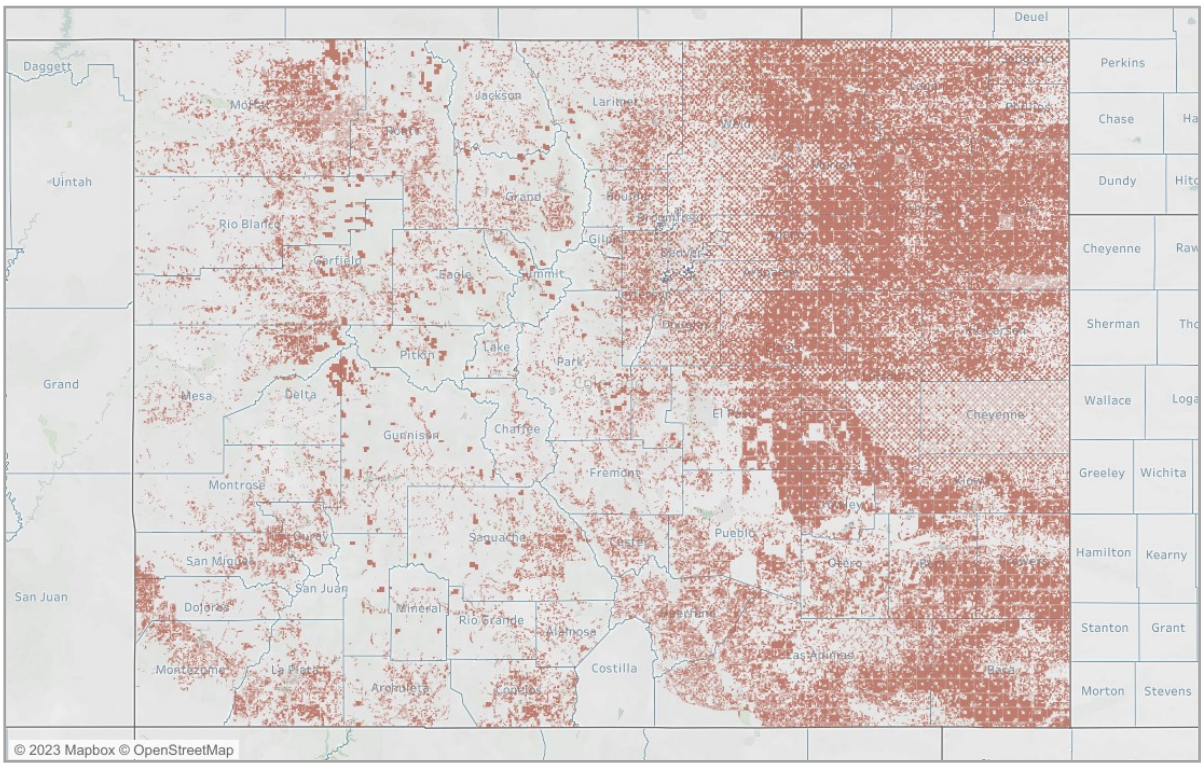


Figure 23. NLAP, *Colorado Homestead Entry Patents from 1862 to 2011*, NLIS.

Access the interactive dashboard: **Click Here**

Watch the timelapse video: **Click Here**

The dashboard image above shows the distribution of homestead patents in all Colorado counties from **1862 to 2011**. Across this period, there have been 269,220 homestead patents issued in Colorado. As previously mentioned, these **homestead patents comprise 21,835,708 acres of land in Colorado**.

Additionally, the median acres of a Colorado homestead patent was 160 acres.

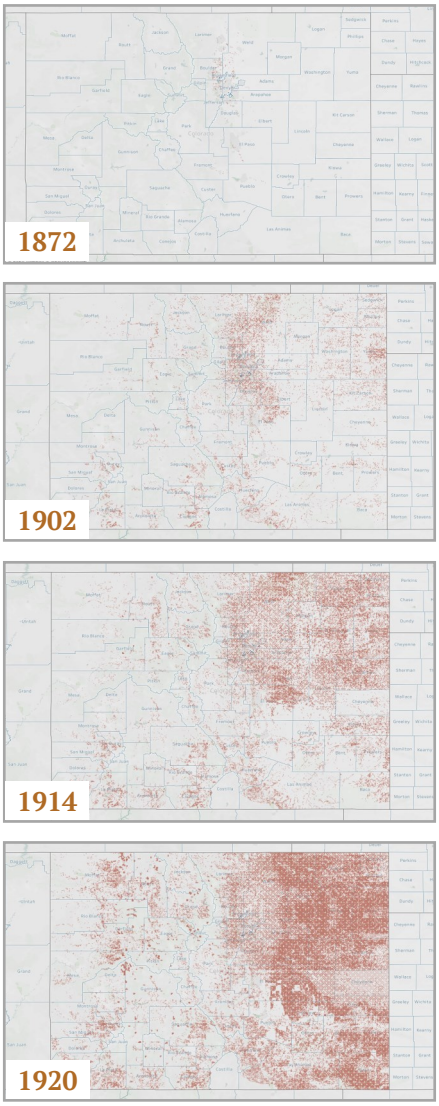


Figure 24. NLAP, *CO Homestead Patent Entry Time Lapse Screenshots*, NLIS.

Figure 24 demonstrates a time-lapse of homestead patents issued in Colorado during 1872, 1902, 1914, and 1920. The GLO data highlights a surge in homestead patents between 1914 and 1920. In 1872—just ten years after the authorization of the Homestead Act—homestead patents made up nearly 94,000 acres of land in Colorado. By 1914, homestead patents comprised almost 10 million acres and increased to about 16.6 million acres by 1920. A time-lapse of each top ten entry class is available via YouTube link attached at the bottom of each dashboard image. To access the live interactive dashboard, click on the dashboard link below the dashboard image.

Nationally, by 1934, the federal government processed over 1.6 million homestead applications and granted more than 270 million acres of land to individual settlers.[26] The passage of the Federal Land Policy and Management Act of 1976 officially repealed the Homestead Act in 48 contiguous states.[27]

Additionally, print notices of settlers "proving" their homesteads were common during this time.[28] To demonstrate this practice, we provide an image of homestead notices published in *The Larimer County Independent* on October 18, 1888.

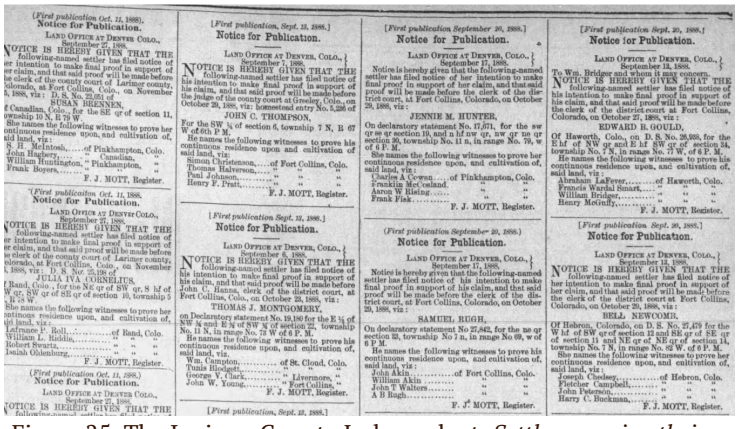


Figure 25. The Larimer County Independent, *Settlers proving their homesteads,* October 18, 1888, Newspapers.com

Sale-Cash Entry Patents

Sale-cash entry patents were a type of land patent issued by the U.S. government in the late 19th and early 20th centuries. These patents were issued to individuals who purchased public land outright rather than homesteading or acquiring land through other means.

To acquire a sale-cash entry patent, an individual or corporation would need to purchase the land from the government and then apply for a patent, which would grant legal ownership of the land. The government would determine the sale price of the land which could vary depending on the location, quality, and potential uses of the land.

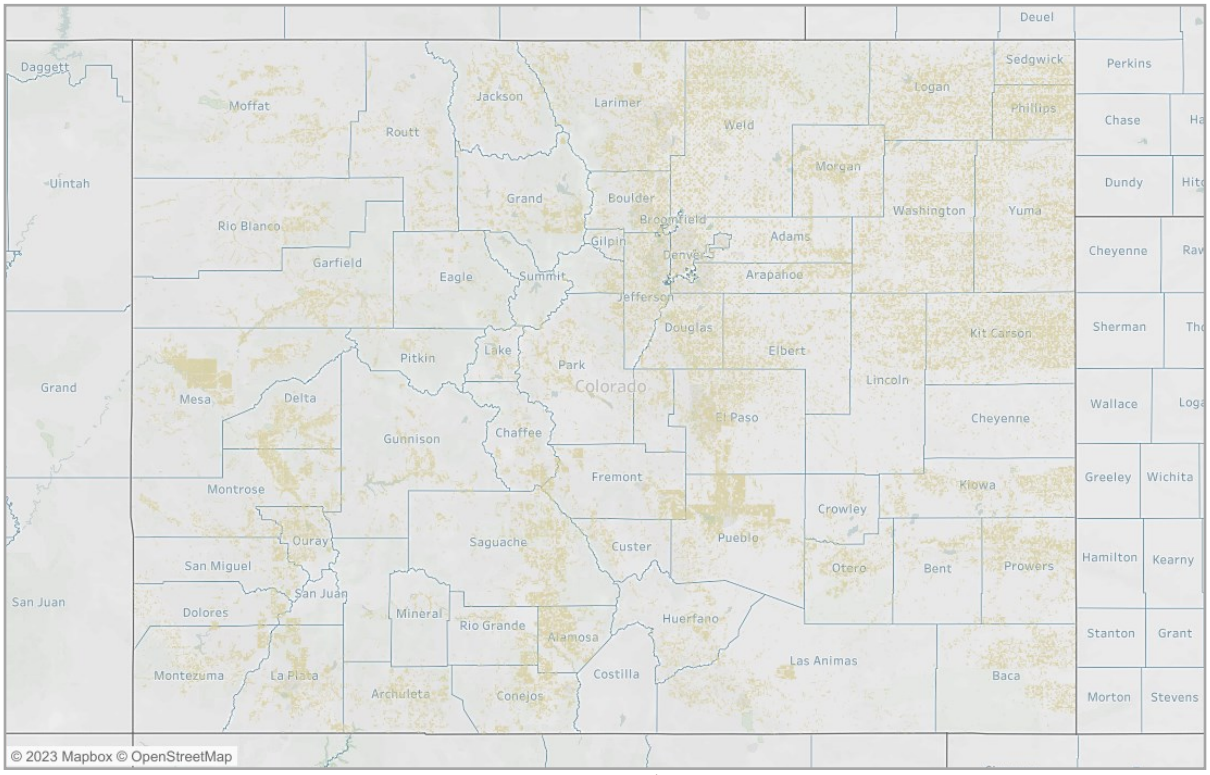


Figure 26. NLAP, *Colorado Sale-Cash Entry Patents from 1865 to 2011*, NLIS.

Access the interactive dashboard: **Click Here**

Watch the timelapse video: **Click Here**

This dashboard image above shows the distribution of sale-cash patents in all Colorado counties from **1865 to 2011**. Across this period, 192,813 sale-cash entry patents have been issued in Colorado, **totaling 14,241,992 acres of land**.

The Pre-Emption Act of 1841

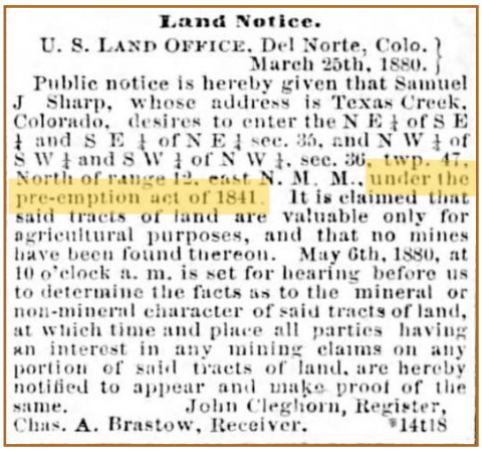
What about settlers who squatted on the land prior to the Colorado Enabling Act and prior to being surveyed by the GLO?

The **Pre-Emption Act of September 4, 1841** was designed for just this class of settler. According to the National Archives, the Pre-Emption Act "permitted 'squatters' who were living on federal government-owned land to purchase up to 160 acres (65 ha) at a meager price (not less than $1.25 per acre) before the land was to be offered for sale to the general public. To qualify under the law, the 'squatter' had to meet the following criteria:

1. a "head of household";
2. a single man over 21 or a widow;
3. a citizen of the United States (or was intending to become naturalized); and,
4. a resident of the claimed land for a minimum of 14 months."[29]

It is nearly impossible to determine just how lands were liquidated to these "squatters" since their patents, once issued, are assigned a sale-cash entry status. However, it is possible to locate the public notice for when these patents were "proven" in court.

For example, Figure 27 displays a public notice for Samuel J. Sharp, who sought to "prove" his preemption under the Act of 1841 for a part of Section 36. However, when we researched the listing in the BLM GLO Database (Figure 28), the "Authority" for the patent issued was listed as a 'Sale-Cash Entry' (3 Stat. 566) and not the 'Act of 1841.'



Land Notice.

U. S. LAND OFFICE, Del Norte, Colo. } March 25th, 1880. }

Public notice is hereby given that Samuel J Sharp, whose address is Texas Creek, Colorado, desires to enter the N E ¼ of S E ¼ and S E ¼ of N E ¼ sec. 35, and N W ¼ of S W ¼ and S W ¼ of N W ¼, sec. 36, twp. 47, North of range 12, east N. M. M., under the pre-emption act of 1841. It is claimed that said tracts of land are valuable only for agricultural purposes, and that no mines have been found thereon. May 6th, 1880, at 10 o'clock a. m. is set for hearing before us to determine the facts as to the mineral or non-mineral character of said tracts of land, at which time and place all parties having an interest in any mining claims on any portion of said tracts of land, are hereby notified to appear and make proof of the same. John Cleghorn, Register, Chas. A. Brastow, Receiver. 14t18

Figure 27. Newspapers.com, *Public notice for Samuel J Sharp who seeks to "Prove" his preemption under the Act of 1841*, March 25, 1880.

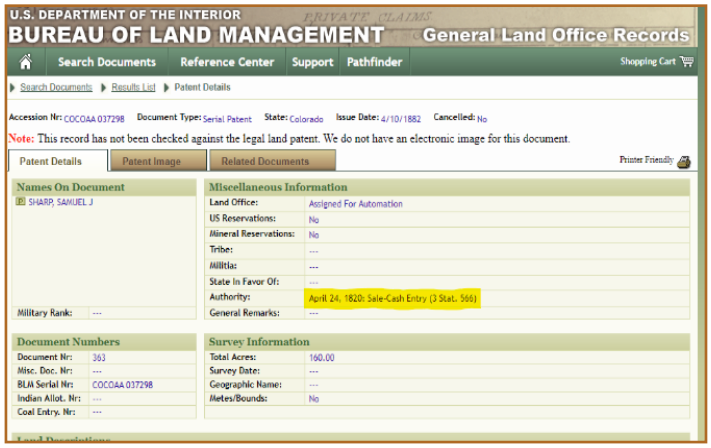


Figure 28. General Land Office Records, *Listing for Samuel J. Sharp's public notice in the BLM GLO Database*, Bureau of Land Management.

Additionally, the Denver Land Office Records' 1862-1908 "Register of Cash Receipts, 3 vols"[30] contains a list of cash receipts for Preemption Act entries. Ancestry.com has a searchable database of the register containing 63,976 records.

According to Ancestry.com:

"This informative database contains claim records collected from the Land Office in Denver, Colorado. Persons who applied for land ownership between 1862 and 1908 are included along with the location of their claim. In addition to this information, the law providing for the claim and the source from which the record was taken are also included. For further information regarding land records in the Denver area, contact National Archives - Rocky Mountain Region; Email: archives@denver.nara.gov."

Unfortunately, the data contained in the Ancestry.com database is not sufficient to determine if lands were settled were prior to cession. Below is a sample record from Ancestry.com.

Name	Martin Liston
Township/Direction	9/South
Range/Direction	64/West
Book	Register of Cash Receipts, 3 vols.
Type	Preemption Act entry
Bureau of Land Management	6
Application #	1856.00

Figure 29. Ancestry.com, *All Denver Land Office Records, 1862-1908 Results,* table values retrieved from https://www.ancestry.com/search/collections/3313/?count=50&f-F00029F6=Preemption+Act+entry.

Homestead Entry Stock-Raising Patents

The **Stock-Raising Homestead Act of 1916** amended the Homestead Act to allow individuals to claim up to 640 acres of public land to raise livestock. The law was designed to encourage the development of ranching and grazing on public lands and helped to promote the growth of the livestock industry in Colorado and other western states.

Under both the **Homestead Act** and the **Stock-Raising Homestead Act**, individuals could claim public land by filing a Homestead Entry and proving that they had lived on and "improved" the land for the required period of time. Once the requirements were met, a Homestead Entry Patent or a Stock-Raising Homestead Patent would be issued, granting the individual legal ownership of the land.

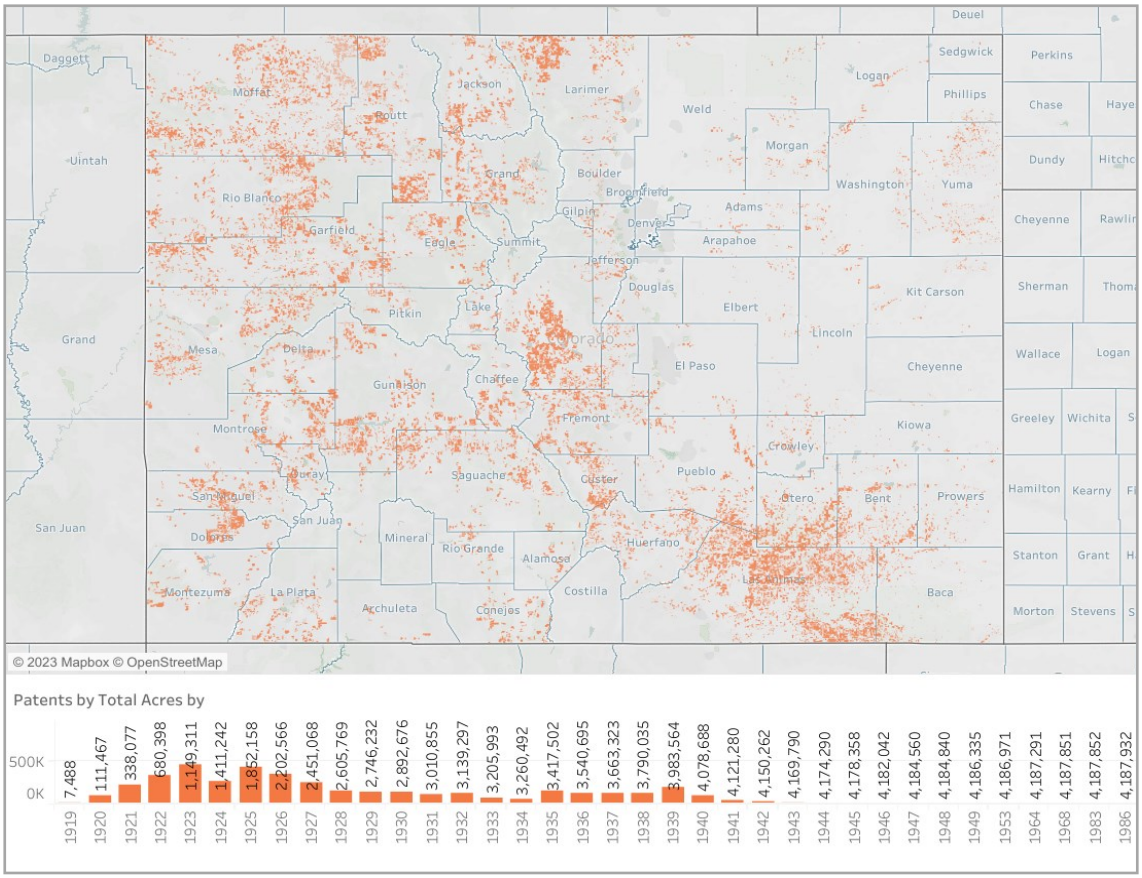


Figure 30. NLAP, *Colorado Homestead Stock-Raising Entry Patents from 1919 to 1986*, NLIS.

Access the interactive dashboard: **Click Here**

Watch the timelapse video: **Click Here**

This dashboard image shows the distribution of homestead stock-raising patents in Colorado from **1919 to 1986**. Across this period, 57,227 stock-raising patents have been issued in Colorado, **totaling 4,187,932 acres of land**.

Union Pacific and Central Pacific Railroad Land Grants

The **Union Pacific Railroad** and the **Central Pacific Railroad** were two major railroads built in the western United States during the 19th century. These railroads were constructed with the help of federal land grants, which allowed the companies to acquire public land to build the railroads and related infrastructure.

Under the terms of the land grants, the Union Pacific and Central Pacific were each authorized to claim up to 20 square miles of public land per mile of track they constructed. The companies were required to sell the land that they acquired to settlers and other buyers, which helped finance the railroad's construction. In Colorado, the Union Pacific and Central Pacific both received federal land grants to construct their railroads. The companies were authorized to claim large tracts of public land in the state, which they then sold to settlers and other buyers.

Figure 31. Charles Weitfle, *Snowy range and railroad in Central City, CO*, Photograph, Boston Public Library, 1836-1921.

Union Pacific and Central Pacific Railroad Land Grants

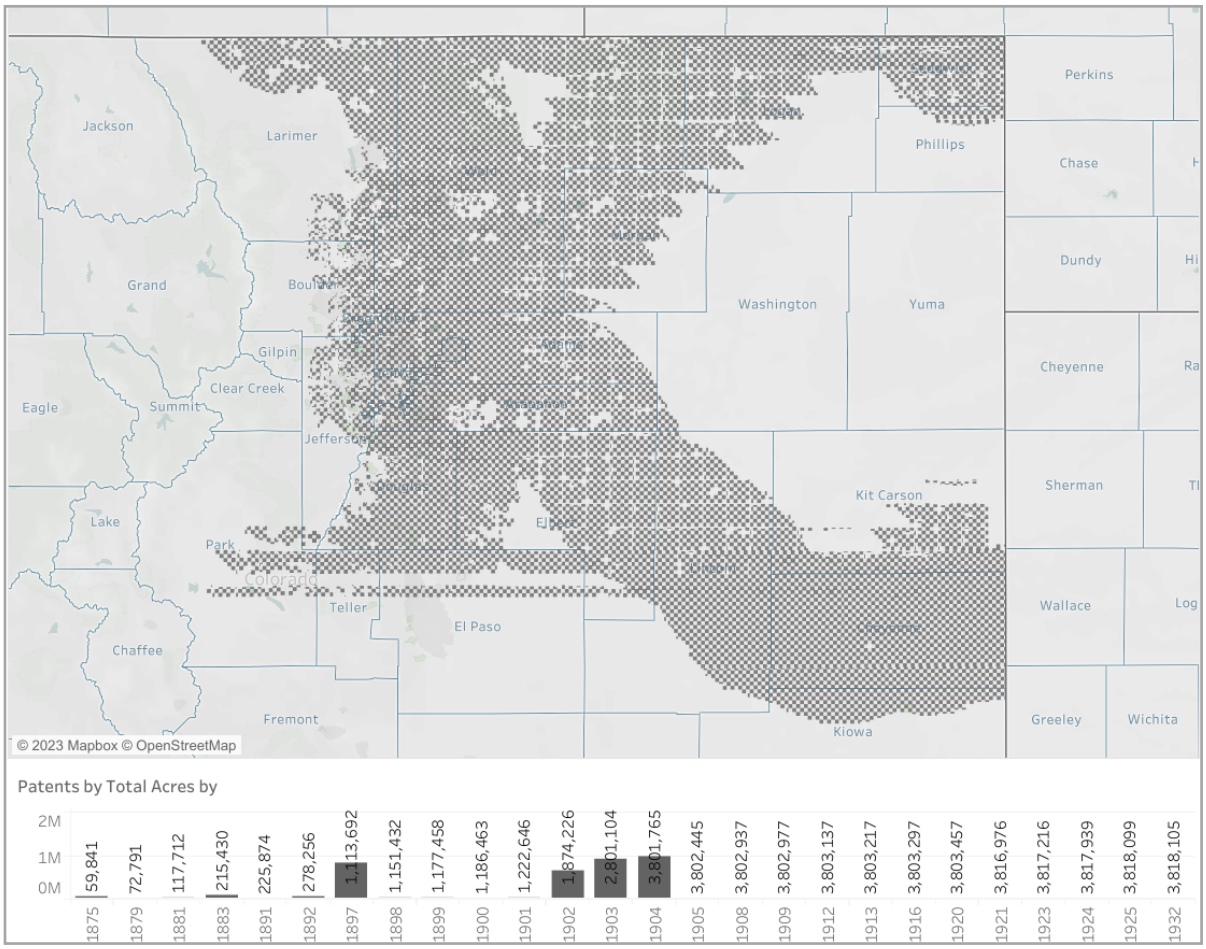


Figure 32. NLAP, *Colorado Union and Central Pacific Railroad Land Grant Patents from 1875 to 1932*, NLIS.

Access the interactive dashboard: **Click Here**

Watch the timelapse video: **Click Here**

This dashboard image shows the distribution of Colorado land patents related to the Union Pacific and Central Pacific Railroad, according to the GLO data. The bar chart at the bottom of the map calculates the running total acres by each year. By analyzing the bar chart, it is evident that these patents significantly increased during 1897 and again in 1903 and 1904.

According to the GLO data, **from 1875 to 1932**, 17,403 of these patents have been issued in Colorado, **totaling 3,818,105 acres of land**.

Lands Patented Under The 1862 Morrill Act

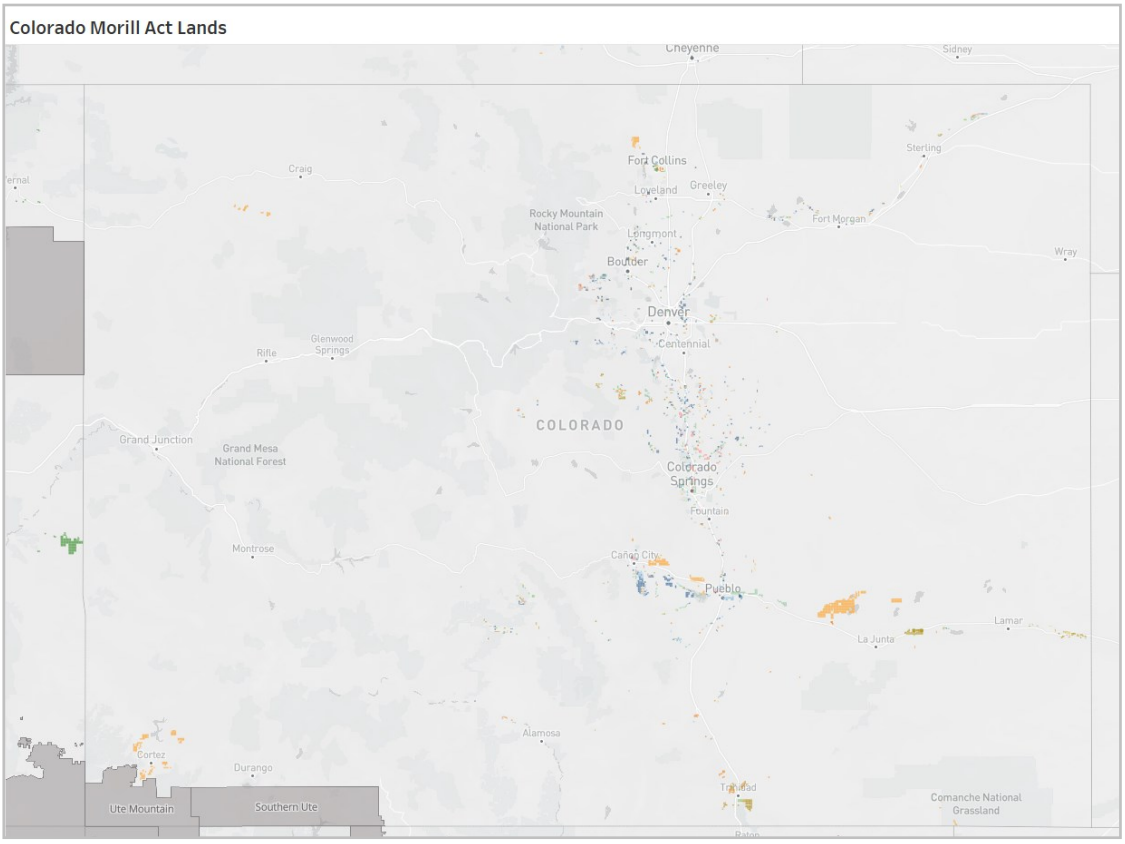


Figure 33. NLAP, *Map of Colorado Morrill Act Lands in 1862,* Tableau.

Access the interactive dashboard: **Click Here**

This dashboard summarizes parcel data for lands ceded from Native tribes in Colorado and granted (by the federal government) to universities under the **1862 Morrill Act**. Along with the GLO data, the data used to create this dashboard was also compiled and made available by *High Country News* as a part of their March 2020 feature, "Land-Grab Universities."

Tribal Nation	US Acquired Mode	Acres
Arapaho of Upper Arkansas; Cheyenne of Upper Arkansas	Ceded by treaty, February 18, 1861	237,140
Arapaho; Cheyenne	Ceded by treaty, October 14, 1865	50,784
Comanche; Kiowa	Ceded by treaty, October 18, 1865	11,480
Uta	Ceded by agreement (former reservation), April 29, 1874	15,914
Uta	Ceded by agreement (former reservation), March 6, 1880	3,138
Uta (Tabeguache, Muache, Capote, Weeminuchi, Yampa, Grand River, and Uintah bands)	Ceded by treaty, March 2, 1868	12,797
Grand Total		**331,253**

Figure 34. *Table of Total Acres Patented under the Colorado Morrill Act in 1862*. See **Appendix B** for full table.

Figure 34 breaks down the total land acres granted to universities under the Morrill Act for the tribes included in this assessment. **The Morrill Act dispossessed these Native communities of 331,253 acres of land.** It should be noted that we are referring to the tribes as listed by Royce. We acknowledge that these are not necessarily how the tribes prefer to be identified.

Private Land Claim Entry Patents

Private Land Entry (PLE) claims allowed individuals to acquire public land by proving that they had previously settled and improved the land, often without official authorization. Under the PLE system, settlers could file a claim for land that they had already "improved" and occupied, and the government would then recognize their rights to the land and issue a patent. The PLE system was designed to encourage settlement and development in the western United States by allowing individuals to acquire land yet to be available for public sale.

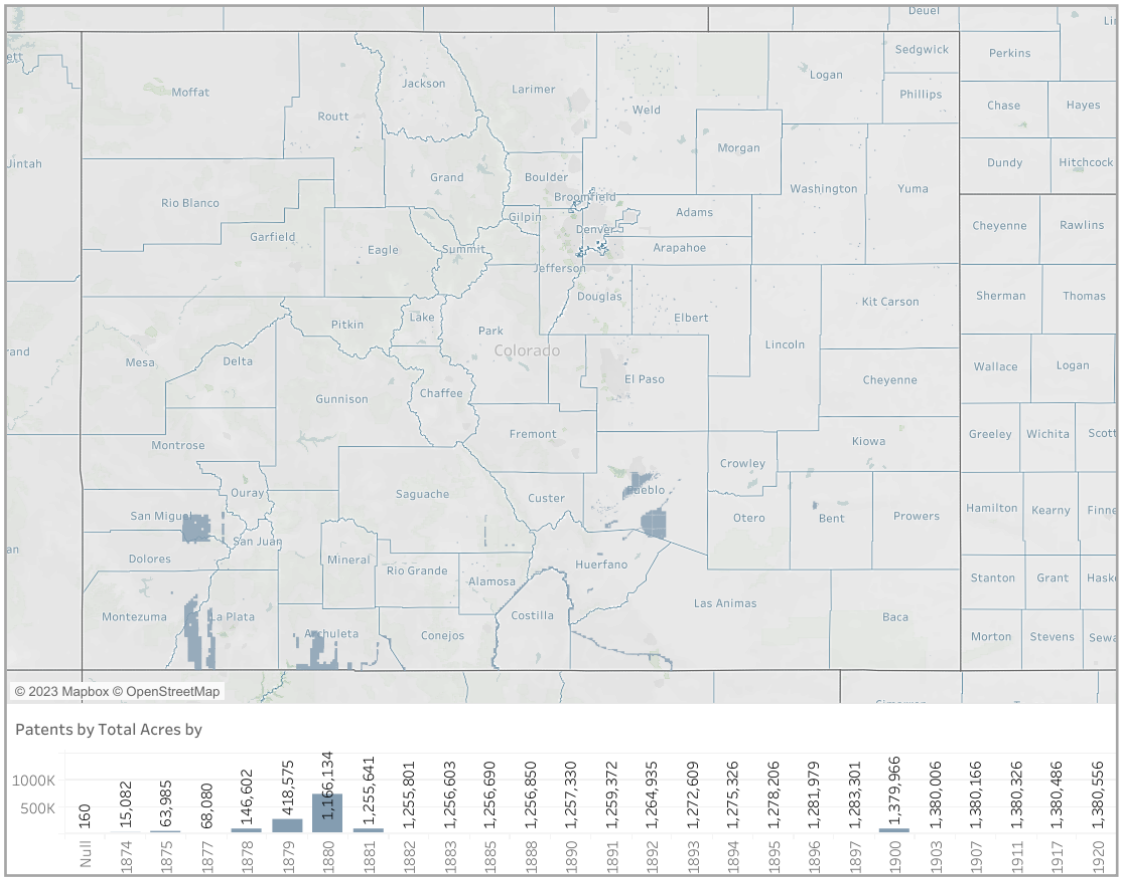


Figure 35. NLAP, *Colorado Private Land Claim Entry Patents from 1874 to 1920*, NLIS.

Access the interactive dashboard: **Click Here**

Watch the timelapse video: **Click Here**

This dashboard image shows the distribution of Colorado private land claim entry patents. The bar chart at the bottom of the map displays the patents by their running total acres each year. According to the GLO data, from **1874 to 1920,** 3,469 of these patents were issued in Colorado, **totaling 1,380,556 acres of land**.

Timber Culture Patents

The **Timber Culture Act of 1873** was a federal law that allowed individuals to claim up to 160 acres of public land in the western United States, including Colorado, on the condition that they would plant and cultivate trees on at least a quarter of the land within four years. The law was designed to promote reforestation and timber production in the western states.

Under the Timber Culture Act, individuals could claim land by paying a fee of $1.25 per acre and agreeing to plant and maintain trees on at least a quarter of the land. The law required that the trees be planted in rows or blocks, with a minimum of 4,000 trees per acre, and that they be maintained for at least ten years.

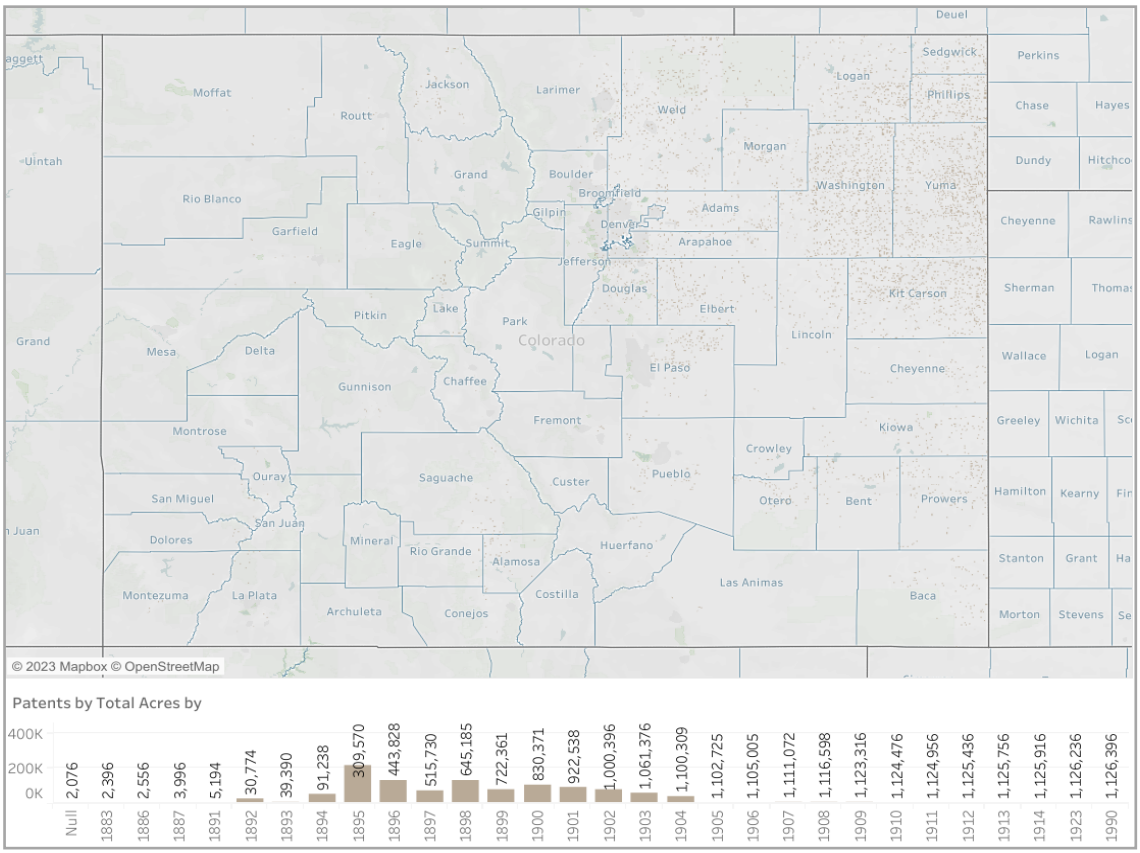


Figure 36. NLAP, *Colorado Timber Culture Patents from 1883 to 1990*, NLIS.

Access the interactive dashboard: **Click Here**

Watch the timelapse video: **Click Here**

This dashboard shows the distribution of Colorado timber culture patents. The bar chart at the bottom of the map displays the patents by their running total acres by each year. According to the GLO data, from **1883 to 1990,** 10,691 timber culture patents were issued, **totaling 1,126,396 acres of land**.

Desert Land Act Patents

The **Desert Land Act of 1877** was a federal law that allowed individuals to claim up to 640 acres of public land in arid regions of the western United States, including Colorado.

Under the Desert Land Act, individuals could claim land by paying a fee of $1.25 per acre and demonstrating that they intended to irrigate and cultivate the land. The law required that the land be irrigated within three years of the claim being made, and the claimant had to show that they had the financial means and expertise to successfully develop the land.

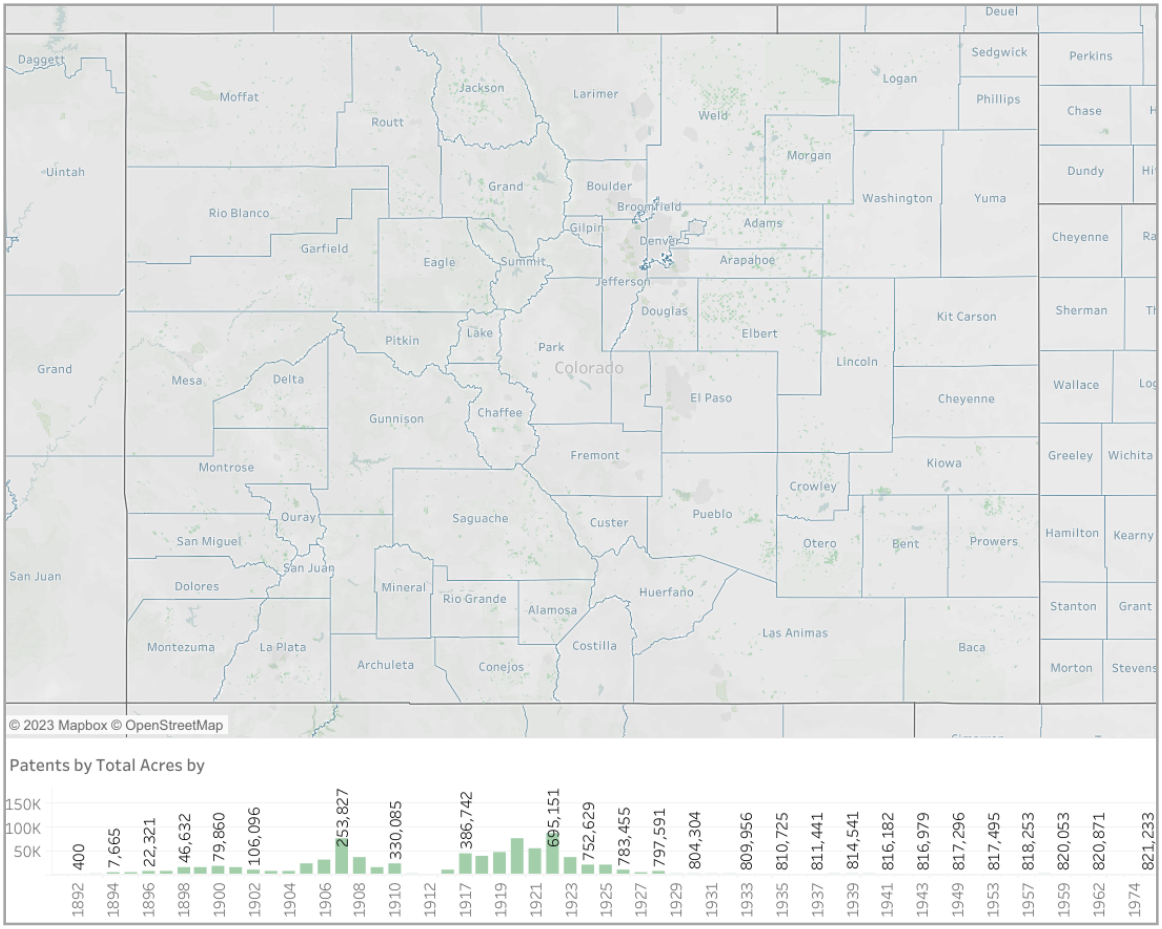


Figure 37. NLAP, *Colorado Desert Land Act Patents from 1877 to 1976,* NLIS.

Access the interactive dashboard: **Click Here**

Watch the timelapse video: **Click Here**

This dashboard shows the distribution of Desert Land Act patents in Colorado. The bar chart at the bottom of the map displays the patents by their running total acres by each year. According to the GLO data, from **1887 to 1976,** 11,438 Desert Land Act patents were issued, **totaling 821,223 acres of land**.

Acquired Bankhead-Jones Patents

The **Bankhead-Jones Farm Tenant Act of 1937** was a federal law that provided financial assistance to farmers and ranchers in the United States, including Colorado. The law was designed to help struggling farmers and ranchers during the Great Depression and to promote sustainable land use practices.

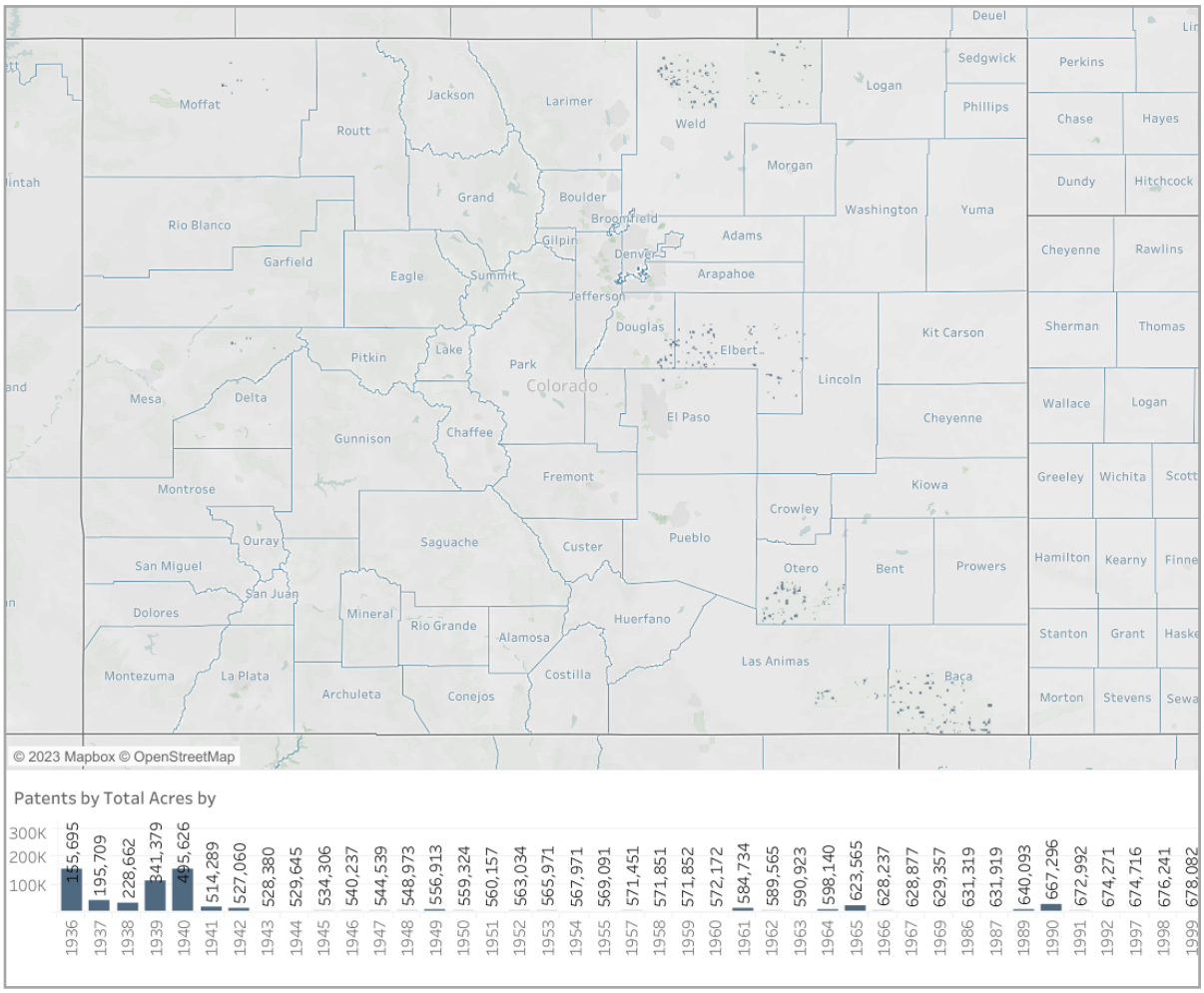


Figure 38. NLAP, *Colorado Acquired Bankhead-Jones Patents from 1936 to 1999,* NLIS.

Access the interactive dashboard: **Click Here**

Watch the timelapse video: **Click Here**

This dashboard shows the distribution of Acquired Bankhead-Jones patents for all Colorado counties. The bar chart at the bottom of the map displays the patents by their running total acres by each year. According to the GLO data, from **1936 to 1999,** 6,817 Acquired Bankhead-Jones patents were issued, **totaling 678,082 acres of land**.

Summary of Native Land Dispossession Through Colorado Land Patenting

In summary, these ten patent entry classes have had the most impact on lands in Colorado, accounting for a total of **53,082,542 acres**. This total makes up **93.25%** of the overall **56,926,317 acres** for all land patents issued in the state.[31]

Figure 39. NLAP, *Acreage Total for Top Ten Entry Classes,* infographic, NLIS. See Appendix C for the spreadsheet for all Colorado land patents.

Recommendations for Further Research

We feel we have just scratched the surface of exploring the GLO Database for Colorado. One of the biggest remaining questions is how many land patents were issued to people who were occupying lands illegally in violation of the Indian Non-Intercourse Act. Most likely, such patents would have been issued under the **Preemption Act of 1841**. However, as stated above, to the best of our knowledge, these would have been classified as Sale-Cash Entry and, therefore, it is difficult to parse whether the sale was for lands settled before or after a cession occurred. It is possible that the materials used for "proving" preemption lands could be obtained at the National Archives in Denver.

For further information regarding land records in the Denver area, contact **National Archives - Rocky Mountain Region** (email: archives@denver.nara.gov). Unfortunately, the data contained in the Ancestry.com database is not sufficient to determine if lands were settled prior to cession.

VALUE OF DISPOSSESSED LANDS

This section calculates the value of dispossessed lands in Colorado at the Time of Taking and the Time of Land Cession."

Methods & Calculation

The Colorado Constitution and statutes specify that county assessors value real property classified as commercial, industrial, and vacant land by considering the market, cost, and income approaches to value.[32] The calculation to determine the **assessed value** for each of these land classes is the following:

Actual Value		$275,000
Assessment Rate	×	0.29
Assessed Value		$ 79,750

Using this calculation and data published by the Colorado Department of Local Affairs Division of Property Taxation[33], this section articulates the value of dispossessed lands in Colorado at the **Time of Taking** and the **Time of Land Cession.** The CO Department of Property Taxation data is the most comprehensive dataset we have found. However, this data does not include a breakdown of assessed values for each land class. Therefore, to calculate the market value of this historical data, we took the percent difference of Assessed/Market value of 11.50% from 2021 and applied that same percentage to previous years, all the way back to 1883.

Analysis of Contemporary Colorado Land Ownership

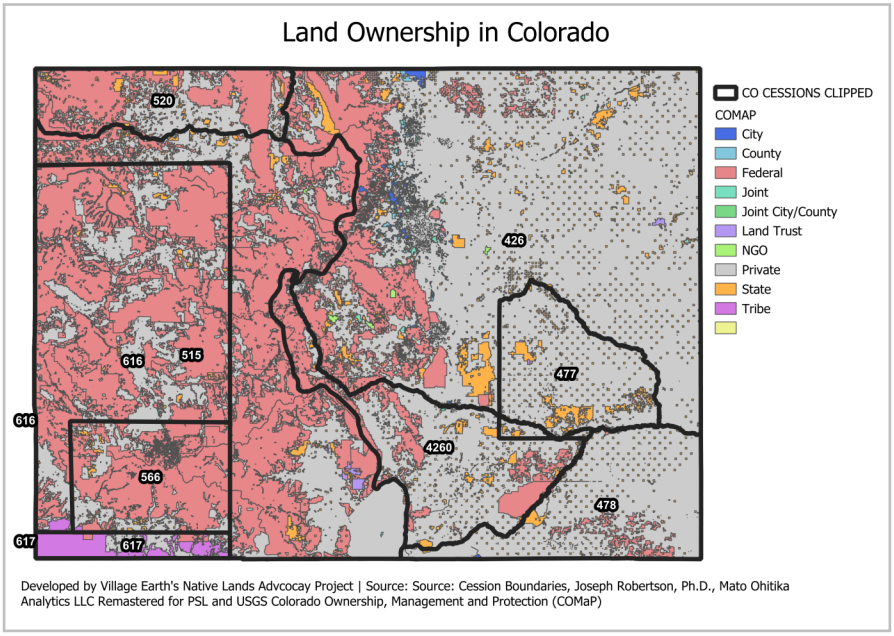


Figure 40. NLAP, *Analysis of Contemporary Colorado Land Ownership,* data retrieved from United States Geological Survey (USGS) COMaP and Dr. Joseph Robertson's remastered cession boundaries.

Figure 40 displays contemporary land ownership in Colorado by land class. We include this map to provide context for each land cession's various land class developments. Regarding total acreage, Figure 41 displays the breakdown of ownership of the 66 million acres of land in Colorado according to the Colorado Ownership, Management, and Protection (COMaP) database. This database cites that nearly 38 million acres in Colorado are classified as private land. Other major land classes are federal lands (~24 million acres), state lands (~3.2 million acres), and tribal lands (~769,000 acres).

Ownership	Acres
Private	37,912,621
Federal	24,099,634
State	3,259,261
Tribe	769,229
City	188,867
County	154,707
Land Trust	90,303
NGO	71,463
Joint	65,707
Joint City/County	8,734

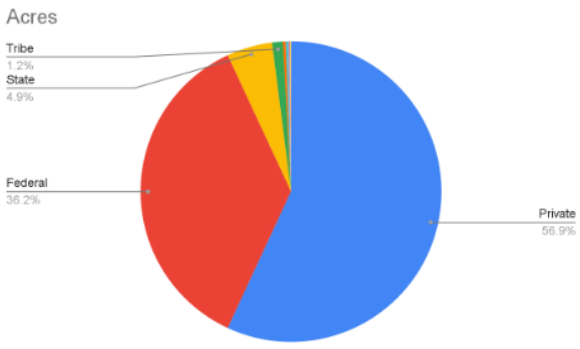


Figure 41. NLAP, *Ownership Breakdown of Lands in Colorado,* data retrieved from the USGS COMaP.

Ratio of Public Lands vs. Private Lands by Cession

Royce No.	Tribe	Public Acres	% of Total	Private Acres	% of Total
426	Arapaho and Cheyenne of Upper Arkansas	5,947,279	22.55%	20,424,116	77.45%
4260	Arapaho and Cheyenne of Upper Arkansas	1,880,395	34.30%	3,602,069	65.70%
477	Cheyenne and Arapaho	507,507	13.53%	3,243,837	86.47%
478	Comanche and Kiowa	511,558	10.82%	4,216,746	89.17%
515	Uta (Tabeguache, Capote, Weeminuchi,Yampa,Grand River, and Uintah Bands	17,406,760	64.79%	8,691,782	32.35%
520	Shoshoni and Bannock (Eastern Bands)	2,029,728	64.08%	1,137,006	35.90%
566	Uta	2,755,793	74.04%	956,341	25.70%
616	Uta	10,392,596	65.54%	4,702,177	29.65%
617	Uta	79,796	7.36%	321,397	29.63%

Figure 42. Analysis by NLAP, *Ratio of Public Lands vs, Private Lands by Cession,* data retrieved from USGS COMaP and Dr. Joseph Robertson's remastered cession boundaries.

Figure 42 provides a granular breakdown of public and private lands by land cession.

Actual Value of Land

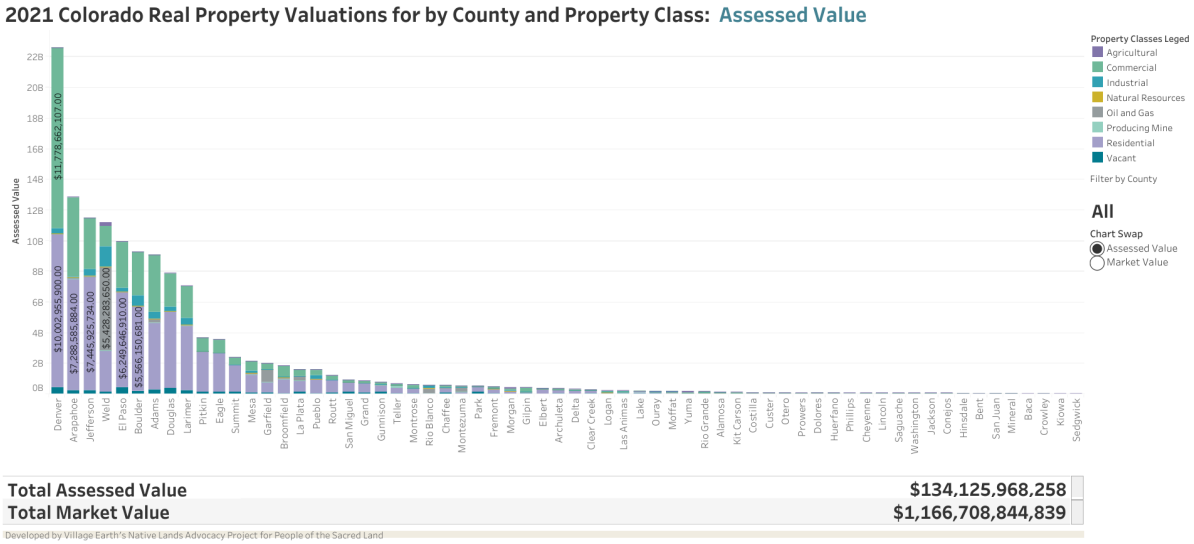


Figure 43. NLAP, *Total Assessed Value and Total Market Value of Land in 2021,* NLIS.

Access the interactive dashboard:
Click Here

This section analyzes real property values in Colorado according to the Colorado Department of Property Taxation. The real property values are displayed by Colorado county and property type (ex. agriculture, commercial, industrial, natural resources, oil and gas, etc.).

According to the CO Department of Property Taxation, as of 2021, the assessed value of all property in Colorado is $134,125,968,258. In contrast, the estimated total market value of all property in Colorado is $1,166,708,844,839.

Considering that there is a total of 56,926,317 acres patented in the GLO database, this translates to an average of $2,356 per acre assessed value or an average of $20,484 per acre market value.

2021 Assessed and Market Value of Lands in Colorado by County

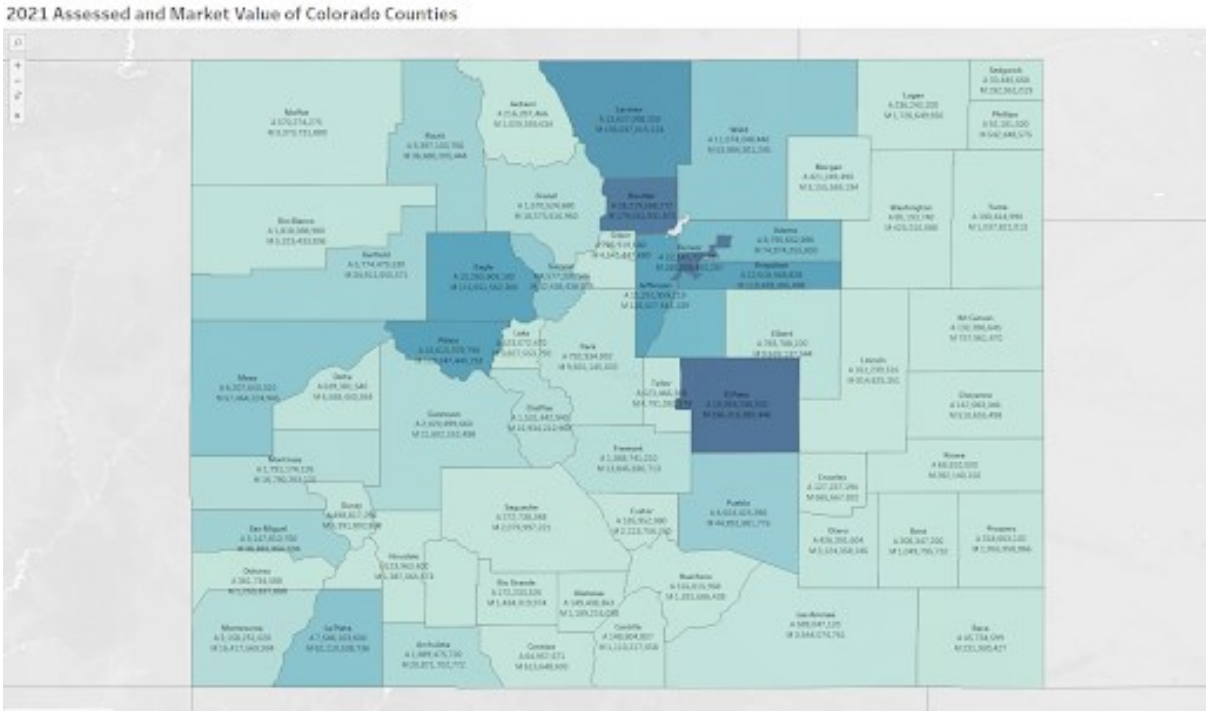


Figure 44. NLAP, *Total Assessed Value and Total Market Value of Land in 2021 by CO County*.

Figure 44 presents the real property data mapped to the county level in Colorado. Each county in the map is shaded by its market value, in which a darker shade of blue indicates a higher market value.

2021 Assessed and Market Value of Lands in Colorado by Land Cession

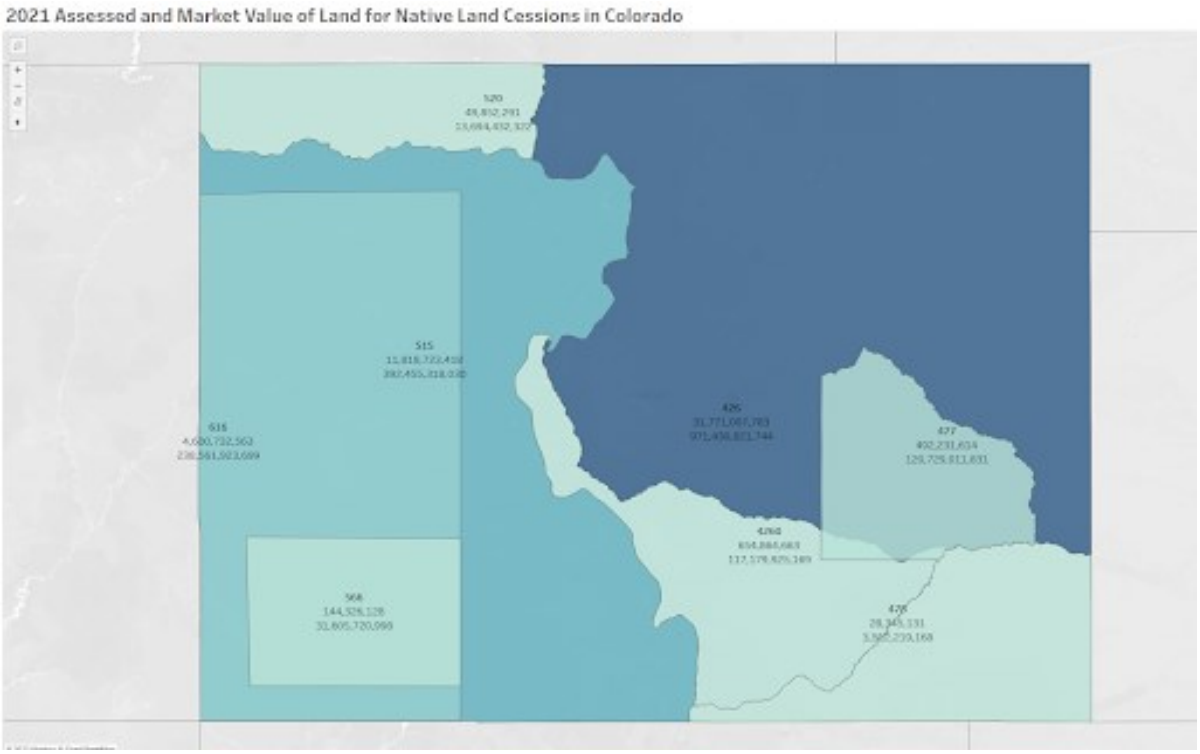


Figure 45. NLAP, *Total Assessed Value and Total Market Value of Land in 2021 by Land Cession*.

From the previous map of land value by county, we were able to calculate the area overlap for each county and produce the real property value of land for each Native land cession (Figure 45). This map was created by averaging the assessed and market values of the counties within each cession weighted by the percent of overlap.

Value of Land at Time of Taking

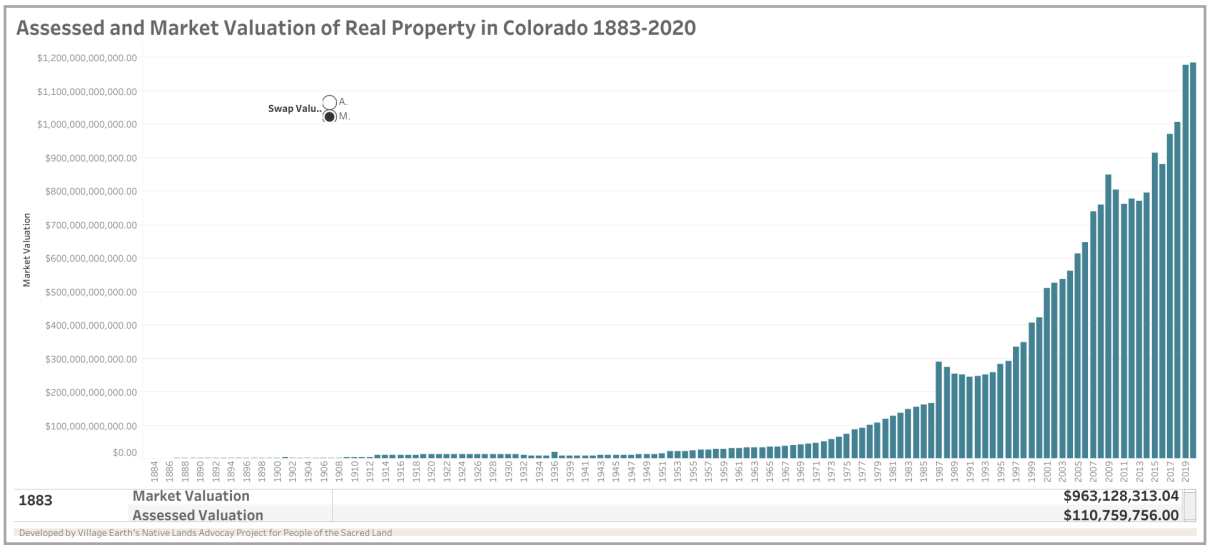


Figure 46. NLAP, *Assessed and Market Valuation of All Property in CO from 1883-2020,* NLIS.

Access the interactive dashboard:
Click Here

According to the CO Department of Property Taxation, in 1883, the assessed value of all private property in Colorado was $110,759,756.00. Assuming the difference in Market Value is the same as in 2022, the Market Value in 1883 would have been $963,759,756.00. However, this value does not reflect the value "at the time of cession."

In order to calculate the value of **ceded lands** at the time of taking, we had to statistically "backcast" the CO Department of Property Taxation data for each cession. We describe more about this process in the next section.

Market Value of Ceded Lands at Time of Taking

In 1883, the assessed valuation of Colorado's lands was **$110,759,576** and the estimated market value was **$963,128,313**. According to the GLO database, in 1883, there were **7,941,031 acres patented**, translating to an assessed value of $14 per acre and an estimated Market Value of $121 per acre.

However, the various cessions occurred years before Colorado's earliest assessed valuation dates. To estimate assessed and market values for land during these periods, we had to statistically "backcast" the data using a model that best fits the yearly growth in the value of land for Colorado. While a calculation of this nature is **highly speculative**, it at least gives us an estimate based on the historical data. The table below represents a **sample** of the results of this backcast from 1882 - 1850, showing the lower range, upper range, and best "FIT" values for each year (See **Appendix D** for full table and discussion on methods).

new_date	Fit	Lower	Upper
1850	$22,113,598.73	$9,722,985.35	$50,294,352.12
1851	$23,242,173.99	$10,222,817.21	$52,842,444.59
1852	$24,428,346.48	$10,748,308.19	$55,519,817.75
1853	$25,675,055.70	$11,300,773.64	$58,333,040.42
1854	$26,985,391.16	$11,881,596.20	$61,289,015.73
1855	$28,362,600.06	$12,492,229.31	$64,394,998.06
1856	$29,810,095.28	$13,134,200.77	$67,658,611.03
1857	$31,331,463.94	$13,809,116.58	$71,087,866.26
1858	$32,930,476.18	$14,518,664.92	$74,691,183.20
1859	$34,611,094.56	$15,264,620.34	$78,477,409.87

Figure 47. Dr. Joseph Robertson, *Statistical Backcast from 1882-1850*, Mato Ohitika Analytics LLC. See **Appendix D** for full table and discussion of methods.

Market Value of Ceded Lands at Time of Taking

Figure 48 displays the per-acre values based on the 1883 patented acres and the backcast values from Figure 47 to estimate the assessed and market value for each land cession in Colorado at 5% compound interest. This calculation is based on the U.S. Supreme Court decision in *United States v. Sioux Nation of Indians* in which the court held that the Sioux Nation was "entitled to an award of interest, at the annual rate of 5%, on the principal sum of $17.1 million, dating from 1877."[34]

Table of CO Cessions and Acreage and Values at Time of Taking

Royce No.	Tribe	Date	Stat. Reference	Description	Acres	Backcast Total	Based on Total Acres in 1883	Per Acre Assed Value Applied to Cession Acres	Assessed Value at 5% Compound Interest	Market Value	Market Value at 5% Compound Interest
426	Arapaho and Cheyenne of Upper Arkansas	02/18/1861	Stat. L., XII, 1163	Fort Wise, Kansas Territory	22,620,411	$38,234,022	$4.82	$109,076,906.87	$295,392,363,237	$1,254,384,429	$3,397,012,177,224
4260	Arapaho and Cheyenne of Upper Arkansas	02/18/1861	Stat. L., XII, 1163	Fort Wise, Kansas Territory	5,482,463	$38,234,022	$4.82	$26,436,748.16	$71,593,646,545	$304,022,604	$823,326,935,269
477	Cheyenne and Arapaho	10/14/1865	Stat. L., XIV, 703	Camp on Little Arkansas River, Kansas	3,751,432	$46,657,265	$5.88	$22,074,899.01	$49,182,203,055	$253,861,339	$565,595,335,129
478	Comanche and Kiowa	10/18/1865	Stat. L., XIV, 717	Camp on Little Arkansas River, Kansas	4,728,722	$46,657,265	$5.88	$27,825,657.36	$61,994,717,604	$319,995,060	$712,939,252,442
515	Uta (Tabeguache, Capote, Weeminuchi, Yampa,Grand River, and Uintah Bands	03/02/1868	Stat. L., XV, 619	Washington, D.C.	23,142,672	$54,171,548	$6.83	$158,112,824.55	$369,884,088,256	$1,818,297,482	$4,253,667,014,950
520	Shoshoni and Bannock (Eastern Bands)	07/03/1868	Stat. L., XV, 673	Fort Bridger, Utah Territory	3,167,251	$54,171,548	$6.83	$21,638,941.83	$50,621,448,909	$248,847,831	$582,146,662,457
566	Uta	04/29/1874	Stat. L., XVIII, 36	Act of Congress	3,721,873	$73,025,608	$9.21	$34,278,286.15	$49,229,413,446	$394,200,291	$566,138,254,627
616	Uta	03/06/1880	Stat. L., XXI, 199	Agreement	15,857,639	$98,441,704	$12.42	$196,879,278.18	$210,993,839,645	$2,264,111,699	$2,426,429,155,916
617	Uta	03/06/1880	Executive Order	Executive Order	1,084,682	$98,441,704	$12.42	$13,466,788.92	$14,432,242,577	$154,868,073	$165,970,789,639
	Grand Total							**$609,790,331.04**	**$1,173,323,963,274**	**$7,012,588,807**	**$13,493,225,577,662**

Figure 48. NLAP, *Per Acre Values Based on Patented Acres and Statistical Backcast.* See **Appendix E** for a full-size image of the table.

Another way to calculate land valuation before 1883 is based on the valuation for unsurveyed land described in the Preemption Act of 1841 just 42 years earlier. Figure 49 displays the market value of ceded lands at the time of taking, including eight land cessions that overlap the state of Colorado.

Table of CO Cessions and Acreage and Values at Time of Taking

Royce No.	Tribe	Date	GIS Acres	Premption Act Value	Inflation Factor	Total w/ Simple Inflation	Total with 5% Compounding Interest Since Cession Date
426	Arapaho and Cheyenne of Upper Arkansas	02/18/1861	26,371,843	$32,964,804	0.0360	$34,151,536	$89,272,344,701
4260	Arapaho and Cheyenne of Upper Arkansas	02/18/1861	5,482,463	$6,853,079	0.0360	$7,099,790	$18,558,897,234
477	Cheyenne and Arapaho	10/14/1865	3,751,432	$4,689,290	0.0660	$4,998,783	$10,447,595,969
478	Comanche and Kiowa	10/18/1865	4,728,722	$5,910,903	0.0660	$6,301,022	$13,169,311,692
515	Uta (Tabeguache, Capote, Weeminuchi,Yampa,Grand River, and Uintah Bands	03/02/1868	26,864,545	$33,580,682	0.0660	$35,797,007	$64,629,510,248
520	Shoshoni and Bannock (Eastern Bands)	07/03/1868	3,167,251	$3,959,063	0.0650	$4,216,402	$7,619,628,476
566	Uta	04/29/1874	3,721,873	$4,652,341	0.0470	$4,871,001	$6,681,548,771
616	Uta	03/06/1880	15,857,639	$19,822,049	0.0420	$20,654,575	$21,243,120,738
617	Uta	03/06/1880	1,084,682	$1,355,853	0.0420	$1,412,799	$1,453,056,033
	Grand Total			**$113,788,064**		**$119,502,917**	**$233,075,013,862**

Figure 49. NLAP, *Market Value of Ceded Lands At Time of Taking.* See **Appendix F** for a full-size image of the table.

Recommendations for Further Research

Calculating the value of Colorado trust lands was outside of our original scope of work but could bring a significant source of value to this section. The data to calculate these values is readily available in the biannual reports of the Colorado **State Land Board.** The data from these reports dates back to 1904 and can be freely accessed at **Archive.org**.

For example, in 1904 alone, the Colorado State Land Board Collected $161,355 in rental income from 1.8 million acres of land.[35] In 2022, the Board collected $246.6 million dollars from rental income on 2.8 million surface acres and 4 million subsurface acres.[36]

LOSS OF LIFE

This section highlights data from the Indian Wars Casualty Database (IWCD)[37], which logs violent incidents between Indigenous peoples and state/federal militaries, cavalries, and volunteer cavalries.

Content Warning

The subsequent sections highlight several accounts of violent incidents between Natives and settlers, including that of the Sand Creek Massacre.

> **While there is power in data like this, we must emphasize that these are not mere statistics. Every number in this database represents a loved one, and these deaths have had enduring effects into our present day. Moreover, these losses taken together represent the collective efforts of settlers to eradicate Indigenous peoples from the state. The forced relocation, massacre, land dispossession, and losses of cultural and spiritual practices among the Indigenous peoples of Colorado contribute to intergenerational trauma still being grappled with today.**

For those who carry this intergenerational trauma, we acknowledge the pain this database may cause and encourage you to proceed only if you are able. For those who do not carry this trauma and are here to learn, we ask that you keep the gravity of this data in mind as you proceed.

Painting of the Battle of Washita (River) - Sand Creek Massacre by Frederic Remington

Acknowledgment of Data Limitations

The IWCD was created by geolocating incidents listed in a public dataset by Colin S. Gillespie.[38] The dataset itself is a composite of multiple sources documenting conflicts between settlers and Indigenous peoples.[39]

It is important to acknowledge that these numbers are approximate and, especially in the case of Native losses, may be underestimated. The U.S. military kept records of these violent incidents and were diligent about recording U.S. losses, but it is doubtful that they carefully counted each Native casualty. This is supported by the fact that many of the incidents highlighted below have conflicting accounts with varying casualty estimates.

Even with these questions of record-keeping, we find this database powerful for the counter-narrative it paints of these violent years. Settlers were invested in creating a narrative in which Natives were believed to be murderous, lawless, and unreasonable because this narrative helped "justify" policies of systematic relocation and annihilation. Unfortunately, this narrative still has enduring power in the U.S. today. However, as the incidents in this database clearly show, it was not settlers but Natives who consistently experienced the most losses.

Context

While the rest of this report goes into further detail about settler incursions into Native lands, it is nonetheless worth acknowledging here that the Natives of Colorado were responding to the invasion and destruction of lands and relatives that had, since time immemorial, been theirs to steward and caretake.

In many cases (as highlighted by the 'Settlements' section of this report), settlers were squatting, building, and mining on lands that had not yet even been ceded in treaties. When Natives petitioned the relevant U.S. authorities to deal with such cases, little to nothing was typically done in response.

All of the following incidents must be approached with this context in mind. Settlers and Natives were not meeting on equal ground, with equally justified reasons. The Natives of Colorado were defending their communities, lands, and relatives from unprecedented encroachment and exploitation.

Loss of Life Between 1848 and 1887

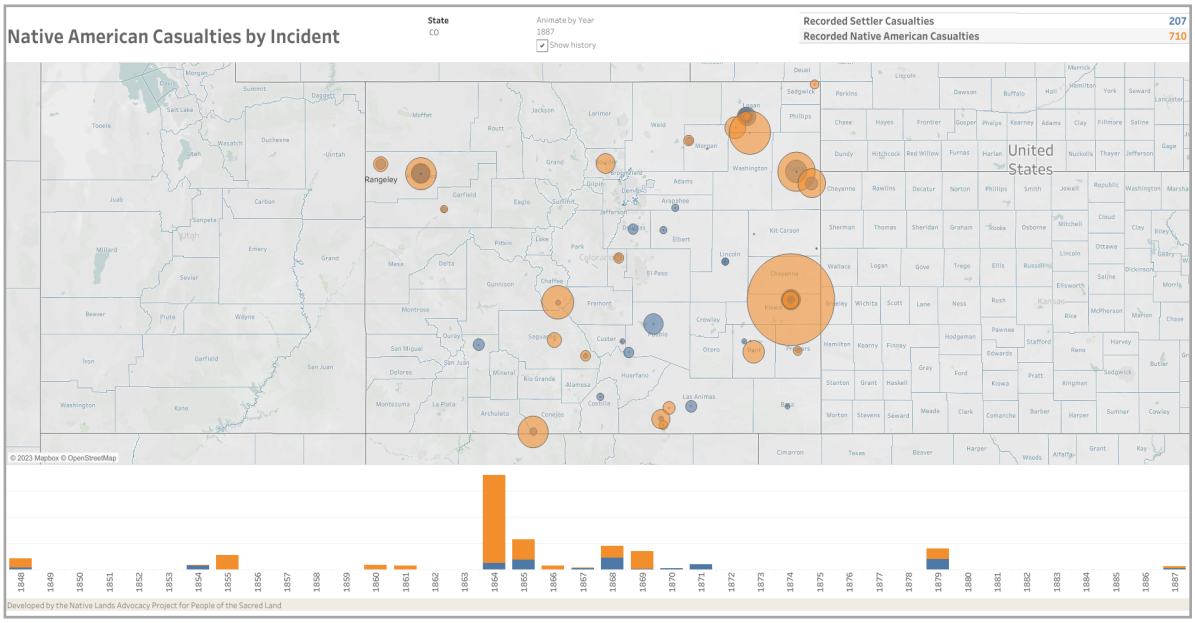


Figure 50. NLAP, *Native American Casualties by Incident in Colorado*, infographic, Tableau.

Access the interactive dashboard:
Click Here

The Indian Wars Casualty Database logs violent incidents between Indigenous people and state/federal militaries, cavalries, and volunteer cavalries.

In Colorado, this database covers the years between 1848 and 1887, during which approximately 710 Native people were killed. 207 Settler Casualties were reported in this same timeframe. This section highlights some of these incidents.

Historical accounts of Colorado's settlement are overwhelmingly obfuscated by settler entitlement, paternalism, and outright hatred towards the land's Indigenous communities. In providing context for the following violent incidents, it is our hope that we can paint a clearer picture of these bloody years—a picture that does not treat these incidents as a collection of random and isolated events, but rather as the unfolding and evolving legacy of U.S. mistreatment of Colorado's Native communities. Without this clearer and more honest picture, we cannot begin to mend the many wounds these communities bear today.

Fisher's Peak, June 1854

Figure 51. *Plate VIII—Fisher's Peak, Near Trinidad, Colo.*, photograph, USGS Bulletin 613 (10), https://www.nps.gov/parkhistory/online_books/geology/publications/bul/613/sec10.htm.

In 1854, the Jicarilla Apache, having been confined west of the Rio Grande River, were starving. Promises of food and provisions had been made by U.S. officials but were not being fulfilled. The systematic extermination of bison by settlers was well underway, making a cornerstone of the Apache food system scarce. And in the cases where bison were available for hunting, even acting Governor Messervy acknowledged that the Apache had reason to fear hunting, as the troops in the area could not "distinguish the good from the bad."[40] In other words, the Apache faced being indiscriminately killed if they tried to hunt. On one occasion, the Apache attacked a farm and took cattle, presumably to feed their people.

Despite knowing these reasons for their discontent, Acting Governor Messervy pronounced a state of war with all Jicarilla Apache, proclaiming that they "should be severely chastised and punished, and to be made to know and feel the power of the government."[41] Even Kit Carson, scout for the U.S., noted that "the Apache had been driven to war because of the attitudes and actions of the military in the vicinity of Taos."[42] "War" is an arguable term, as it seems the Apache were simply trying to protect and feed themselves.

In June of 1854, U.S. Army Captain James H. Carleton and 100 of his men, along with a battalion led by James Quinn, followed Kit Carson in pursuit of the Jicarilla Apache. While settler accounts of this pursuit portray it as part of a war, the reality is chilling: the military tracked the Apache for weeks through the mountains, even noting that they were clearly taking more difficult routes in order to not be followed, then eventually ambushed their camp. It was not a battle, but a hunt.

Many were able to escape; however, at least 3 were killed in the attack. The military destroyed 22 lodges and stole 38 horses.

Abiquiú Meeting, Fall 1854

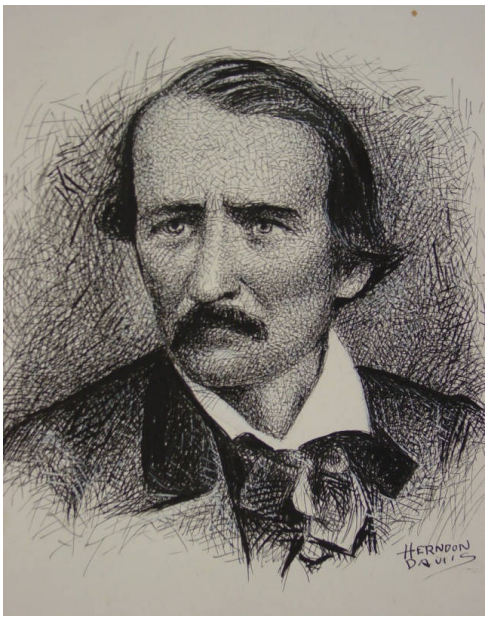


Figure 52. Herndon Davis, *Kit Carson in 1859,* drawing, Denver Public Library Digital Collections (C69-24 ART), https://digital.denverlibrary.org/digital/collection/p15330coll22/id/84697/rec/1.

In 1848, the Mexican-American War ended with the signing of the Treaty of Guadalupe Hidalgo. This treaty ceded a large swath of land, including western parts of present-day Colorado, to the U.S. (however, this did not mean the Native communities of this region had ceded land to the U.S.; see Mario Gonzalez' explanation of these international land cessions on page 8). After the treaty was established, Mexican citizens living in these "ceded" lands became U.S. citizens. As they began to expand into the San Luis Valley, the Utes defended their territory and hostilities grew. U.S. settlers also began moving to the newly-acquired territory, ushering in a time of unprecedented encroachment on Ute lands.

In March of 1849, the U.S. Army destroyed 50 Ute lodges in New Mexico. This show of violence motivated the Utes to sign the 1849 Treaty of Abiquiú, which promised food and annuities to the Utes in exchange for peaceful passage for settlers through the territory. However, as months passed and the U.S. never delivered these promised annuities, the Utes continued to raid wagon trains and settlements for livestock.

In the fall of 1854, Kit Carson (one of the first Federal Indian Agents in the western United States) and David Meriwether (Governor of the New Mexico Territory) distributed blankets and coats to the Utes during a meeting at Abiquiú, convened in an effort to quell hostilities. After this meeting, all of the chiefs present at the Abiquiú meeting, including Chief Chico Velasquez, died of smallpox, and many more Utes were also infected and died.

The Abiquiú meeting did not quell the hostilities but in fact made them worse, as the Utes suspected their leaders had been intentionally infected. This incident is connected to an attack on a settlement in Pueblo, Colorado (see next page).

El Pueblo Trading Post, December 24, 1854

Figure 53. Colonel Henry Inman, *Mexican Ranch*, drawing, 1897, in Pueblo, Hardscrabble, Greenhorn (Norman: University of Oklahoma Press, 1990), page 51.

The Native attack on El Pueblo Trading Post was the culmination of years of grievances. Governor David Meriwether (who spoke highly of the Utes throughout his career), had met with the Utes multiple times in apparent attempts to address their concerns. However, the Ute's requests were unmet, and Meriwether did not fulfill his promises.

When the Utes asked for firearms (as settlers and many other tribes alike had firearms), they were refused. Promised food and medicines, such as those promised in the 1849 Treaty of Abiquiú, were never delivered. And though they were promised recognition and protection of their ancestral lands, settlers continued to build homesteads in them. (It is of note that the 1863 Conejos Treaty would be the first treaty to attempt to cede Ute land, and even then, this treaty was only signed by the Tabeguache band of Utes; the other bands of Utes therefore did not view it as valid. Furthermore, the U.S. never delivered any of the promised goods to the Tabeguache Utes, despite the U.S. continuing to sanction incursions into the land. The first major Ute land cession would occur in 1868, with the signing of the Kit Carson Treaty—14 years after this incident.)

After the Abiquiú meeting in the fall of 1854 (detailed above), multiple tribal leaders died from smallpox. After years of bad dealings, the Utes suspected they had been infected and killed intentionally. In the wake of these losses, Chief Tierra Blanco led his followers (along with some allied Jicarilla Apache) to attack El Pueblo Trading Post on December 24, 1854. They killed 15 men, wounded 2 men, took 1 woman and 2 children captive, and took many horses.

Poncha Pass, April 29, 1855

Figure 54. William Henry Jackson, *Colorado, the Sangre de Cristo from Poncha Pass*, photograph, 1890 -1900, Denver Public Library Digital Collections (WHJ-11173), https://digital.denverlibrary.org/digital/collection/p15330coll22/id/88032/rec/1.

Hostilities continued to grow in Colorado as settlers traveled through, or settled in, unceded territories. The stream of Americans moving west disturbed hunting and grazing lands, and bison populations continued to plummet under settlers' concerted efforts to exterminate them and starve Natives. U.S. settlements were established in the San Luis Valley, which had not been ceded by treaty. Some Ute and Apache Natives responded to this invasion of their hunting lands by attacking settlements.

After one such attack along the Conejos River, the U.S. authorities—feeling that the land was now theirs to govern (especially following the 1850 organic act that formalized the New Mexico Territory) and motivated by the previous winter's attack on El Pueblo—began seeking the "thorough chastisement" of the group of Utes and Apaches responsible. [43] (Ironically, in his correspondence about this conflict, General John Garland wrote that this group "did not pretend to keep good faith in treaties or promises."[44] No mention of the years of unfulfilled promises by the U.S. to the Utes is made.)

Wanting to demonstrate that the Natives "[were] not safe from pursuit in the most inaccessible parts of the Rocky Mountains,"[45] U.S. forces led by Colonel Thomas Fauntleroy and Kit Carson followed the group to Poncha Pass, a gap between the San De Cristos and San Juan Mountains. The group of about 150 Ute and Apache Natives were caught off guard by the ambush and, by all accounts, may have been dancing when the soldiers first attacked.

The soldiers killed 40 Utes and burned all their provisions, winter clothing, and shelters.[46] This attack is said to have subdued the Utes' resistance towards the settlers—and no wonder. The U.S. had proven that they were unsafe in their ancestral homeland.

Leading up to the Sand Creek Massacre: Governor John Evans' Proclamation

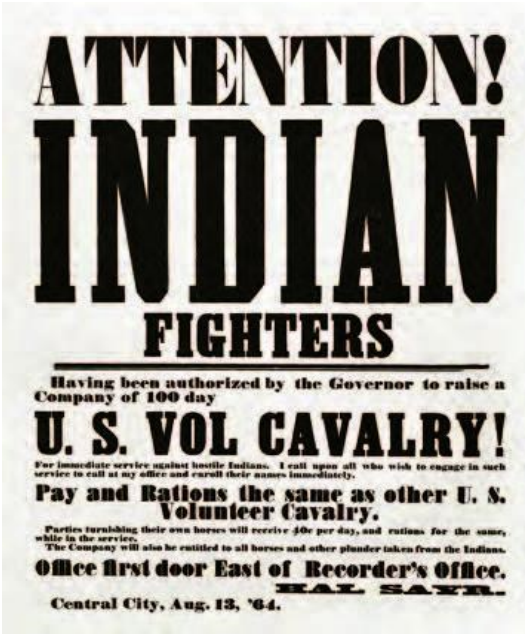

ATTENTION!
INDIAN
FIGHTERS
Having been authorized by the Governor to raise a Company of 100 day
U. S. VOL CAVALRY!
For immediate service against hostile Indians. I call upon all who wish to engage in such service to call at my office and enroll their names immediately.
Pay and Rations the same as other U. S. Volunteer Cavalry.
Parties furnishing their own horses will receive 50c per day, and rations for the same, while in the service.
The Company will also be entitled to all horses and other plunder taken from the Indians.
Office first door East of Recorder's Office.
MAX SAXE.
Central City, Aug. 13, '64.

Figure 55. *Attention Indian Fighters,* poster, 1864, American Indian Magazine, www.americanindianmagazine.org/media/740.

In the winter of 1864, approximately 1,000 Cheyenne and Arapaho Natives were encamped in a bend of Sand Creek (known also as Big Sandy Creek), at the edge of the reservation created by the 1861 Treaty of Fort Wise. The treaty had only been signed by a minority of Cheyenne and Arapaho leaders, and hostilities had been growing between settlers and the many Cheyenne and Arapaho who had not agreed to the treaty.

On August 11, 1864, Colorado Territory's Governor John Evans released a proclamation authorizing all Colorado citizens to "kill and destroy, as enemies of the country,"[47] the Natives of Colorado. Though the proclamation promised protection and provisions to all "friendly" Natives, there were no consequences in the case of citizens targeting peaceful Native groups.

On the contrary, the proclamation allowed citizens to take the land and property of any Natives they killed, permitting them to either keep the property or receive a reward from Governor Evans for it. **This proclamation put a bounty on the head of every Native in Colorado.** Furthermore, the Sand Creek Massacre (see below) evinced that the government itself had no intention of honoring its promises of protection and provision.

Sand Creek Massacre, November 29, 1864

The approximately 1,000 Cheyenne and Arapaho Natives encamped at Sand Creek had been pushed from their homes by settler expansion and violence. Many of them were women, children, and elderly, led by Cheyenne Chiefs Black Kettle and White Antelope and Arapaho Chief Left Hand.

Figure 56. Dow Helmers, *Looking southwest, Sand Creek or Chivington Massacre, 1864*, art, Denver Public Library Digital Collections (X-3385), https://digital.denverlibrary.org/digital/collection/p15330coll22/id/96469/rec/1.

Heeding Governor Evans' command to seek refuge at various forts, they were waiting on word from the nearby Fort Lyon about where they could safely live. But instead of the protection and provisions they had been promised, they were ambushed by U.S. troops on November 29, 1864.

Hearing the troops approaching, the Natives raised an American flag. They also waved white flags. The Colorado cavalry troops, led by U.S. Army Colonel (and former Reverend) John Chivington, attacked regardless.

The reported numbers of Native deaths vary. The IWCD records 300 Native casualties, while some reports approximate 150 casualties. In consultation with Cheyenne and Arapaho tribal members, History Colorado estimates at least 230 deaths. And Chivington claimed to have killed between 500-600 Natives, though this was, by all accounts, overblown. There were few U.S. casualties, and the ambush was so chaotic that it's likely some of them were from friendly fire.

The horror of the Sand Creek Massacre did not end with the merciless slaughter of so many lives. Many of the Cheyenne and Arapaho bodies were mutilated, regardless of whether they were men, women, children, or elderly. Soldiers who returned from Sand Creek paraded body parts through the streets of Denver, including scalps, genitalia, and unborn fetuses.

Many of the chiefs who had been advocating for peaceful relations with the U.S. were killed in this massacre. In the wake of Sand Creek, most Cheyenne and Arapaho Natives resolved that fighting against the settler presence in Colorado was their only recourse.

Beecher Island, September 17, 1868

The passage of settlers through Native lands continued to be a source of conflict, especially following the Sand Creek Massacre, which had only inflamed sentiments of fear, distrust, and hatred.

Figure 57. E.A. Brininstool, *Site of the Battle of Beecher's Island as it appears in 1917*, photograph, 1917, Denver Public Library Digital Collections (X-32031), https://digital.denverlibrary.org/digital/collection/p15330coll22/id/33268/rec/1.

In a letter dated May 27, 1867, Superintendent of Indian Affairs Thomas Murphy shared (and condemned) a message that had been issued to the employees of the American Express Company along the Smoky Hill Route, which ran through eastern Colorado. The letter advised employees that "if Indians come within shooting distance, shoot them; show them no mercy, for they will show you none."[48]

Superintendent Murphy was "credibly informed that General Hancock," (who was then the Commander of the Department of the Missouri, which included Kansas, Colorado territory, and New Mexico territory in its jurisdiction), "[had] issued similar commands to commandants of all posts in his district, and [had] virtually declared war upon all Indians found north of the Arkansas and south of the Platte Rivers."[49] According to existing treaties, the Cheyenne, Arapaho, and Apache Natives' rights to live and travel in these lands were protected.

Superintendent Murphy rightly observed that "if the government countenances these arbitrary acts of... violating treaties, it is unreasonable to expect that the Indians will keep their part in these treaties."[50] General Hancock's burning of a Cheyenne and Lakota Village in Pawnee Fork, Kansas, further inflamed tensions.

Bands of Cheyenne and Arapaho warriors continued conducting raids, especially on railroad lines, which had bisected and damaged traditional hunting grounds and brought more permanent white settlements into their lands. From these raids, they often took ammunition, livestock, and other provisions. One such raid took place near Sheridan, Colorado, then the railhead of the Kansas Pacific Railroad.

U.S. Army Brevet Colonel Forsyth and a group of 50 scouts responded to this raid, following the trail left by the Natives, eventually making camp about 12 miles downstream of two villages. This alarmed the encamped Natives

(especially after the Sand Creek Massacre), as there were women, children, and elderly people in the villages.

Early the following morning (September 17), Cheyenne, Arapaho, and Lakota warriors attacked the encampment, pushing the U.S. scouts to retreat to an island in the river, buying time for the vulnerable to flee the villages. (This island would later be named Beecher Island, after an American lieutenant who died during this conflict.)

The battle lasted five days. Six U.S. soldiers were killed and 18 wounded; approximately 30 Natives were killed (though some sources say as many as 75, and the surviving U.S. soldiers boasted of killing "hundreds"), and approximately 60 were wounded. Included in these losses was the death of respected Cheyenne warrior Roman Nose (also known as Hook Nose).

Summit Springs, July 11, 1869

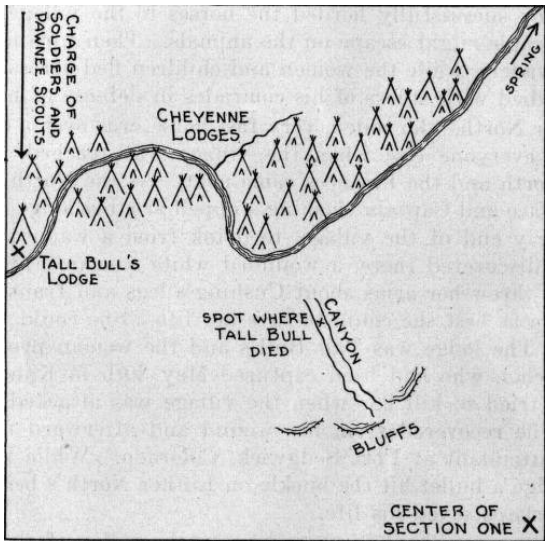


Figure 58. *Drawing of Summit Springs battleground*, map, 1929, Denver Public Library Digital Collections (X-33830), https://digital.denverlibrary.org/digital/collection/p15330coll22/id/38447/rec/1.

For Colorado's Natives, each year of American settlement had brought increasingly arbitrary acts of violence (some of which killed well-loved leaders), further incursions by growing railroads, continued annihilation of bison populations, and an ever-shrinking land base in which their communities could take refuge. The U.S. had not proven faithful to treaties, seizing treaty land for the gold rush and failing to deliver promised foods, medicines, and other supplies. Native attempts to peacefully address these failures often ended in only more coercion and bloodshed.

By 1869, the Cheyenne Natives who had not left Colorado had mostly taken refuge in the Republican River Valley, which stretched from southwestern Nebraska into northeastern Colorado and was a traditional hunting ground. The policies of the U.S. Department of the Missouri (encompassing

Missouri, Kansas, Colorado territory, and New Mexico territory) had already turned to all-out war against the Natives in this region, as noted in the Beecher Island incident.

In 1869, with the organization of the Republican River Expedition, the Department of the Platte (encompassing Iowa, Nebraska, the Dakota territory, the Utah territory, and a small section of Idaho), would also make this their policy. In a letter dated June 1, 1869, General C.C. Augur (Commander of the Dep. of the Platte), wrote that "the only permanent safety to [the] frontier settlements is to drive the Indians entirely out of the Republican country. This is what I hope to do this summer."[51]

The Cheyenne Natives in the Republican River Valley, known as Dog Soldiers and led by Chief Tall Bull, were also joined by some Cheyenne from other bands and by some Lakota. Galled by years of violence and loss (but especially by the November 1868 Washita Massacre, which killed Chief Black Kettle, a survivor of the Sand Creek Massacre who had nonetheless been seeking peace with the U.S.), these warriors did not see peace or compromise with the U.S. as an option.

The Republican River Expedition, led by General Eugene A. Carr, had one purpose: "To clear the Republican Territory of Indians. All Indians found in that country will be treated as hostile,"[52] read the orders. On June 9, 1869, the expedition departed from Fort McPherson, Nebraska.

On July 11th, the expedition caught up to Chief Tall Bull's band. They had encamped at Summit Springs on the South Platte River, numbering around 400 people, with hundreds of animals, around 84 lodges, and thousands of pounds of supplies.

The expedition surrounded the camp and attacked, catching the Natives by surprise. **Many escaped, but 52 were killed, including Chief Tall Bull, and 15 were captured. The U.S. soldiers burned the village to the ground when the battle was over.**

The survivors—left destitute by the attack and the burning of the village, and having lost their leader—split, some traveling to the reservation of the southern Cheyenne, and some joining the Cheyenne in the north.

The Utes Between 1855 and 1879

Figure 59. H.S. Poley, *Horsemen crossing the Los Pines*, photograph, Denver Public Library Digital Collections (P-52), 1899, https://digital.denverlibrary.org/digital/collection/p15330coll22/id/18227/rec/12.

Following the series of conflicts in the 1850s (which came to be known as the Ute Wars), tensions between settlers and Utes continued to grow. The Pike's Peak gold rush, which began in 1858, marked a major intrusion of settlers into eastern Ute lands, pushing Utes further west to avoid contact and to follow game that had also been pushed west. New gold and mineral strikes would continue to bring settlers west in the following decades. Furthermore, the creation of the territory of Colorado in 1861 and the passage of the Homestead Act in 1862 brought a monumental influx of settlers west.

In the 1863 Treaty with the Utah-Tabeguache Band of Utes, the Utah-Tabeguache ceded their hunting rights to all land east of the continental divide in Colorado. However (as already noted above), the other Ute bands did not agree to this treaty and therefore did not abide by it. The increasing presence of settlers in the San Luis Valley and portions of the Colorado Mountains was therefore seen as an invasion of traditional Ute lands.

In 1868, another attempt was made at a treaty, this time with representatives of seven Ute bands. This treaty established a reservation of about 16.5 million acres in western Colorado for the 6 Ute bands of Colorado and established a reservation in Northeast Utah for the Uintah Utes. This treaty also dictated that the Utes had to send their children to American boarding schools and created allotments of land. The Utes were expected to abandon their more nomadic way of life and their close ties with their horses, and to take up farming.

The lands ceded in this treaty included the Yampa River Valley, favored hunting ground that had already been encroached upon by prospectors. In return, the Utes were promised that the U.S. government would prevent any trespassing onto the reserved Ute land. Certain deliveries of food and supplies would be delivered by agencies—one on the White River and another

near the Los Piños River.

It was during the negotiation of this treaty that Ouray, Chief of the Utah-Tabeguache Band, delivered a famous speech, saying, "The agreement an Indian makes to a United States treaty is like the agreement a buffalo makes with his hunter when pierced with arrows. All he can do is lie down and give in."[53]

White River Indian Agency, September 29, 1879

Figure 60. *Meeker, Colorado*, photograph, 1897, Denver Public Library Digital Collections (X-12375), https://digital.denverlibrary.org/digital/collection/p15330coll22/id/10654/rec/1.

Two Indian agencies were created under the Treaty of 1868. The Los Piños Agency was established in the far south of Colorado (despite its name, it was never actually located on the Los Piños River). The White River Agency was constructed in Northern Colorado, near present-day Meeker.

Like in previous agreements between the Utes and the U.S. government, the promises made in the Treaty of 1868 were not upheld. The agencies had been established to distribute annuities, but these annuities rarely arrived, and when they did, were late. Furthermore, miners continued trespassing in Ute land, despite Article 2 of the treaty's guarantee that the land was "set apart for the absolute and undisturbed use and occupation of the Indians."[54]

By the time Nathan C. Meeker was appointed Indian Agent of the White River Agency in 1878, discontentment was already high among the Northern Utes. Meeker's policies did not ameliorate these tensions whatsoever, but instead inflamed them to the point of ignition.

Meeker had no prior experience working with Native communities. His vision for the Northern Utes involved forcing them to abandon practically all of their traditions: though they were nomadic, he expected them to become sedentary; though they were seasonal hunter-gatherers, he expected them to

become farmers; though they had cultural and religious customs of their own, he expected them to assimilate into American culture and embrace Christianity. When the Utes at White River resisted his demands, he withheld food and supplies to coerce them. When the Utes left for hunts (partly due to these starvation conditions), he requested U.S. troops to patrol traditional Ute hunting grounds.

In September of 1879, the tensions came to a head. Various accounts of the instigating conflict exist. Some accounts say that Meeker plowed up the race ground where the Utes raced their horses—an important part of their culture. Some accounts say that Meeker plowed up pasture where horses grazed, and others say that Meeker plowed up farmland where a Ute leader had conceded to growing crops, but had been feeding them to his horses rather than using them for subsistence.

Regardless of which account is most accurate, they all reveal the same things about the conflict between Meeker and the Utes. **Meeker had failed to understand how important horses were to the Utes' culture. He had also failed to understand how destructive and offensive it was to the Utes to break the land by plowing. Furthermore, Meeker's attitude towards the Utes was heavy-handed and paternalistic, seeking to control their lives on the land that had been set aside for their "absolute and undisturbed use."**

A scuffle ensued between Meeker and Canavish ("Johnson"), a Ute leader. Alarmed by the encounter, Meeker requested troops and was answered by the nearby Major Thomas Thornburgh, who began approaching the reservation with his troops. Hearing word about the approach of Thornburgh, the Utes warned that U.S. troops entering the reservation would be seen as an act of war.

As soon as Thornburgh's troops reached the reservation boundary at Milk Creek, conflict erupted (see more about Milk Creek below). Word was sent to the Utes at the agency, who proceeded to set fire to its buildings, killing Meeker and several agency employees and capturing two women and two children (including Meeker's wife and daughter; all four were later rescued). 14 of the agency's men and 3 Utes were killed.

Milk Creek, September 29 - October 5, 1879

Figure 61. *Site of Thornburg [sic] Battle*, photograph, 1927-1940, Denver Public Library Digital Collections (X-30690), https://digital.denverlibrary.org/digital/collection/p15330coll22/id/19806/rec/1.

Responding to the invasion of their land by Major Thornburgh and his troops, the Utes of the White River agency defended the boundary of the reservation at Milk Creek. The conflict lasted from September 29 to October 5, when the U.S. reinforcements arrived and the Utes surrendered.

In this conflict, 13 U.S. soldiers were killed and 47 wounded; 37 Utes were killed.

The sentiment of settlers in Colorado had long been turned against the Utes. In 1878, Frederick Walker Pitkin had run for Governor of Colorado under the banner "The Utes Must Go!" and won. Miners, homesteaders, and railway companies alike wanted the land of the 1868 Treaty to be opened to non-Natives. The events at the White River Indian Agency (which would come to be known as the Meeker Massacre)[55] seemed to provide justification for Colorado's settlers who were already set on driving Utes off the land.

In 1880, the Ute Removal Act was passed.[56] This was not a treaty, as some sources say. The U.S. had ended formal treaty-making with tribes in 1871 through the passage of the Indian Appropriations Bill.

In 1881, the U.S. military forcibly removed the northern Utes from the White River Agency to the Uintah Valley Reservation in Utah. The Ouray Reservation, adjacent to the Uintah Reservation, was created in 1882, and the Uncompahgre Utes were forcibly relocated to it. The Southern Utes were relocated to a small strip of land in southwestern Colorado (now the Southern Ute and the Ute Mountain Reservations).

The Utes, who had once inhabited nearly all of present-day Colorado since time immemorial, had been removed or, in the case of southern Utes, confined to a minuscule strip of Colorado's land.

Recommendations for Further Research

The IWCD relies heavily on non-Native sources for casualty estimates. While we have made an effort to find Native accounts of the highlighted events above, this information is, understandably, not always readily accessible. While gathering tribal accounts and casualty numbers from the nine Native Nations of Colorado could potentially be painful for tribal communities and would have to be approached with sensitivity, it could provide some correction or corroboration to the numbers in the database (and at the very least, such research would place Native voices at the center of these accounts, which is rarely the case).

Furthermore, there is much work to be done in correcting the existing narratives of these violent incidents. Creating resources that provide proper context surrounding these events and the immense suffering they inflicted on Native communities would be a powerful avenue for education and advocacy.

EXTRACTION OF MINERALS, OIL, AND GAS

This section provides an assessment of economic losses from mineral, oil, and gas extraction in Colorado.

We must first recognize that these losses communicate far more than just the inequitable profits made by settlers. These numbers represent the uprooting of resources that had served Indigenous communities and their nonhuman relatives in more ways than one. When we consider minerals as more than their production value, the full impact of their loss is truly unquantifiable. For our communities, minerals are an intricate expression of the sacred, and they offer pathways for creating traditional medicine, art, and tools. When not employed by Natives for traditional use, some minerals were often left alone, but this does not mean that their existence was unknown.

We must also consider the ecological impact of extracting these minerals from the earth. Mining is an inherently destructive and invasive process, and it continues to impact the surrounding land, water, atmosphere, flora, and fauna long after sites have been abandoned. This section of our report does not seek to quantify how destructive mineral extraction was and is to the ecology of Colorado, but these impacts should be kept in mind.

Finally, we must consider how settlers' greed for these minerals contributed to the rapid expulsion of Natives from the Colorado territory and how the narrative of "discovery" bolstered this expulsion. Take gold, for example: well before the Gold Rush took place in Colorado**, tribes in the region had prior knowledge of the presence of gold on their lands.** It was not until the extractions made at Little Dry Creek and South Clear Creek in the 1850s that settlers crafted a narrative of "gold discovery" for themselves. The fact that these settler "discoveries" were second to the knowledge of the Indigenous communities in the region is important to keep in mind as you proceed through this section.

A Brief History of Mining in Colorado

The following section is not intended to be a comprehensive history of mining in present-day Colorado, but instead to provide context for the data that follows. For a more in-depth report about the history of mining in present-day Colorado, see the Colorado Historical Society's documentation form for the National Register of Historic Places about the Mining Industry in Colorado[57].

Sutter's Mill and the California Gold Rush, 1848

Figure 62. *James Marshall, discoverer of gold, at Sutter's Mill.* Coloma California, 1850. [?, Printed 1948] Photograph.

In January 1848, James Marshall and John Sutter identified gold on the American River in north-central California. This news drew thousands of miners to California and kicked off the settlers' search for gold throughout the entire American West.

Notably, one of the main trails miners took across the continental U.S. to California was the Santa Fe Trail, which ran through present-day Denver. This stream of miners traveling west through Colorado led to the gold "discoveries" in that territory.

Gold in the Denver Area, 1857-1858

Figure 63. *Routes to the Pikes Peak gold regions*. [S.l.: s.n., 186, 1860] Map. https://www.loc.gov/item/2004629247/.

In 1857 and 1858, multiple "discoveries" of gold were made in the vicinity of present-day Denver. In the spring of 1857, George Simpson made note of gold dust in Cherry Creek. Around the same time, Fall Leaf found gold nuggets near the future site of Denver. And in the summer of 1858, the

Russell brothers found placer gold along Little Dry Creek in present-day Englewood.

This latter discovery is credited with launching the Pike's Peak Gold Rush, and it led to the founding of Auraria, Denver, Golden, and many other towns in the Denver area.

Pike's Peak Gold Rush, 1858-1861

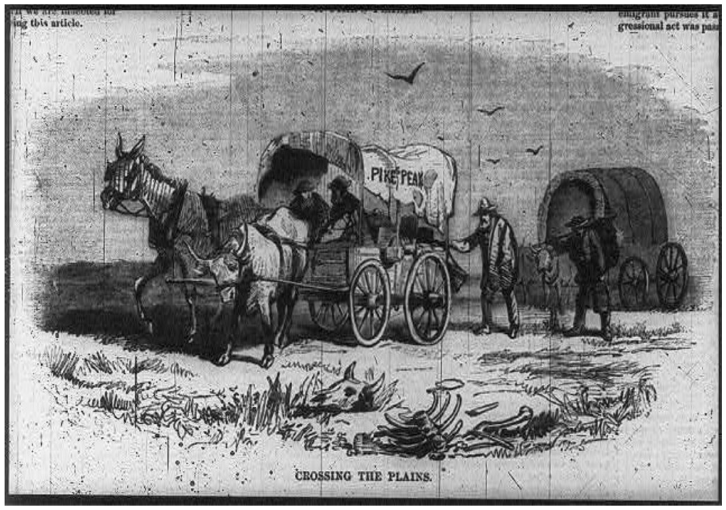


Figure 64. Bierstadt, Albert, Artist. *A Pike's Peaker Crossing the Plains*; Crossing the Platte. Colorado, 1859. [New York: Harper & Brothers] Photograph. https://www.loc.gov/item/2003663651/.

With the waning of the gold rush in California and the economic downturn of 1857, the news of the Russell brothers' gold brought thousands of hopeful miners into present-day Colorado.

This rush was centered on a location approximately 85 miles away from its namesake; however, Pike's Peak was the most notable landmark nearby and therefore became the titular peak.

Some of the locations where gold was found in this time include Left Hand Creek, Twelve-Mile Diggings, Chicago Creek, Cache la Poudre, and the Jackson Diggings. **Gregory Gulch and Clear Creek, both founded in 1859, were major sites of gold.** Many mining camps and townsites were founded in this time: Montana City, St. Charles, Auraria City, Arapahoe (no longer in existence), Golden City (now Golden), Boulder City (now Boulder), South Park, Montgomery, Buckskin Joe, Fairplay, Tarryall, Hamilton, Jefferson, and more.

The rapid population boom caused by the Pike's Peak Gold Rush led to the creation of the Colorado Territory in 1861. While miners at this time were primarily interested in gold, their mining efforts also led to the extraction of silver, copper, lead, coal, and other minerals.

The Marshall Coal Deposit, 1863

In 1863, about 20 miles northwest of Denver in present-day Marshall, James Marshall opened a coal deposit and sold coal to households and businesses. While Marshall was not the first settler to mine coal, his was the first successful operation of its kind, and the coal industry grew in its wake.

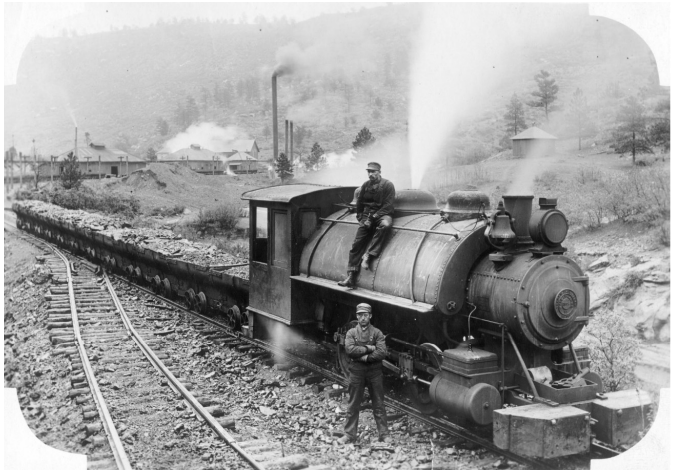


Figure 65. *Miners and train*, photograph, between 1890 and 1920, Denver Public Library Digital Collections (CHS.X4925), https://digital.denverlibrary.org/digital/collection/p15330coll21/id/10042/rec/1.

Incursions into Ute Land, 1860s & Onwards

Figure 66. P. A. Felt, *Eureka in 1877, San Juan Co., Colorado,* photograph, 1877, Denver Public Library Digital Collections (X-11438), https://digital.denverlibrary.org/digital/collection/p15330coll22/id/13893/rec/1.

In 1860, a group of prospectors under Charles Baker located gold in the San Juan Mountains in present-day Eureka, Colorado. The Utes drove the prospectors out of the area, as the San Juan Mountains were within their unceded territory. But rumors of gold in the San Juans abounded, and prospectors continued invading Ute lands in search of it. Notably, in 1871, prospectors began mining gold in the Little Giant vein at Arrasta Gulch near present-day Silverton.

The Silver Boom Begins in Leadville, 1878

Miners had known about the presence of silver in Colorado since at least the 1860s, but the passing of the Bland-Allison Act in 1878 (which authorized the free coinage

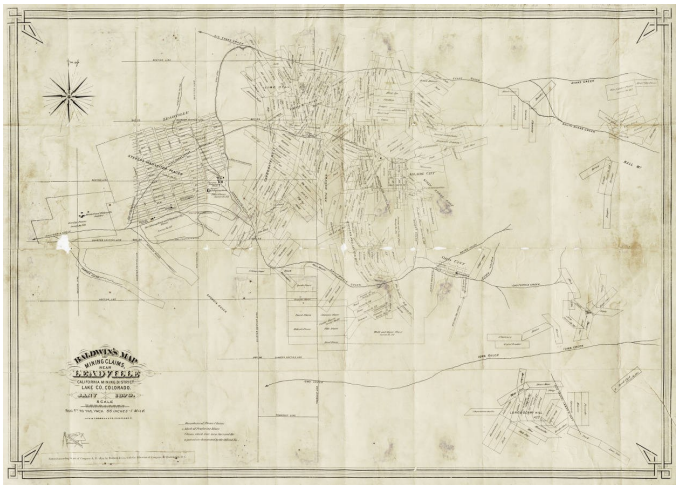


Figure 67. Baldwin & Co., *Baldwin's map of mining claims near Leadville, California Mining District, Lake Co. Colorado*, map, 1879, Denver Public Library Digital Collections (CG4311 .H2 L2 1879 .B3), https://digital.denverlibrary.org/digital/collection/p16079coll39/id/985/rec/1.

of silver in the U.S.) created demand for the metal.

The boom was most pronounced in Leadville, which in the course of one year grew from a few hundred residents to over 30,000. This boom lasted until 1893, when U.S. President Grover Cleveland repealed the Sherman Silver Purchase Act in 1893 and Colorado fell into a recession.

However, silver has continued to be mined in Colorado into the present-day.

The Florence Oil Field, 1881

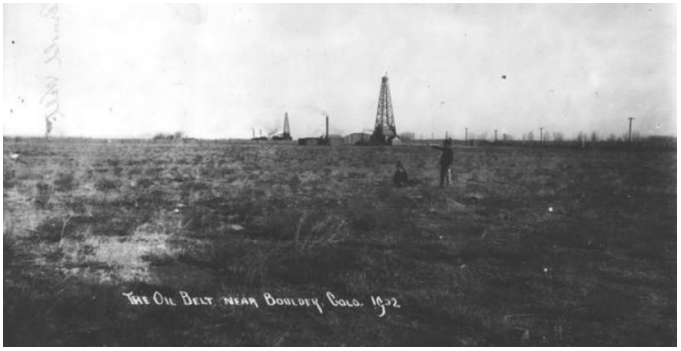


Figure 68. Joseph Bevier, J.B. Sturtevant, *Boulder oil fields: Great oil basin*, photograph, Carnegie Library for Local History (BHS 214-2-14), https://localhistory.boulderlibrary.org/islandora/object/islandora%3A60333.

In 1881, white settlers discovered the Florence Oil Field, which became Colorado's first major oil field. Oil had been extracted from Colorado earlier than this. In 1860, J.L. Dunn dug pits at Oil Spring (near Cañon City), a natural oil seep which Southern Utes had traditionally used for body paint and medicinal ointment. However, the Florence Oil Field dwarfed Oil Spring in terms of production and spurred the growth of the oil industry in Colorado.

Diversification of the Mineral Industry in Colorado, the 1900s

As the mining industry in Colorado grew in the 20th century, it also diversified. For example, molybdenum ore was first mined in 1915 from the Climax Mine, which became the world's largest source of molybdenum. In 1921, the discovery of conventional natural gas in the San Juan Basin (which also stretches into New

Figure 69. *Mine and mill*, photograph, 1940, Denver Public Library Digital Collections (X-60993), https://digital.denverlibrary.org/digital/collection/p15330coll22/id/36912/rec/1.

Mexico) made Colorado one of the oldest producing areas of natural gas in the U.S.

The wars of the 20th century also affected Colorado's mineral industries. World War I created high demand for zinc, lead, vanadium, tungsten, and molybdenum (during this time, Colorado was the world's highest producer of both tungsten and molybdenum). World War II increased the demand for radium and vanadium and, for the first time, uranium. Uranium had been extracted in Colorado for decades alongside vanadium and radium, but was discarded as useless until the nuclear arms race. The demand for uranium would only grow in the post-WWII years.

Other minerals extracted from Colorado in the 20th century can be viewed in our dashboards in the following pages.

Up to the Present Day

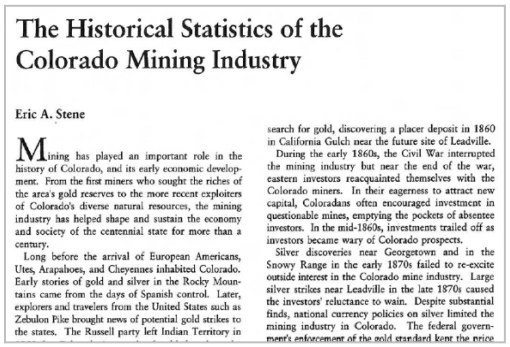
Today, Colorado's most lucrative mining industries are gold, molybdenum, oil, natural gas, coal, carbon dioxide, helium, sand, gravel, quarry aggregate, clay, limestone, gypsum, nahcolite (sodium bicarbonate), and dimension and decorative stone (e.g., marble, sandstone).

Figure 70. Michael Ciaglo, *Elk Creek Mine in Somerset, Colo., shut down in December 2012 and now only employs nine people*, photograph, 2015, The New York Times, https://www.nytimes.com/2015/07/09/us/coal-mine-closed-colorado-town-struggles-to-define-future.html.

Mineral Extraction in Colorado

Finding comprehensive mineral data for Colorado was more challenging than anticipated. This section of the report highlights data dashboards that display data from several different sources. The source of each dashboard's data, along with relevant notes and explanations, accompany each.

Historical Statistics of Mining in Colorado, 1869-1992



The Historical Statistics of the Colorado Mining Industry

Eric A. Stene

Mining has played an important role in the history of Colorado, and its early economic development. From the first miners who sought the riches of the area's gold reserves to the more recent exploiters of Colorado's diverse natural resources, the mining industry has helped shape and sustain the economy and society of the centennial state for more than a century.

Long before the arrival of European Americans, Utes, Arapahoes, and Cheyennes inhabited Colorado. Early stories of gold and silver in the Rocky Mountains came from the days of Spanish control. Later, explorers and travelers from the United States such as Zebulon Pike brought news of potential gold strikes to the states. The Russell party left Indian Territory in search for gold, discovering a placer deposit in 1860 in California Gulch near the future site of Leadville.

During the early 1860s, the Civil War interrupted the mining industry but near the end of the war, eastern investors reacquainted themselves with the Colorado miners. In their eagerness to attract new capital, Coloradans often encouraged investment in questionable mines, emptying the pockets of absentee investors. In the mid-1860s, investments trailed off as investors became wary of Colorado prospects.

Silver discoveries near Georgetown and in the Snowy Range in the early 1870s failed to re-excite outside interest in the Colorado mine industry. Large silver strikes near Leadville in the late 1870s caused the investors' reluctance to wain. Despite substantial finds, national currency policies on silver limited the mining industry in Colorado. The federal govern-

Figure 71. NLAP, *Screenshot of Eric E. Stene's publication in the Mining History Journal.*

In 1996, the *Mining History Journal* published an article by Eric E. Stene containing Annual Mineral Production statistics for Colorado from 1868-1993.

Figure 72 displays the dashboard that visualizes these statistics. The dashboard can be filtered for a range of years or for specific minerals.

Please note that these minerals are represented by their quantities and that each is measured differently—for example, gold is measured in ounces, while lead is measured in thousand pounds. Also, note the limited scope of this dataset. While it spans over a hundred years, it only reports production amounts for nine minerals: coal, copper, gold, lead, molybdenum, natural gas, petroleum, silver, and zinc. Therefore, this data paints a very important picture of Colorado's mineral extraction from 1868-1992, but an incomplete picture nonetheless.

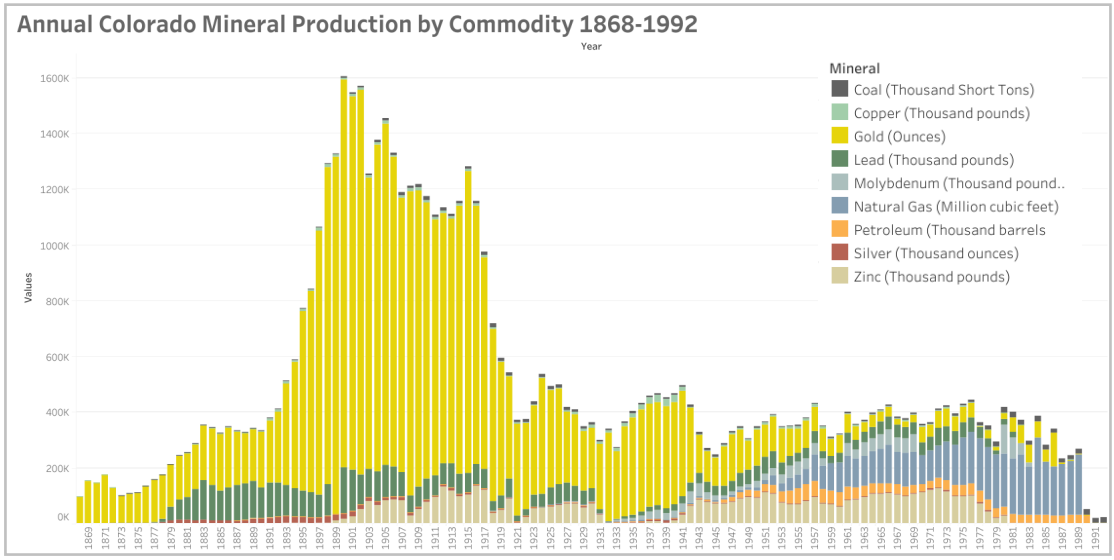


Figure 72. NLAP, *Annual Colorado Mineral Production by Commodity from 1868-1992*. Tableau.

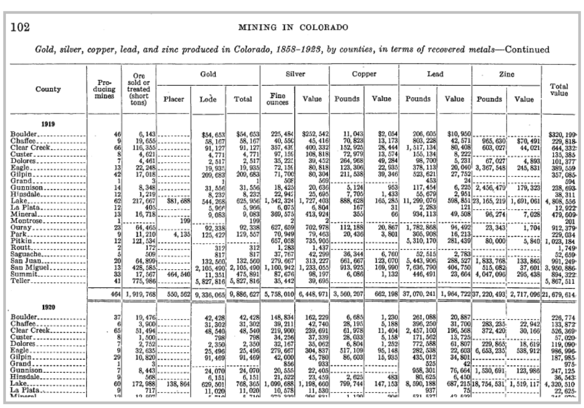
A summary of the production data for each mineral from 1868-1992 is as follows:

Coal (thousand short tons)	875,926
Copper (thousand pounds)	657,188 *
Gold (ounces)	40,543,006
Lead (thousand pounds)	6,255,410 *
Molybdenum (thousand pounds)	1,313,027 *
Natural Gas (million cubic feet)	5,324,264 *
Petroleum (thousand barrels)	1,597,355
Silver (thousand ounces)	834,149 *
Zinc (thousand ounces)	5,697,600 *

**This total is affected by values being withheld for proprietary reasons multiple years in this time range. Therefore, the actual production amount is higher than this number.*

Link to interactive dashboard:
Click Here

Minerals Data from the Department of the Interior,1858-1923



102 MINING IN COLORADO

Gold, silver, copper, lead, and zinc produced in Colorado, 1858-1923, by counties, in terms of recovered metals—Continued

County	Producing mines	Ore sold or treated (short tons)	Gold: Placer	Gold: Lode	Gold: Total	Silver: Fine ounces	Silver: Value	Copper: Pounds	Copper: Value	Lead: Pounds	Lead: Value	Zinc: Pounds	Zinc: Value	Total value
1919														
Boulder	46	6,143		$54,653	$54,653	225,484	$252,542	11,043	$2,054	206,605	$10,950			$320,199
Chaffee	9	19,655		58,167	58,167	40,550	45,416	70,823	13,173	803,228	42,571	965,630	$70,491	229,818
Clear Creek	66	116,355		91,127	91,127	357,439	400,332	152,925	28,444	1,517,134	80,408	603,027	44,021	644,332
Custer	8	4,621		4,771	4,771	97,159	108,818	72,979	13,574	155,134	8,222			135,385
Dolores	7	4,461		2,517	2,517	35,225	39,452	264,968	49,284	98,700	5,231	67,027	4,893	101,377
Eagle	13	22,248		19,935	19,935	72,159	80,818	123,306	22,935	378,113	20,040	3,367,548	245,831	389,559
Gilpin	42	17,018		209,683	209,683	71,700	80,304	211,538	39,346	523,621	27,752			357,085
Grand	1	3		1	1	508	569			453	24			594
Gunnison	14	8,348		31,556	31,556	18,425	20,636	5,124	953	117,454	6,225	2,456,479	179,323	238,693
Hinsdale	12	1,219		8,232	8,232	22,942	25,695	7,705	1,433	55,679	2,951			38,311
Lake	62	217,667	$81,688	544,268	625,956	1,542,324	1,727,403	888,628	165,285	11,299,076	598,851	23,165,219	1,691,061	4,808,556
La Plata	12	405		5,966	5,966	6,075	6,804	167	31	2,283	121			12,922
Mineral	13	16,718		9,083	9,083	369,575	413,924	355	66	934,113	49,508	96,274	7,028	479,609
Montrose	1		199		199	2	2							201
Ouray	23	64,465		92,338	92,338	627,659	702,978	112,188	20,867	1,782,868	94,492	23,343	1,704	912,379
Park	9	11,210	4,135	125,422	129,557	70,949	79,463	20,436	3,801	305,908	16,213			229,034
Pitkin	12	121,534				657,058	735,905			5,310,170	281,439	80,000	5,840	1,023,184
Routt	2	172		312	312	1,283	1,437							1,749
Saguache	5	509		817	817	37,767	42,299	36,344	6,760	52,515	2,783			52,659
San Juan	20	64,899		132,560	132,560	279,667	313,227	661,667	123,070	5,443,906	288,527	1,833,768	133,865	991,249
San Miguel	13	428,585		2,105,490	2,105,490	1,100,942	1,233,055	913,925	169,990	7,636,790	404,750	515,082	37,601	3,950,886
Summit	33	17,567	464,540	11,351	475,891	87,676	98,197	6,086	1,132	446,491	23,664	4,047,096	295,438	894,322
Teller	41	775,986		5,827,816	5,827,816	35,442	39,695							5,867,511
	464	1,919,768	550,562	9,336,065	9,886,627	5,758,010	6,448,971	3,560,207	662,198	37,070,241	1,964,722	37,220,493	2,717,096	21,679,614
1920														
Boulder	37	19,476		42,428	42,428	148,834	162,229	6,685	1,230	261,088	20,887			226,774
Chaffee	6	3,900		31,302	31,302	39,211	42,740	28,195	5,188	396,250	31,700	283,235	22,942	133,872
Clear Creek	65	51,494		48,540	48,540	219,900	239,691	61,978	11,404	2,457,100	196,568	372,420	30,166	526,369
Custer	8	1,500		798	798	34,256	37,339	28,033	5,158	171,562	13,725			57,020
Dolores	7	2,752		2,350	2,350	32,167	35,062	6,804	1,252	772,588	61,807	229,865	18,619	119,090
Eagle	9	32,635		25,496	25,496	279,667	304,837	517,109	95,148	282,538	22,603	6,653,235	538,912	986,996
Gilpin	29	10,820		91,469	91,469	42,000	45,780	86,603	15,935	435,012	34,801			187,985
Grand	1	3				856	933			525	42			975
Gunnison	7	8,443		24,070	24,070	20,555	22,405			958,301	76,664	1,530,691	123,986	247,125
Hinsdale	9	568		6,151	6,151	21,522	23,459	2,625	483	80,625	6,450			36,543
Lake	60	172,988	138,864	629,501	768,365	1,099,688	1,198,660	799,744	147,153	8,590,188	687,215	18,754,531	1,519,117	4,320,510
La Plata	9	717		11,020	11,020	10,578	11,530			937	75			22,625
Mineral	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			[illegible]

Figure 73. *Excerpt from the Henderson report published by the Department of the Interior.*

In 1926, the Department of the Interior's U.S. Geological Survey (USGS) published a report titled *Mining in Colorado: a History of Discovery, Development, and Production* by Charles W. Henderson.

Figure 73 shows an example of the data found within this report. Unlike the other data sources used in this section, this report presents data from each county in

Colorado, allowing for a high level of detail and exploration. Also of note is the fact that this report gives the value of each year's mineral extractions (rather than just the production quantities, like the data found in Stene's article).

To present this data in a more accessible format, Village Earth's Native Lands Advocacy Project created the dashboard below.

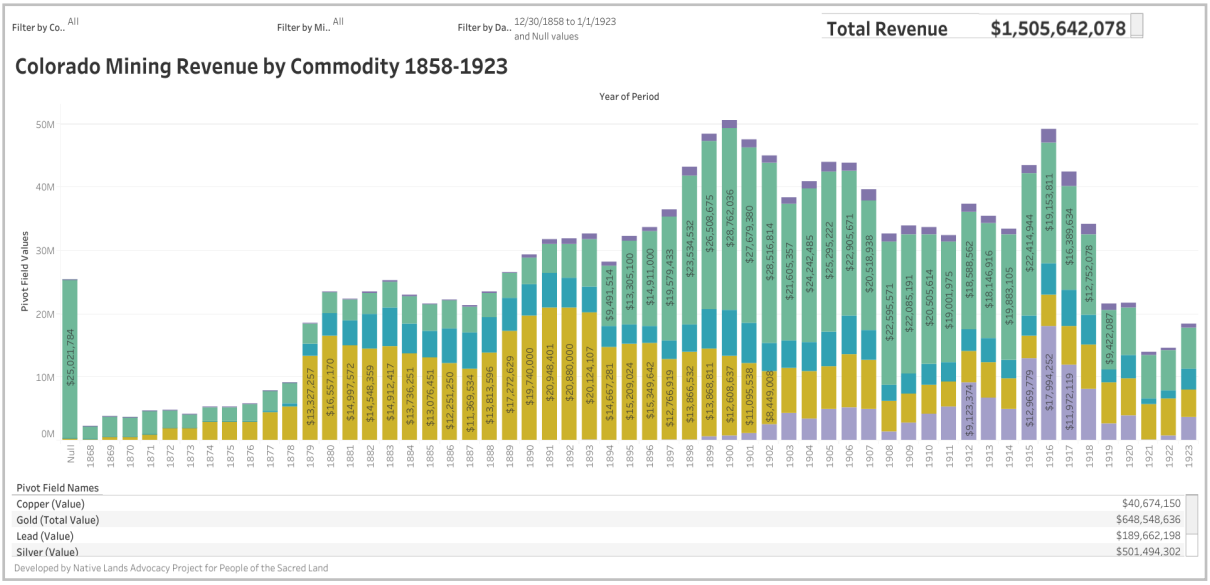


Figure 74. NLAP, *Colorado Mining Revenue by Commodity from 1858 to 1923*, Tableau.

Link to interactive dashboard:
Click Here

Similar to the previous dashboard, please note that this data is limited in which minerals it represents—namely, that it only shows data for copper, gold, lead, silver, and zinc values. We know from historical records that other minerals were being extracted from Colorado in this time period (see our historical overview above); however, the early mining efforts in Colorado were heavily focused on these metals.

Based on the data published by the USGS, between 1858 and 1923, $1,505,642,078 dollars in these five minerals were extracted from Colorado.

A summary of the production values for these five minerals is presented on the next page.

The value of these extracted minerals in Colorado between 1858 and 1923 is as follows:

Copper	$40,674,150
Gold	$648,548,636
Lead	$189,662,198
Silver	$501,494,302
Zinc	$125,262,792

This dataset is especially valuable for its ability to filter by county. This data can therefore be used to track mining trends in each county, especially during the early years of prospectors trespassing in Native lands and the ensuing land cessions. (Please note that the bar on the far left of the graph, labeled "Null," represents a composite number for the years of 1858-67). As an example of how this data dashboard can be filtered for a specific purpose, Figure 76 below shows the value of silver extracted between 1878 and 1893 in Lake County, the county in which Leadville is located and where the silver boom was centered.

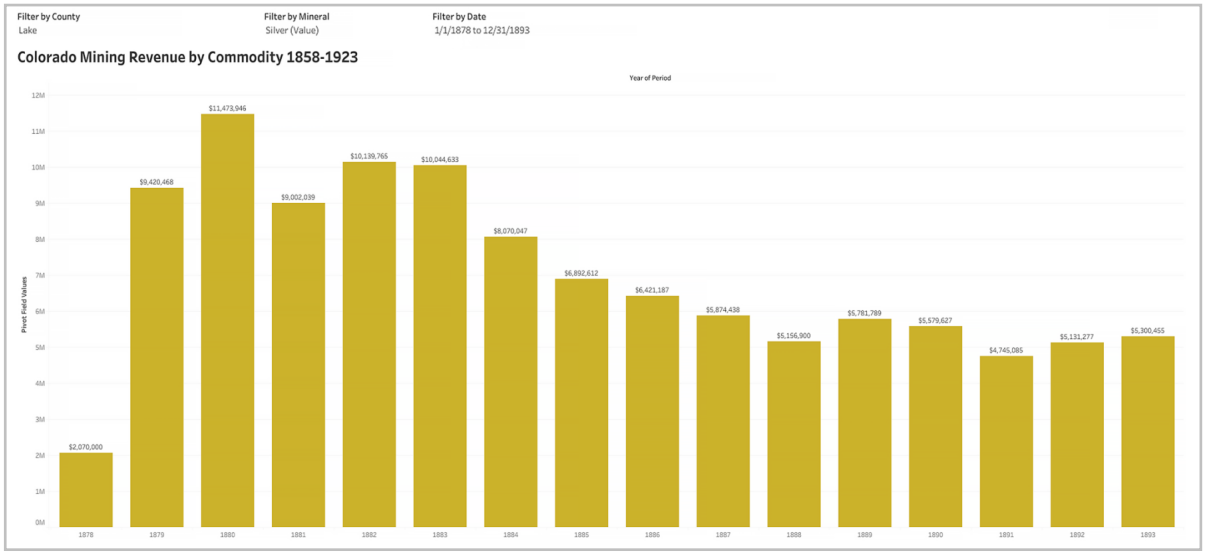


Figure 75. NLAP, *Colorado Mining Revenue by Commodity from 1858 to 1923*. Tableau.

USGS Minerals Yearbooks, 1934-2019

The USGS has published annual minerals yearbooks since the 1930s. Figure 76 below presents the dashboard visualization of the nonfuel mineral data for Colorado from 1934-2019 (the most recent year the USGS has released data for). By clicking the link to the interactive dashboard, users will find that the dashboard can be filtered for year and mineral type. There are also tabs to view a pie chart of each year's mineral revenue and to explore the raw data tables.

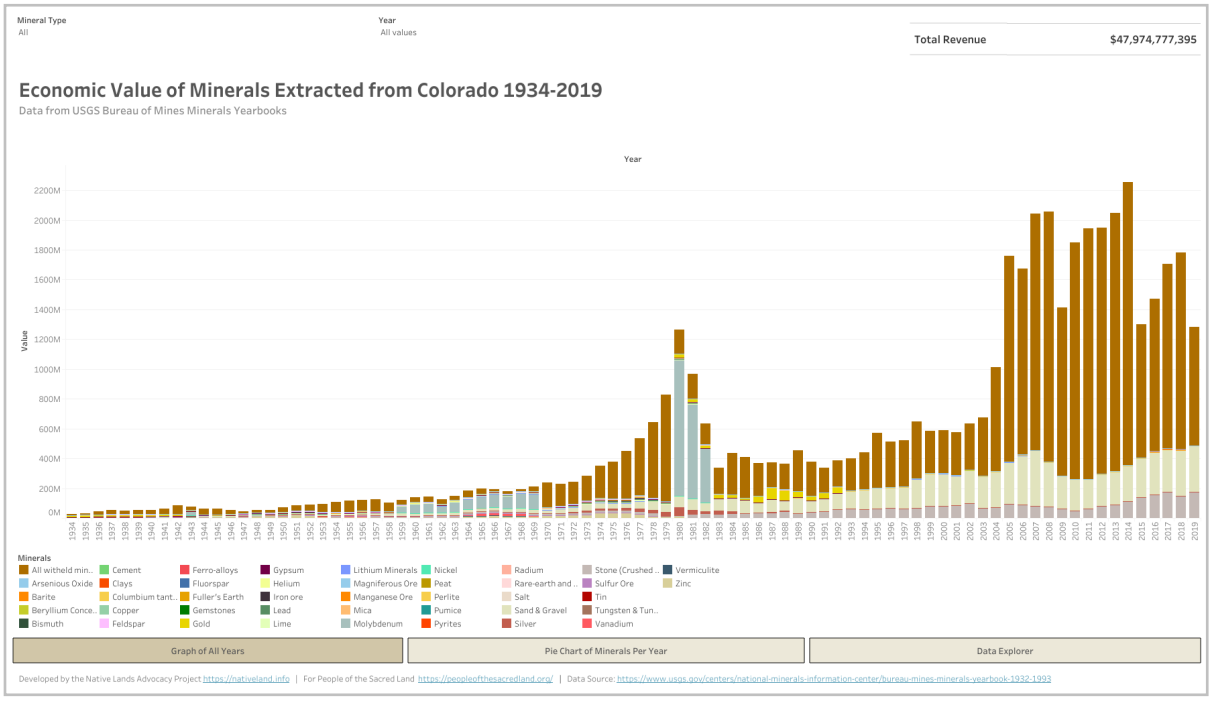


Figure 76. NLAP, *Economic Value of Minerals Extracted from Colorado from 1934-2019*. Tableau.

Link to interactive dashboard:
[Click Here]

According to the data from the mineral yearbooks, between 1934 and 2019, at least $47,974,777,395 of nonfuel minerals have been extracted from Colorado.

Of note is the fact that some values are withheld from the USGS yearbooks because they are considered proprietary; these withheld values are then given as a lump sum. In this dashboard, that lump sum is titled "**All withheld mineral values.**" If you hover over the graph, you can view exactly which minerals had their values withheld in that year.

This dashboard visualizes 41 different nonfuel minerals and therefore shows a more

complete picture of Colorado's mineral extraction in the last century. However, the prevalence of withheld values in the data makes it difficult to know exactly how much of certain minerals have been extracted. For example, see the pie chart below which visualizes the value of minerals extracted from Colorado in 2019.

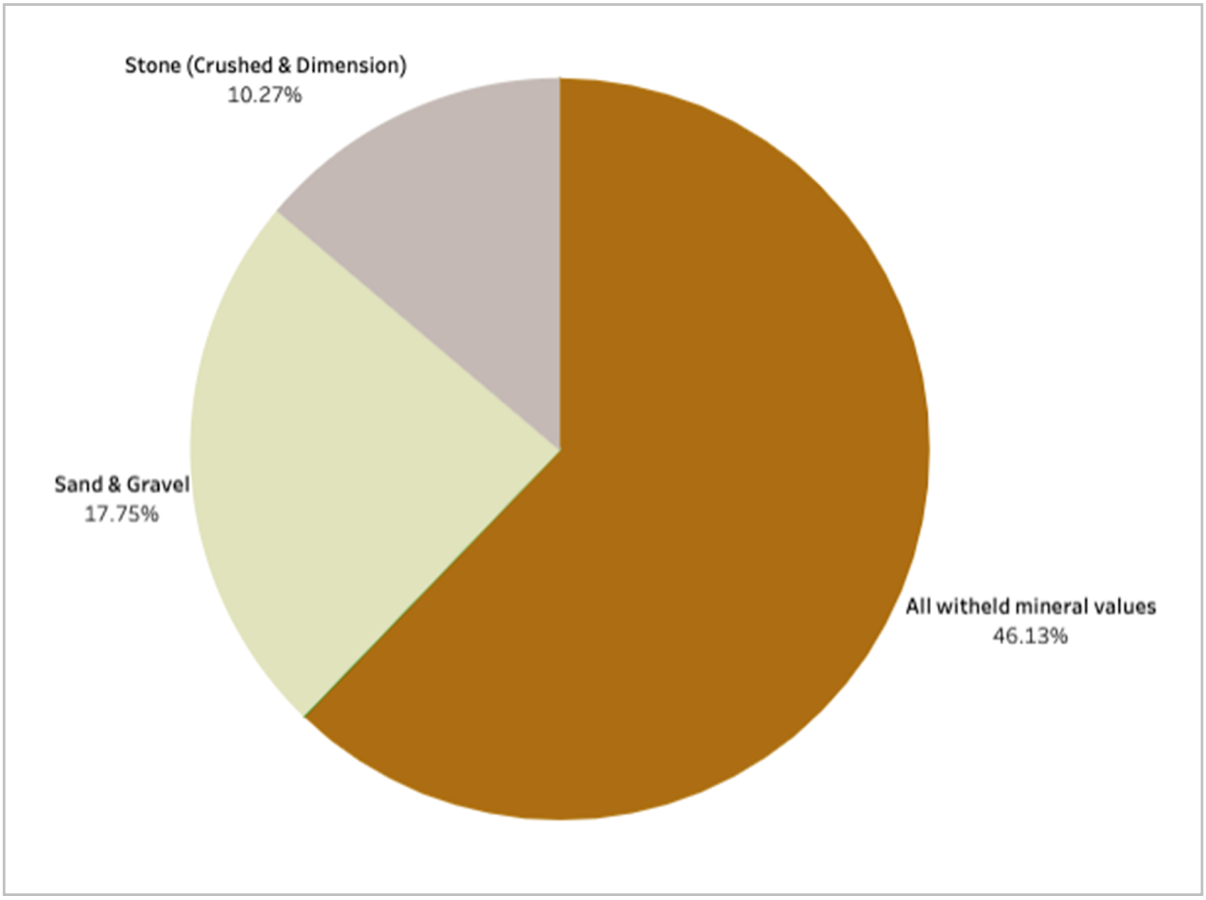


Figure 77. NLAP, *Pie Chart of Mineral Values and Withheld Values*. Tableau.

In 2019, withheld mineral values made up nearly half of Colorado's nonfuel mining revenue. That year, the minerals with withheld values were cement, gold, gypsum, helium, lime, molybdenum, and silver; however, we have no way of knowing how much each of these minerals contributed to the overall value. See **Appendix G** for a chart of all withheld mineral values from 1934-2019.

Combined Mineral Value Data: 1858-2022

The following dashboard combines multiple sources of data to create the most complete picture of mineral extraction in Colorado possible. The data sources are as follows:

- The nonfuel mineral data for 1858-1923 is taken from Henderson's USGS report

titled Mining in Colorado: a History of Discovery, Development, and Production and it corresponds to the dashboard on page 74, under the heading **Minerals Data from the Department of the Interior, 1858-1923**. However, for this combined dashboard, we've adjusted the values for inflation.

- The nonfuel mineral data for 1934-2019 is taken from the USGS Annual Minerals Yearbooks and corresponds to the dashboard on page 77, under the heading **USGS Minerals Yearbooks, 1934-2019**. However, for this combined dashboard, we've adjusted the values for inflation.

- Values for Fuel minerals were calculated using the production data from Eric E. Stene containing Annual **Mineral Production statistics for Colorado from 1868-1993** and combining it with commodity values for each year from several sources. These values and source are listed in **Appendix H.** Fuel production values for 1994-2022 were also derived from several sources listed in **Appendix I**.

- Finally, note the gaps that still appear in this data. From 1924-1933, we could not locate nonfuel mineral data, so the only data for these years is fuel data. Similarly, from 2020-2022, the USGS Minerals Yearbooks have not yet been released, so the only data is fuel values. This means the actual grand total value of mineral extraction in these years is higher than the total calculated in this dashboard.

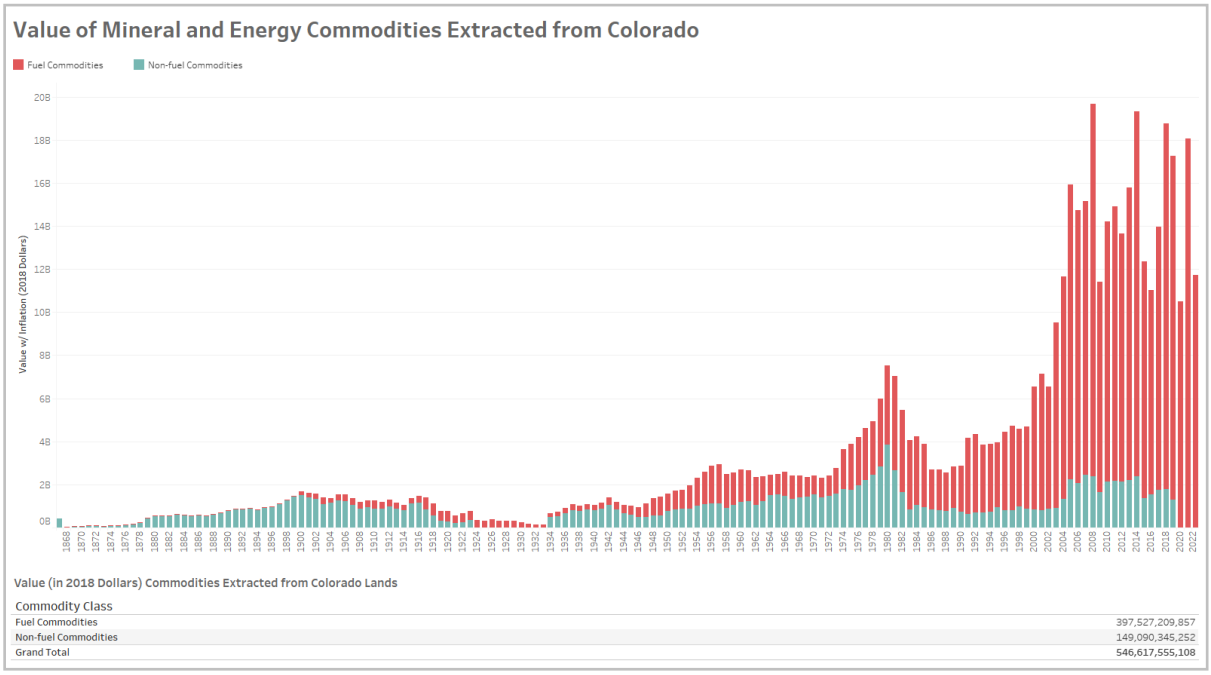


Figure 78. NLAP, *Overall Value Chart of Mineral and Energy Commodities Extracted from Colorado*. Tableau.

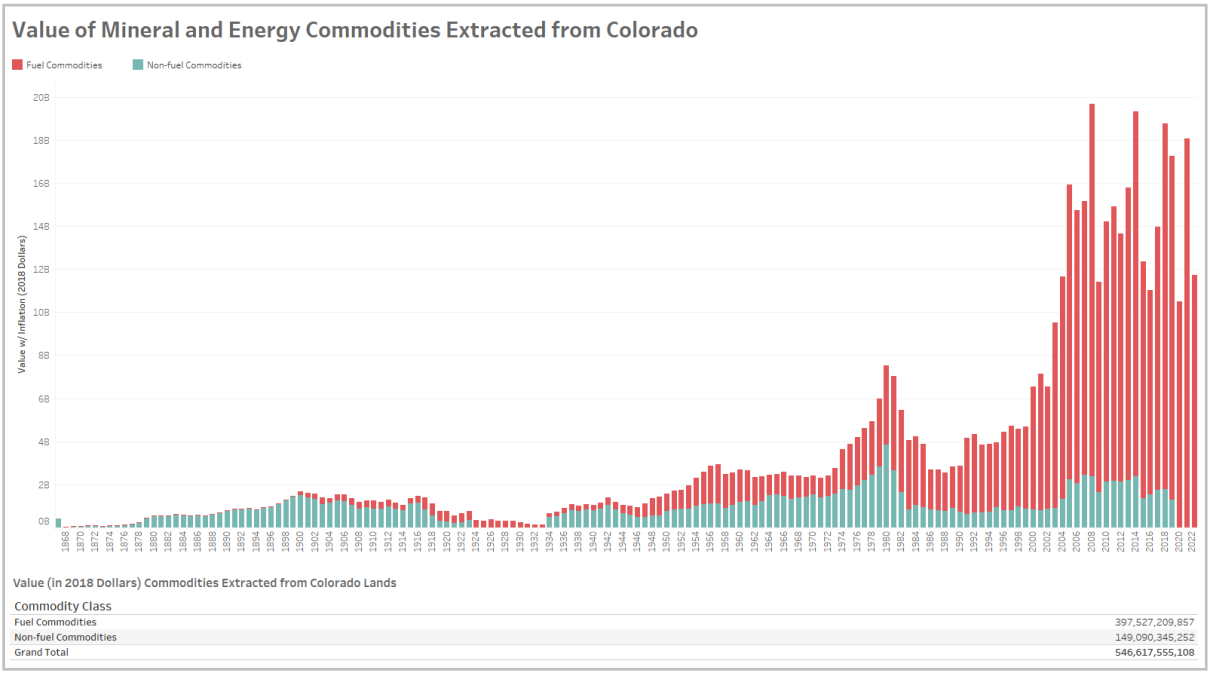


Figure 78. NLAP, *Overall Value Chart of Mineral and Energy Commodities Extracted from Colorado*. Tableau.

We calculate that over $546,617,555,108 (in 2018 dollars) of value in minerals have been extracted from Colorado since 1858.

See Appendix J to view the annual total values, and see Appendix K to see the value of each individual mineral extracted from Colorado since 1858 (though please note, as in previous dashboards, that values have been withheld over the years. See Appendix G for which mineral values were withheld each year).

Recommendations for Further Research

Nonfuel Minerals

Further efforts could be made to fill in some of the gaps we have already noted in this mineral data.

In regard to nonfuel minerals, several gaps exist in the data we tabulated. From 1924-1933, we were unable to locate nonfuel mineral data. However, these years between two world wars were likely lucrative years of mineral extraction in Colorado, even accounting for the economic downturn of the Great Depression.

Furthermore, the dataset we used for the years 1858-1923 only accounts for nine minerals (including several fuel minerals), meaning that it provides an incomplete picture of mineral extraction during this time period.

The USGS Minerals Yearbooks (from which we tabulated the nonfuel mineral values from 1934-2019) also contains data of mineral production amounts. Finding & tabulating the values was very time-consuming, so we did not tabulate the production amounts as well, but having such data accessible could be useful. These minerals yearbooks also contain some fuel mineral data, which could be useful to add to the fuel mineral data we've provided.

Fuel Commodities

In the absence of available revenue data for Fuel Commodities, we decided to calculate values based on the yearly average sale process for each commodity. A more ideal solution would be to use actual revenue data.

We know from historical records that Colorado's Grand Junction mine was the center of the U.S. efforts to mine uranium for the Manhattan Project, but due to the nature of the project, no uranium extraction data exists in the USGS Minerals Yearbooks in the 1940s. Researching whether uranium data for this time period exists could help fill in this era of mining history in Colorado.

Value of Water Rights

This section examines water rights in Colorado that preceded Native land cession.

Water has always played a significant role in the lives of Native American communities in Colorado, as it has for Indigenous peoples across North America. The use of water was essential for Native survival, sustenance, and cultural practices.

Three years after state enabling, in 1879, the Colorado General Assembly passed the **Adjudication Act**, which laid the foundation for managing water rights in the state. The Act introduced the concept of **prior appropriation**, commonly known as "first in time, first in right," which means that the first person or entity to use water for a beneficial purpose is granted the senior water right. According to the Colorado Division of Water Resources,

> **"An appropriation [of a water right] is made when an individual physically takes water from a stream (or underground aquifer) and places that water to some type of beneficial use. The first person to appropriate water and apply that water to use has the first right to use that water within a particular stream system. This person (after receiving a court decree verifying their priority status) then becomes the senior water right holder on the stream, and that water right must be satisfied before any other water rights can be fulfilled."**[58]

The **Colorado Irrigation Act of 1881**, officially titled "An Act to Regulate the Use of Water for Irrigation and Mining," established the legal framework for water rights and irrigation practices in Colorado. According to this Act, a person seeking a court decree of priority for an existing ditch or diversion, or a person proposing to construct a new ditch would submit a map and statement referred to as a "ditch statement" of claim to the county clerk and state engineer.[59] From this map and statement, a date would then be set for adjudication in front of a judge of a district court, and the public from the relevant counties would be formally notified. At the hearing, all interested parties are able to voice their objections. After all evidence has been shared and all objections are raised, a decree is entered into the record. These decrees were documented in the State Engineer's biannual reports.[60]

Managing conflict in this system of prior appropriation requires, among other things, the maintenance of detailed records on the time and location of when a water source was first put to beneficial use. In many cases, the appropriation date precedes the date of cession, which, if appropriated to a non-Native, is evidence of a violation of the Indian Non-Intercourse Act. This dataset is maintained by the Colorado Department of Water Resources and is available at the following link: https://data.colorado.gov/Water/DWR-Water-Right-Net-Amounts/acsg-f33s/data.

Water Rights that Preceded Native Land Cession

From 1850-2022, there was a total of 228,698 water rights appropriations in Colorado. 14,348 of these water rights have decreed appropriation dates prior to the 1881 Act. 11,343 water rights have appropriation dates before Colorado received formal recognition as a state on July 1st, 1876. However, while many water rights can be transferred and re-adjudicated, the greatest volume of appropriations dates occurred after 1944. figure 79 shows the count of Colorado water rights appropriations by year.

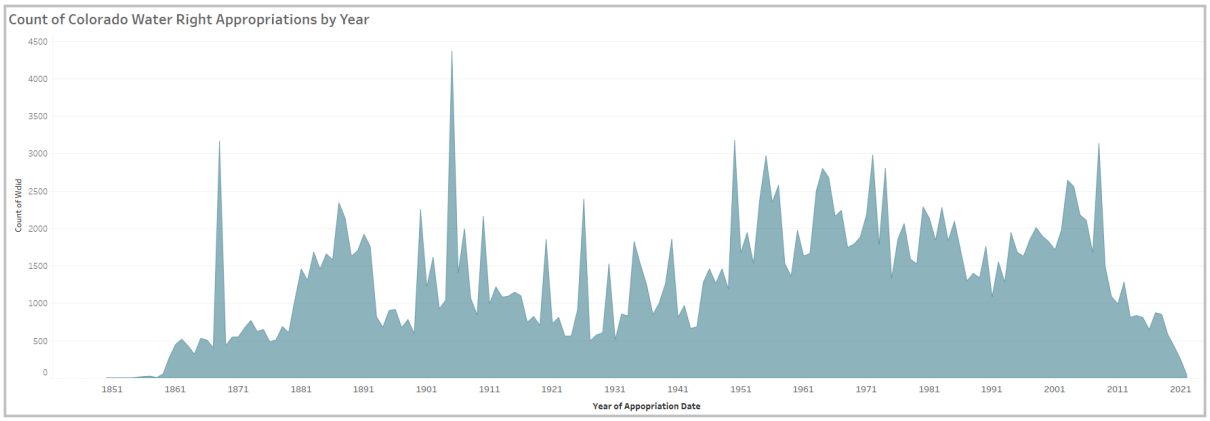


Figure 79. NLAP, *Count of Colorado Water Right Appropriations by Year*. Tableau.

Most concerning, however, is that a great many water rights in Colorado have decreed appropriation dates that precede when the lands were formally ceded from Native American tribes. In fact, out of Colorado's nine Native land cessions, all but two contain water rights that were issued prior to those lands being ceded. While it is difficult to say what this means regarding ownership of those rights, we feel this is important evidence of settler occupation prior to cession, a clear violation of the Indian Non-Intercourse Act mentioned earlier. Based on our analysis, a total of 2,702 or 1.2% of water rights in Colorado predate the cession of the lands where those rights are located. The Figure 80 on the next page shows a breakdown of the number of water rights by Native land cession.

Cession	Number of Water Rights That Precede Cession
616	1,241
617	904
426	293
515	223
478	16
4260	16
566	9
Grand Total	**2,702**

Figure 80. NLAP, *Table of Water Rights that Precede Cession*.

We also provide the map below which shows the water rights that preceded cession and where they are located.

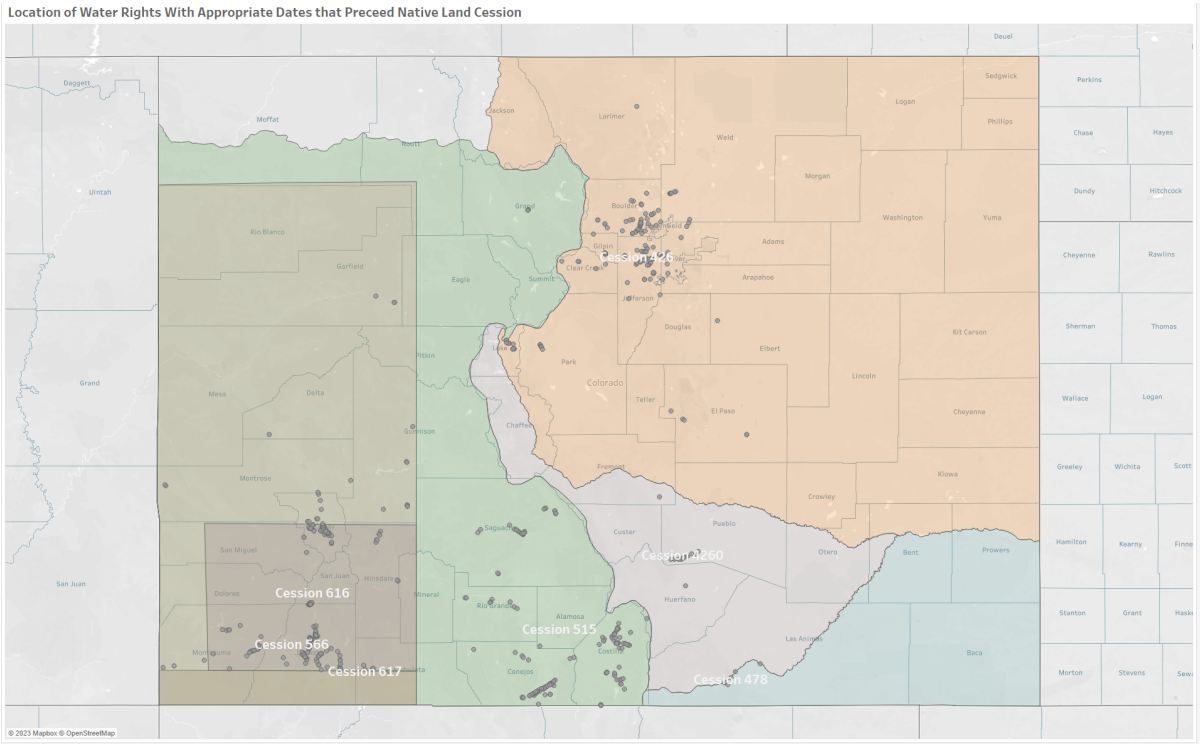


Figure 81. NLAP, *Location of Water Rights with Appropriation Dates that Precede Native Land Cession,* Tableau.

In fact, some of the most important and senior water rights in front-range cities like Denver, Boulder, Longmont, Loveland, and Fort Collins were appropriated by settlers who occupied the land in violation of the Indian Non-Intercourse Act of 1834. Figure 82 on the next page illustrates the location of water rights around Denver and Boulder that preceded the cession of those lands.

Location of Water Rights With Appropriate Dates that Preceed Native Land Cession

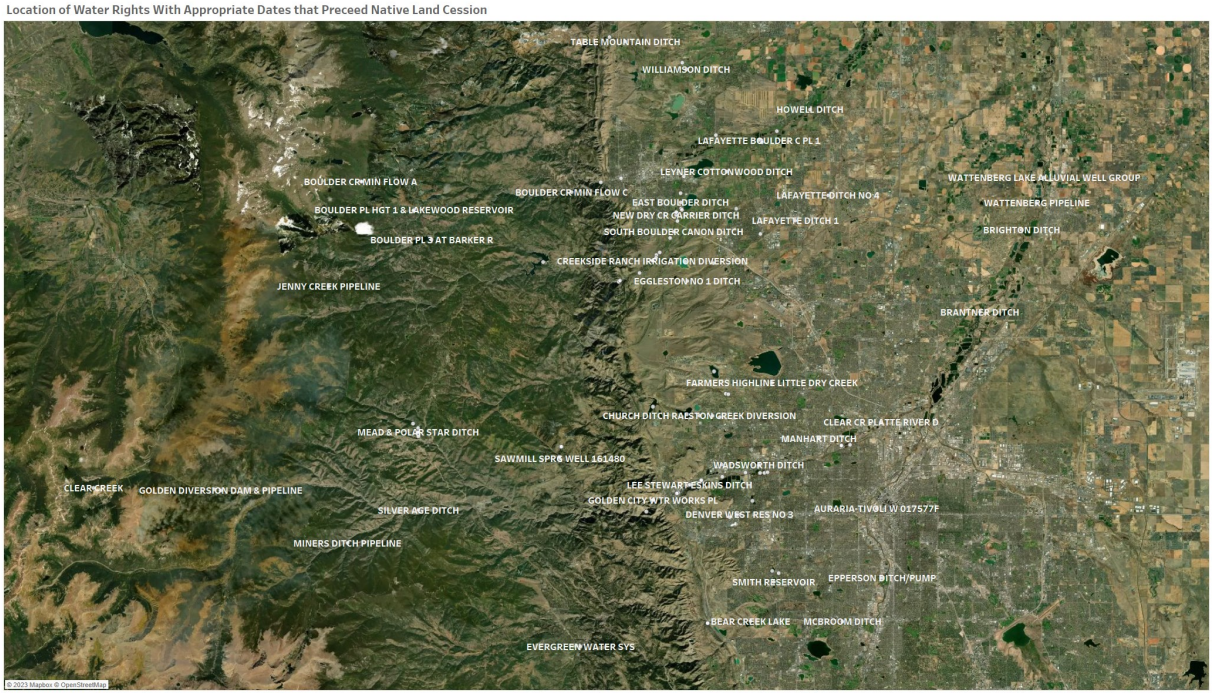


Figure 82. NLAP, *Location of Water Rights Map.*

Valuing Water Rights Taken from Tribes in Colorado

The actual value of water rights taken from tribes from illegal land cessions was one of the questions we tried to answer in our research. We sought not just to quantify what was owed to the existing reservations (as promised by the 1908 Winters Doctrine and what was attempted in the 1988 Colorado Ute Indian Water Rights Settlement Act) but to value ALL water rights in Colorado. To answer this question, we did a thorough examination of the literature and reached out to experts, most notably Brett Bovee, President of WestWater Research, a company in Colorado that specializes in the valuation of water rights. According to their website,

> **"WestWater Research is the leading economic consulting firm in market research, pricing, valuation, and transaction advisory services for water rights and water resource development. For more than 20 years, our clients have relied on our expertise to make sound water resource management and financial decisions as water demands increasingly outpace available supplies."[61]**

When presented the question of how to value water rights taken from tribes, the usual response was "it depends." This dilemma was summarized by Brett Bovee in a July 2020 article titled "The Market Value of a Water Right,"

> **"Unfortunately, there is no value estimate to provide that can represent Colorado water rights. In the past year, I have done valuations or assisted with transactions that involved water right sale prices ranging from $300 per acre-foot to nearly $90,000 per acre-foot. Water right values can have orders of magnitude difference across Colorado. Water rights are no different than other property assets in this regard, with many factors influencing value and producing a huge range of market values across the state."**

The one recommendation we received from Brett is that the value of water rights is often included in the value of the land they are associated with (when the right hasn't been severed from the land as is possible in Colorado). However, separating a water right is as simple as creating a separate deed for it and filing it in the county clerk and recorder's office, just as with deeds for land. So while we may be able to assume the value of lands (calculated later in this report) includes the values of water rights attached to those lands, it does not include the value of water rights severed from those lands. Furthermore, since no comprehensive database of such severed or deeded water rights exists, any estimation on our part would likely vary considerably. Therefore, we have decided to forgo any estimates until we can identify a suitable dataset from which we can base an estimation.

We have created a spreadsheet of all water rights that preceded cession. However, due to the immense size of the spreadsheet, we have decided to include a link to the spreadsheet rather than add the spreadsheet to the appendices:

Google spreadsheet of water rights that preceded cession in Colorado: click here.

Recommendations for Further Research

We believe the adjudicated water rights that precede cession are an indispensable tool for understanding the extent of illegal settlement in Colorado. Since appropriation dates were adjudicated by courts, it would appear to be irrefutable evidence of illegal occupation and theft of Native resources. Evidence used for the adjudication process, such as maps and testimony, could potentially be obtained from court records of these proceedings. The Division Water Courts possess most of the legal records; however, some have been transferred to the Colorado State Archives. Each water court should have a listing of cases and record locations.

Valuing water rights for illegally ceded lands is a valuable endeavor for truly quantifying the losses to Native people in Colorado. It is possible there is a database of deeded water rights, or a database could be assembled from county clerk and recorder offices or rulings from Colorado Water Courts.

SETTLEMENTS PRIOR TO LAND CESSION

This section provides an overview of the illegal settlement of Colorado's Native lands.

The U.S. Non-Intercourse Act (which was really a series of acts, with the first passed in 1790 and the final passed in 1834) established that any land to which "the Indian title [had] not been extinguished" could not be purchased, negotiated for, or settled on by U.S. citizens.

Section 11 of the 1834 Non-Intercourse Act states "that if any person shall make a settlement on any lands belonging, secured, or granted by treaty with the United States to any Indian tribe, or shall survey or shall attempt to survey such lands, or designate any of the boundaries by marking trees, or otherwise, such offender shall forfeit and pay the sum of one thousand dollars. And it shall, moreover, be lawful for the President of the United States to take such measures, and to employ such military force, as he may judge necessary to remove from the lands as aforesaid any such person as aforesaid."[62]

Therefore we can state not only that U.S. citizens settling in the unceded Native lands of Colorado were violating those Native Nations' centuries-long relationship with their land, but also that these incursions into Native land were verifiably illegal according to existing U.S. laws.

NLAP has compiled a non-comprehensive database of these illegal settlements. In the storymap we produced alongside this report, an interactive dashboard of these settlements can be viewed. In this report, we will simply draw attention to some highlights.

Data Disclaimer

This database should not be viewed as a comprehensive report on the illegal settlement of Colorado's Native lands. Such a report was outside the scope of our work, as it would require countless hours researching mining history, trail establishments, ghost towns, trading posts, military installations, fur trappers, individual settler biographies, and more. Instead, this database should be viewed as a broad overview of the illegal settlement of Colorado's Native lands.

In researching the settlements within this database, we prioritized those towns and cities that have remained occupied into the present-day. However, it became quickly evident that this painted an incomplete picture of the history of Colorado's settlement. Many towns—especially mining towns—were established and then abandoned, sometimes within just a few years. When we were able, we attempted to fill these gaps. However, it should be borne in mind that many ghost towns and abandoned settlements are not represented by this database.

Finally, every date we have recorded in this database is linked to its source material, and in the interactive dashboard, the source can be viewed by hovering over a specific data point. But it should go without saying that, in many cases, towns may have been settled before the documentation indicates. Therefore these dates should be viewed not as the earliest possible date of settlement, but rather as the **latest** possible date of settlement.

The Illegal Settlement of Colorado: A Summary

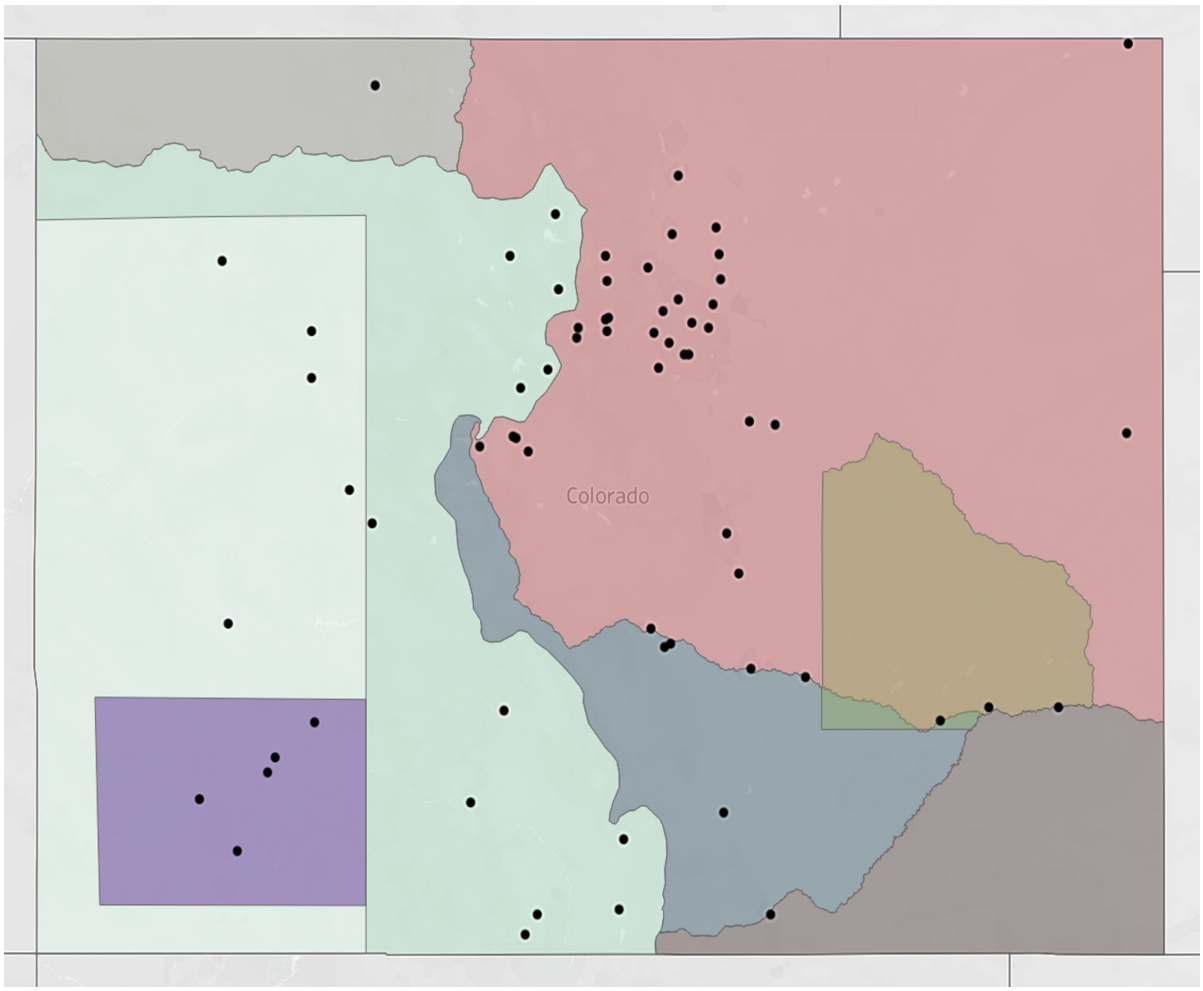


Figure 83. NLAP, *Map of Settlements*, Tableau.

In viewing the map of these settlements, it should be apparent that the illegal settlement of Colorado's Native lands was not constrained to one area or one historical moment (such as the Pike's Peak Gold Rush). Rather, it's clear that U.S. citizens' illegal incursions into Native lands characterized Colorado's entire settlement history.

Link to settlements dashboard:
Click Here

Illegal Settlements by Cession

We've mapped 66 illegal settlements across Colorado's Native lands.

- In Cession 426, we've mapped **37** illegal settlements.
- In Cession 4260, we've mapped **4** illegal settlements.
- In Cession 477, we've mapped **2** illegal settlements.
- In Cession 478, we've mapped **2** illegal settlements.
- In Cession 515, we've mapped **22** illegal settlements.
- In Cession 520, we've mapped **1** illegal settlement.
- In Cession 566, we've mapped **5** illegal settlements.
- In Cession 616, we've mapped **10** illegal settlements.
- In Cession 617, we've mapped **0** illegal settlements.

Cession	
426	37
4260	4
477	2
478	2
515	22
520	1
566	5
616	10
617	0
Grand Total	66

Figure 84. NLAP, *Cession Settlement Chart*, NLIS.

The Earliest Settlements

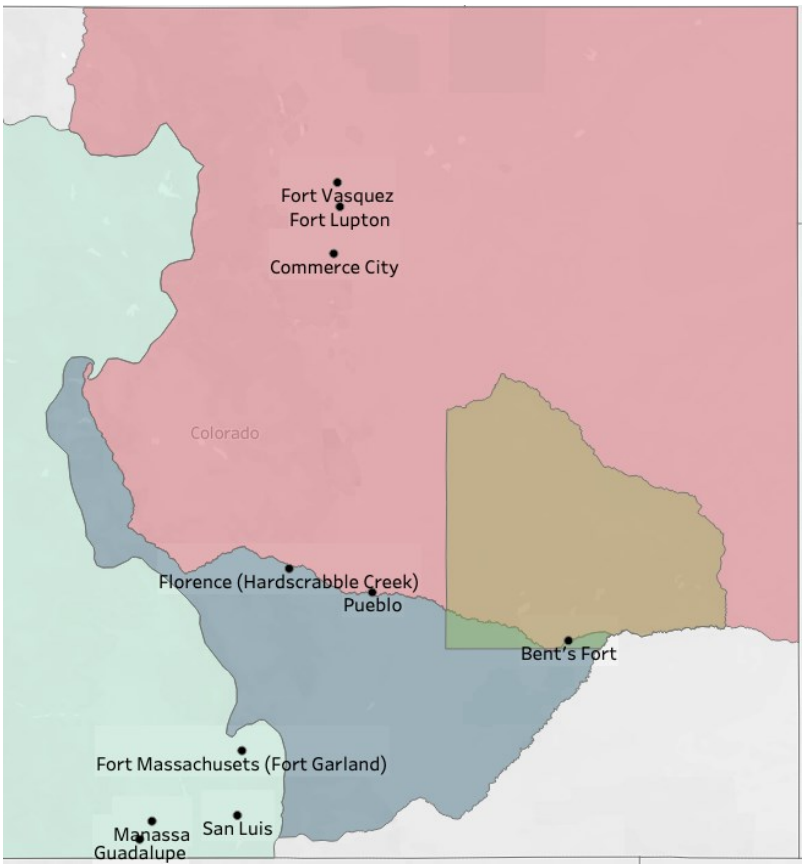


Figure 85. NLAP, *Earliest Settlements*, Tableau.

- Bent's Fort (about 20 miles West of Pueblo's present-day location) was settled by William Bent in 1824. Bent's Fort was illegally settled **41 years** before Cession 477 was ceded in 1865.[63]
- Pueblo was settled when "Jacob Fowler and his men [built] a three-room house on the site of present-day Pueblo, Colorado," on January 3, 1822. Pueblo was illegally settled **39 years** before Cession 426 was ceded in 1861.[64]
- Fort Vasquez was constructed in 1835 "as a fur trading post near the South Platte River built by Andrew Sublette and Pierre Louis Vasquez; it [was] abandoned in 1842." Fort Vasquez was illegally settled **26 years** before Cession 426 was ceded in 1861.[65]
- Fort Lupton was constructed in 1836 by Lancaster P. Lupton "a little north of the present-day town of the same name, having visited the area the previous year with Colonel Henry Dodge and the Dragoons to the Rocky Mountains." Fort Lupton was illegally settled **25 years** before Cession 426 was ceded in 1861.[66]

- Florence (originally Hardscrabble Creek) was settled in 1840 "by Bent, St. Vrain, Beaubien, Maxwell and others just east of present-day Florence, Colorado." Hardscrabble Creek was illegally settled **21 years** before Cession 426 was ceded in 1861.[67]
- Manassa was illegally settled in 1851, **17 years** before Cession 515 was ceded in 1868. [68]
- San Luis was "founded [on April 5], 1851, the original site of San Luis de la Culebra was threequarters of a mile south of the present one." San Luis was illegally settled **17 years** before Cession 515 was ceded in 1868.[69]
- Fort Massachusetts (later Fort Garland) was the "first U.S. military fort in what would become Colorado [...] built at the base of the Sierra Blanca; in 1858 it is moved, rebuilt and renamed Fort Garland." Built in 1852, Fort Massachusetts was illegally settled **16 years** before Cession 515 was ceded in 1868.[70]
- Guadalupe was settled "in what will become Conejos County by Hispanic farmers including Jose Maria Jaque who built the first house and was joined by his family." Established in 1854, Guadalupe was illegally settled 14 years before Cession 515 was ceded in 1868.[71]
- "Prospectors first staked land along the Dolores River in the 1860s, marking the area that would later become known as Rico." We've designated the year 1860 as Rico's settlement date because sources indicate it was settled during the gold rush, but the exact year may have differed. Cession 566 wasn't ceded until 1874, meaning Rico was illegally settled about 14 years before cession.[72]

Colorado's Most Populated Cities

Of the fifteen most-populated cities in Colorado (as of 2023)[73], ten were settled in unceded Native lands.

All of these ten cities are located in Cession 426, which was ceded in the 1861 Treaty of Fort Wise, signed February 18, 1861 and ratified Aug. 6, 1861. (Although it is worth noting that many Cheyenne and Arapaho leaders did not view this treaty as valid, as it had only been signed by a small minority of their leaders. Therefore, even referring to the land as being ceded in 1861 is somewhat controversial.)

Figure 86 on the next page shows a map of these cities.

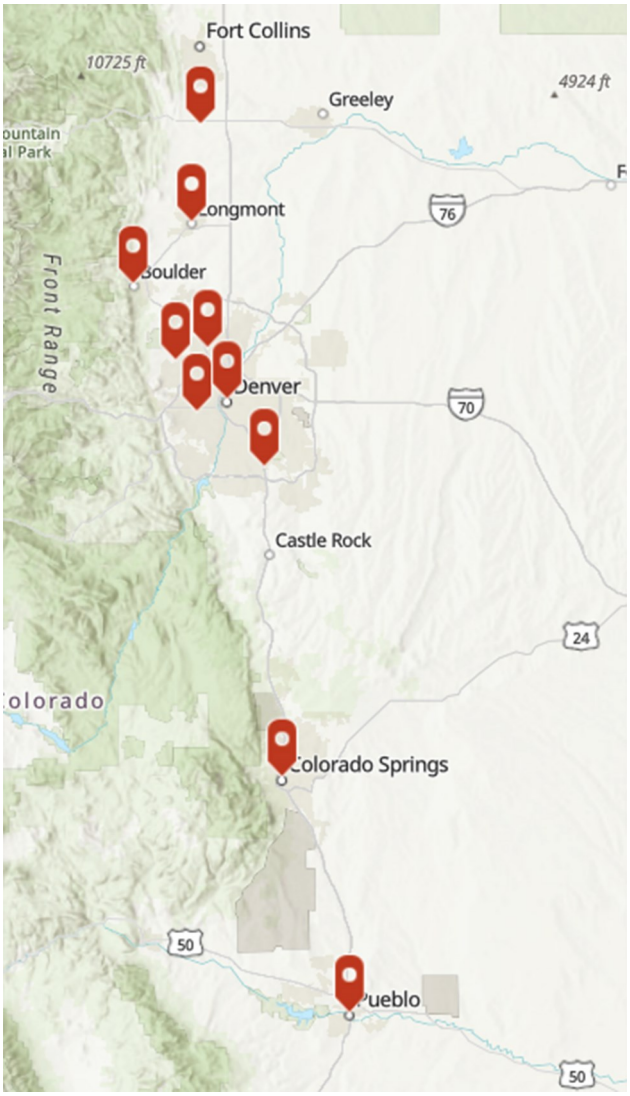


Figure 86. NLAP, *Map of Cities by Land Cession*, created using ArcGIS.

Before the Treaty of Fort Wise, U.S. citizens had been promised safe passage through these lands, but not safety to settle within them. In fact, the U.S. Government had specifically guaranteed protection of these Native lands against all depredation by U.S. citizens. These promises went unfulfilled, leading to some of the incidents covered in the above Loss of Life section as tribes defended their land against intruders.

The ten settlements are as follows:

- Denver (Colorado's most-populated city) was settled in the Colorado Gold Rush of 1858. (Lakewood and Centennial are in the close vicinity of Denver; they appear in this list as well.)[74]

- Colorado Springs (Colorado's second most-populated city) was settled in August of 1859.[75]
- Lakewood (Colorado's fifth most-populated city) was settled in 1859.[76]
- Arvada (Colorado's seventh most-populated city) was settled in 1859.[77]
- Pueblo (Colorado's eight most-populous city) was settled in 1822. (Pueblo was in the lands acquired by the U.S. in 1848 under the Guadalupe Hidalgo Treaty; the city's first settlers were Mexican citizens.)[78]
- Westminster (Colorado's ninth most-populated city) was settled in 1859.[79]
- Centennial (Colorado's eleventh most-populated city), though it would not be called Centennial until the 2000s, was settled in the Colorado Gold Rush of

1858, alongside many settlements in the vicinity of Denver.[80]

- Boulder (Colorado's twelfth most-populated city) was settled in 1858.[81]
- Longmont (Colorado's thirteenth most-populated city) was settled during the Colorado Gold Rush in 1860.[82]
- Loveland (Colorado's fifteenth most-populated city) was settled in 1859.[83]

Population by County, 1790-2010

The data dashboard presented in this section visualizes Colorado population data sourced from a public dataset published by Pamela J. Waisanen and Norman B. Bliss.[84] This map displays the population data for Native and non-Native populations in Colorado going back to 1790.

With this dashboard, users are able to view how quickly the population in Colorado increased during the time of illegal settlement. Also of note is how quickly the population grew during the Gold Rush starting in 1858.

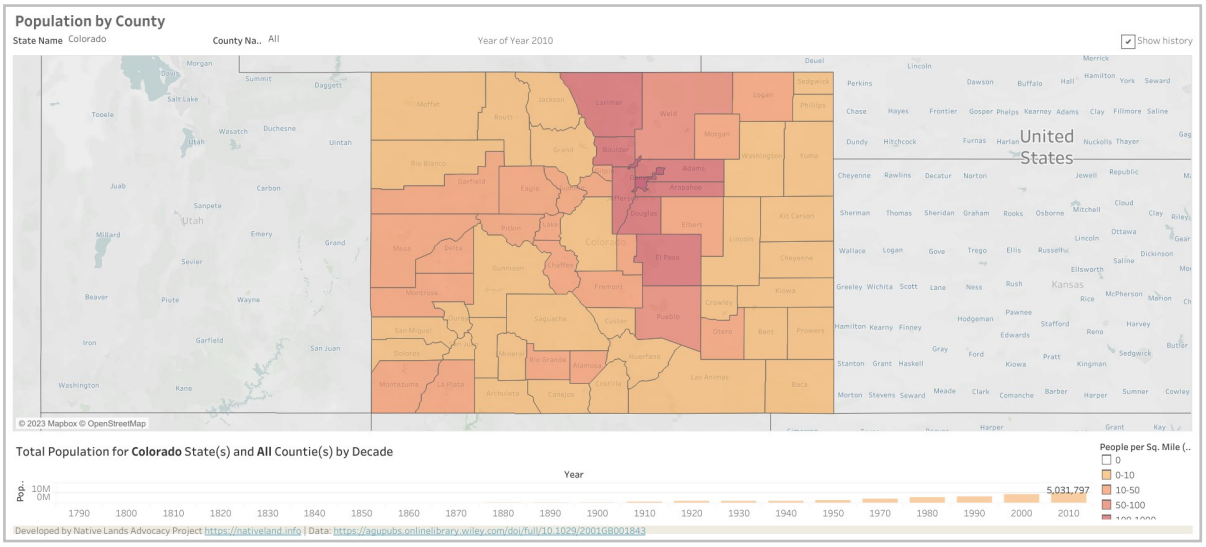


Figure 87. NLAP, *Population by County in Colorado from 1790 to 2010*, Tableau.

Link to population dashboard:
Click Here

Recommendations for Further Research

This database presents opportunities for future research. As noted in our data disclaimer, creating a comprehensive dashboard of every possible illegal settlement in Colorado was outside the scope of our work, but such a comprehensive database could be a powerful tool for education and advocacy.

Some of the areas we suggest researching to gather this comprehensive data include:

- Mapping the progression of early traders and the establishment of forts in the Colorado territory, especially before treaties which guaranteed their safe passage; researching varying tribal receptions of traders; also researching whether these traders were in compliance with existing U.S. laws about trading in Native territory (such as the license requirement laid out in Sec. 2 of the 1834 Indian Non-Intercourse Act)
- Distinguishing between early American settlers and early French and Spanish settlers in the Colorado territory, especially if this data is intended to be used for legal advocacy in the U.S.,
- Referencing the dates of water rights claims (see page 85 of this report) to potentially locate more early settlements,
- Researching trail routes, railroad routes, etc; excluding certain trail stops from illegal settlement data in cases where they are protected by treaties,
- Identifying which military installations were constructed before and after treaty protections in unceded lands,
- Completing a comprehensive overview of mining incursions into Colorado's lands; identifying not just locations where semi-permanent structures were built, but any location where minerals were extracted from Native lands.

This is not necessarily an exhaustive list of areas to research, but they are the most pressing areas that arose as we were compiling information for this database.

Another related tool that would be powerful to create in the future (and for which NLAP already has some of the data) is a database of the settlement of Colorado's present-day counties. In some cases, it is easier to find early documentation of

Recommendations for Further Research Cont'd

settlement in counties than for specific towns or cities. For example, there is documentation of present-day Routt County being settled in 1840—an entire 28 years before that land was ceded. However, because the settler (Jim Baker) built a single log cabin rather than establishing a town, this settlement was not possible to map in this database.

VALUE OF AGRICULTURAL LOSSES

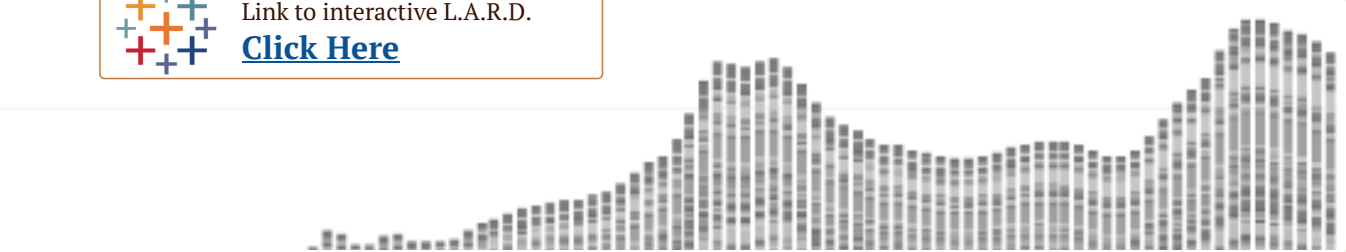
The Lost Agriculture Revenue Database (L.A.R.D.) was developed by the Native Lands Advocacy Project to help quantify the impacts of land cessions and discriminatory agriculture policies of the United States government.

County-level USDA Census data makes it nearly impossible to understand what's occurring on Native lands, which often overlap multiple counties (and sometimes multiple states). Using data from 1840 to the present, the L.A.R.D. disaggregates county-level census data into known agricultural lands of each county and then evenly distributes the census results (in this case, the sum market value of agricultural products sold). You can read more about the L.A.R.D. by clicking the link at the bottom of this page.

On Colorado's reservations, the quantifiable disparities in agricultural revenue are a direct result of discriminatory agriculture policies, especially from allotment and leasing of prime agricultural lands to non-Natives. Furthermore, the agricultural revenue made by non-Natives in ceded territories help reveal the financial gains settlers have enjoyed as a result of removing Native Nations from their lands. However, these dollar amounts should not just be viewed as numbers. They represent U.S. efforts to disconnect Native peoples from their lands and food systems. **Working to rectify these disparities does not just mean potentially earning more agricultural income, but healing our relationships with our lands, our non-human relatives, our foods and medicines, and our own bodies.**

This section estimates the lost agricultural access and revenue for Colorado's six land cessions and two reservations (the Southern Ute and Ute Mountain). For cession lands, this equates to stolen agricultural potential and the original accumulation of capital from which settler communities and economies were established and expanded.

Link to interactive L.A.R.D.
Click Here



Royce Cession 426

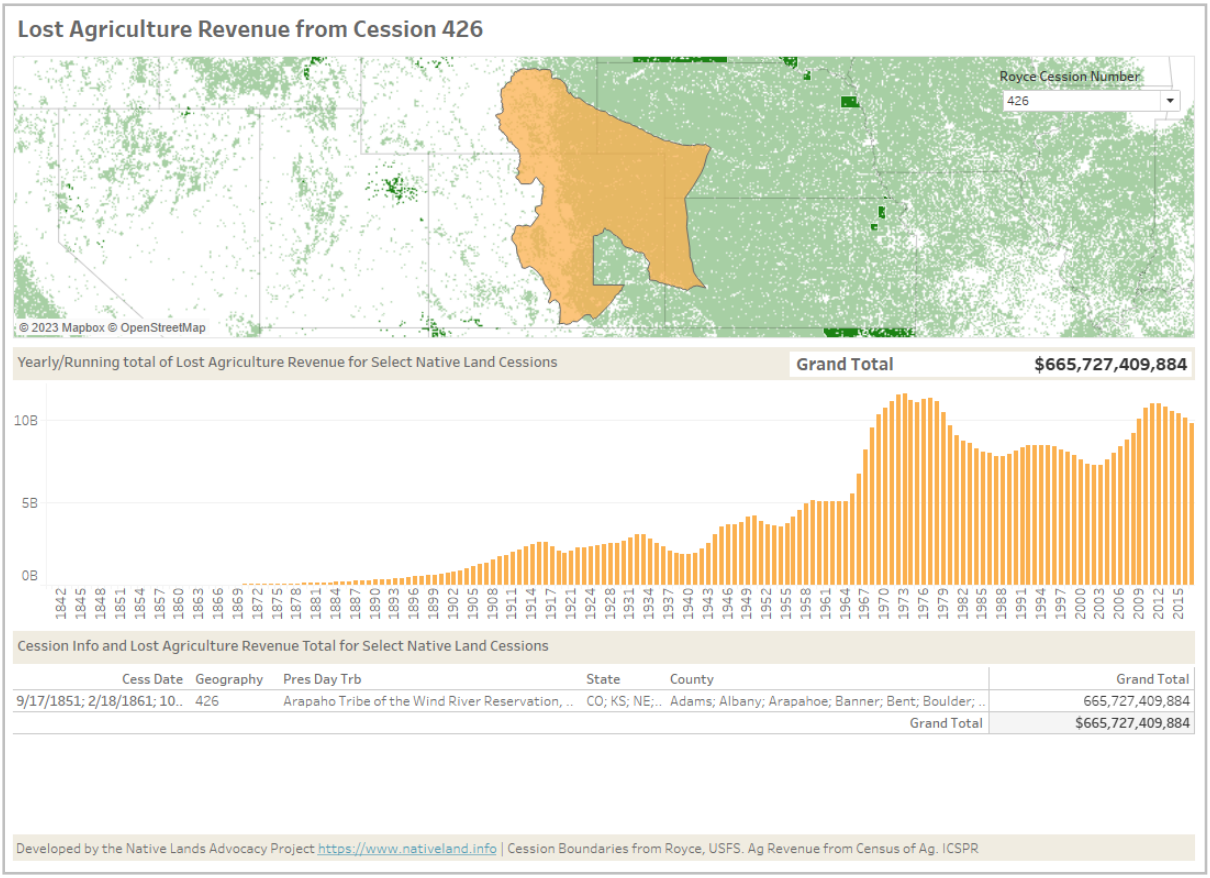


Figure 88. NLAP, *L.A.R.D. Calculations for Cession 426,* NLIS.

Calculations for the ceded lands of the 1861 Treaty of Fort Wise, known by the Royce Cession number 426, are pictured above.

The L.A.R.D. calculates a total of $665,727,409,884 in lost agricultural revenue for Cession 426.

To view the borders of this cession, click the following link: https://digitreaties.org/treaties/cession/426/ .

Royce Cession 477

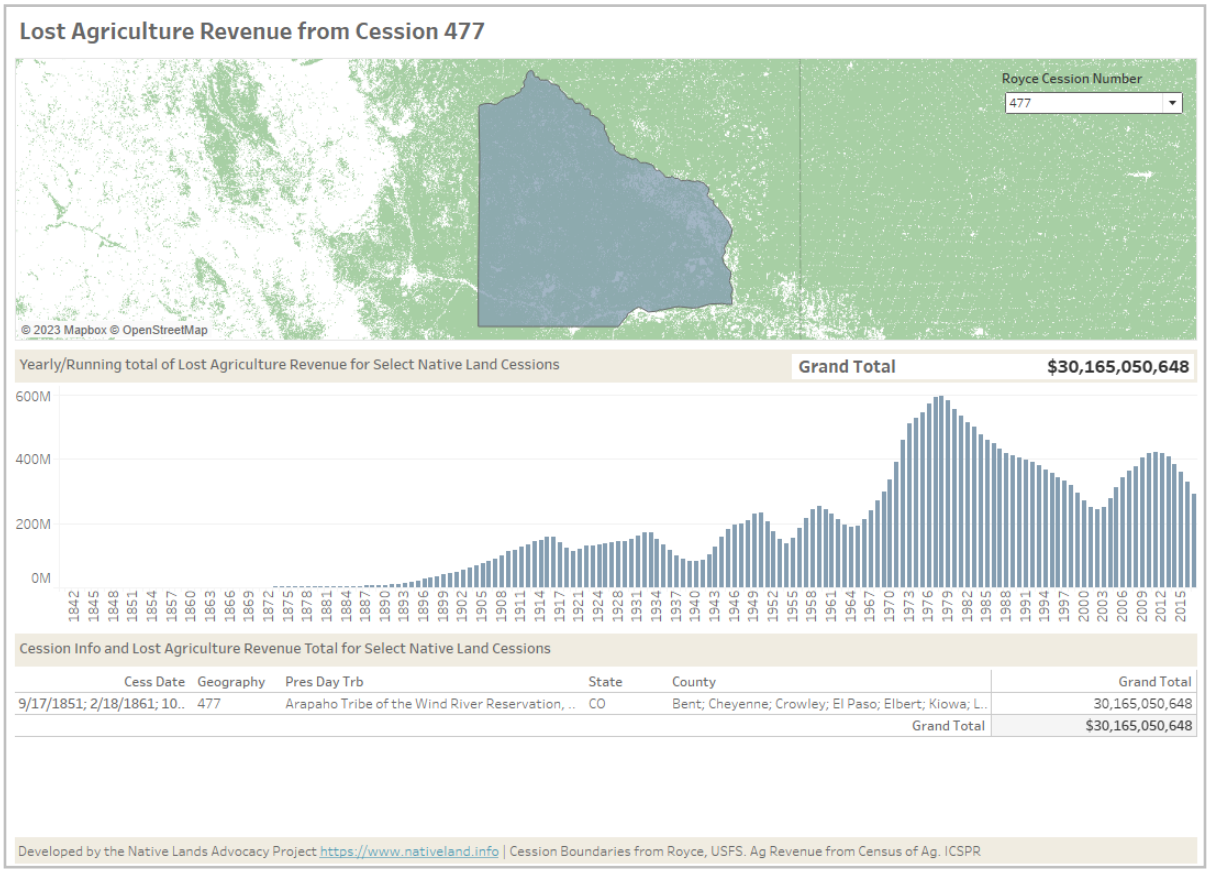


Figure 89. NLAP, *L.A.R.D. Calculations for Cession 477,* NLIS.

Calculations for the ceded lands of the 1865 Treaty of Little Arkansas, known by the Royce Cession number 477, are pictured above.

The L.A.R.D. calculates a total of $30,165,050,648 ($30 billion) in lost agricultural revenue for Cession 477.

To view the borders of this cession, click the following link: https://digitreaties.org/treaties/cession/477/.

Royce Cession 478

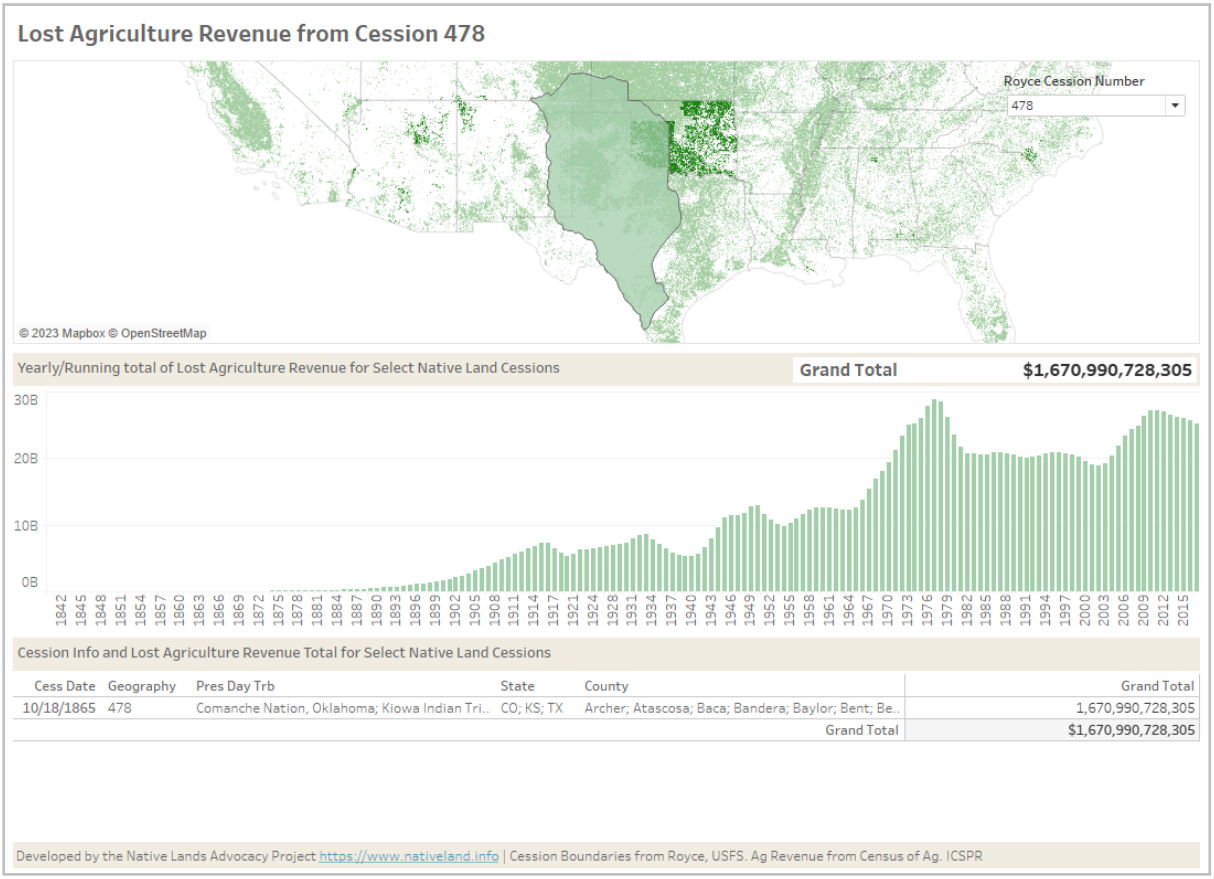


Figure 90. NLAP, *L.A.R.D. Calculations for Cession 478,* NLIS.

Calculations for the ceded lands known by the Royce Cession number 478 are pictured above.

The L.A.R.D. calculates a total of $1,670,990,728,305 in lost agricultural revenue for Cession 478.

To view the borders of this cession, click the following link: https://digitreaties.org/treaties/cession/478/.

Royce Cession 515

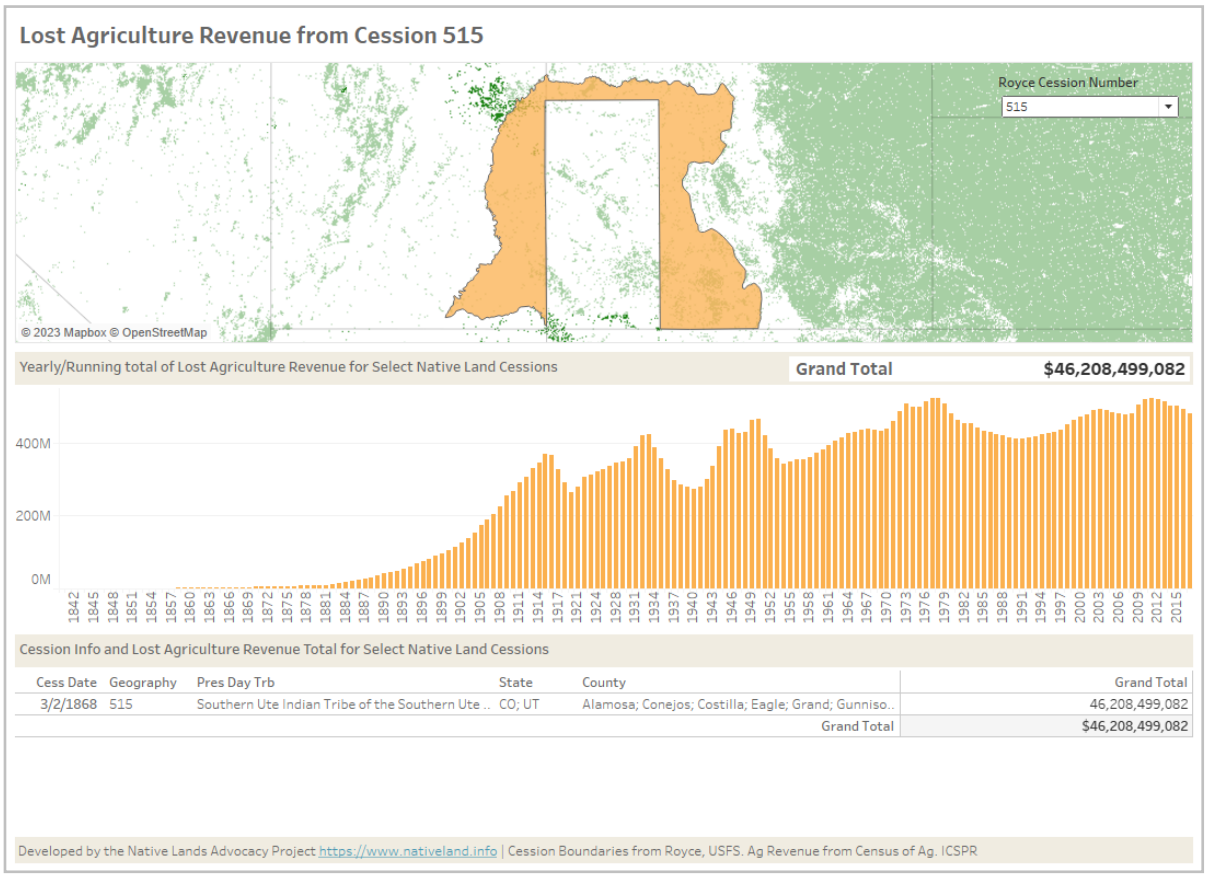


Figure 91. NLAP, *L.A.R.D. Calculations for Cession 515,* NLIS.

Calculations for the ceded lands of the 1868 Treaty with the Ute, known by the Royce Cession number 515, are pictured above.

The L.A.R.D. calculates a total of $46,208,499,082 ($46.2 billion) in lost agricultural revenue for Cession 515.

To view the borders and treaty information of this cession, click the following link: https://digitreaties.org/treaties/cession/515/.

Royce Cession 520

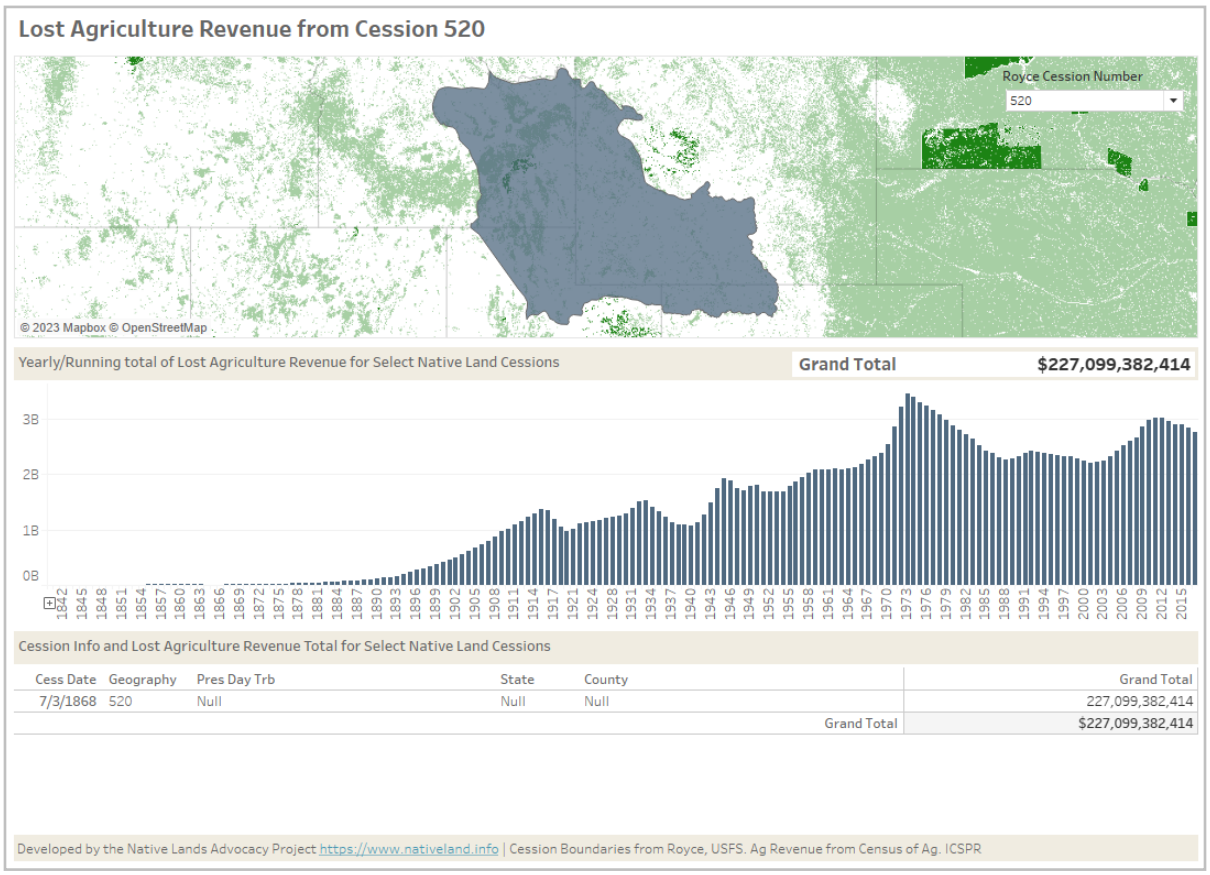


Figure 92. NLAP, *L.A.R.D. Calculations for Cession 520,* NLIS.

Calculations for the ceded lands of the 1868 Fort Bridger Treaty, known by the Royce Cession number 520, are pictured above.

The L.A.R.D. calculates a total of $227,099,382,414 in lost agricultural revenue for Cession 520.

To view the borders and treaty information of this cession, click the following link: https://digitreaties.org/treaties/cession/520/.

Royce Cession 566

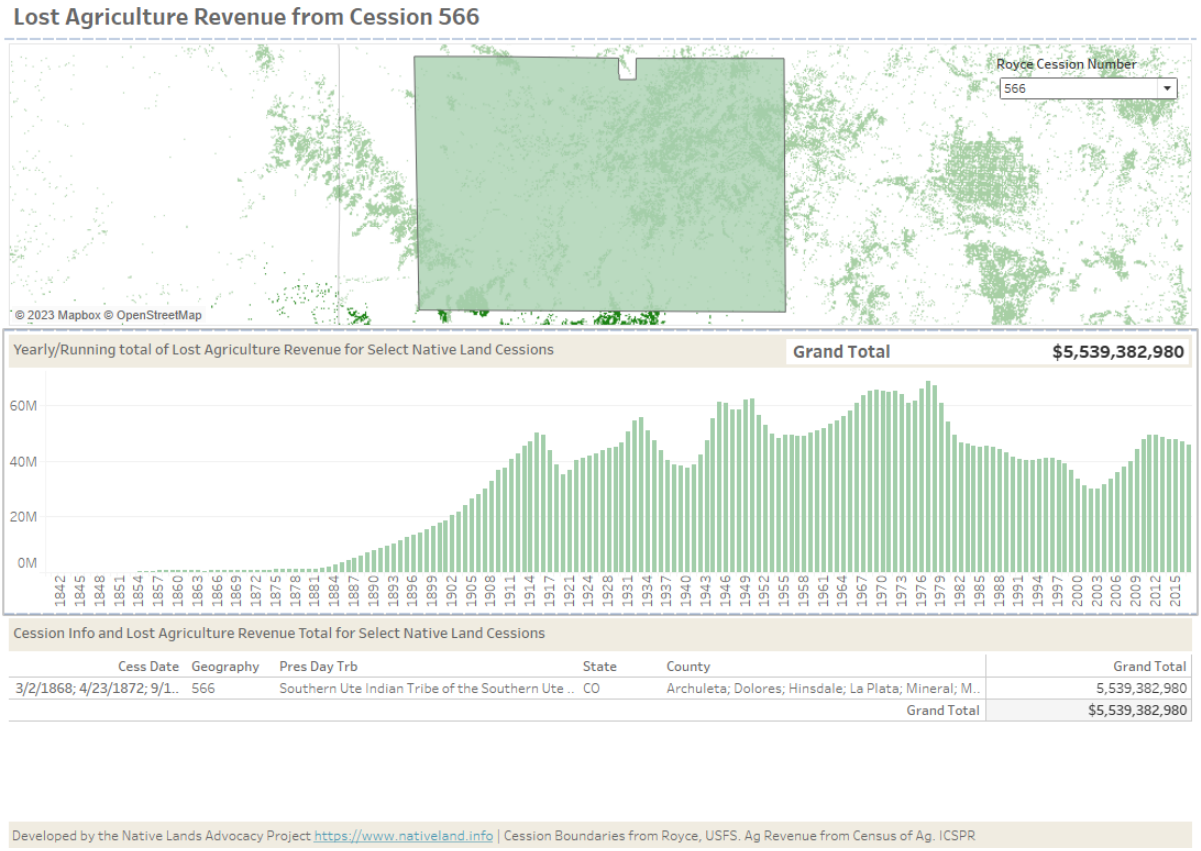


Figure 93. NLAP, *L.A.R.D. Calculations for Cession 566,* NLIS.

Calculations for the ceded lands of the 1874 Brunot Agreement, known by the Royce Cession number 566, are pictured above.

The L.A.R.D. calculates a total of $5,539,382,980 in lost agricultural revenue.

To view the borders and treaty information of this cession, click the following link: https://digitreaties.org/treaties/cession/566/.

Royce Cession 616

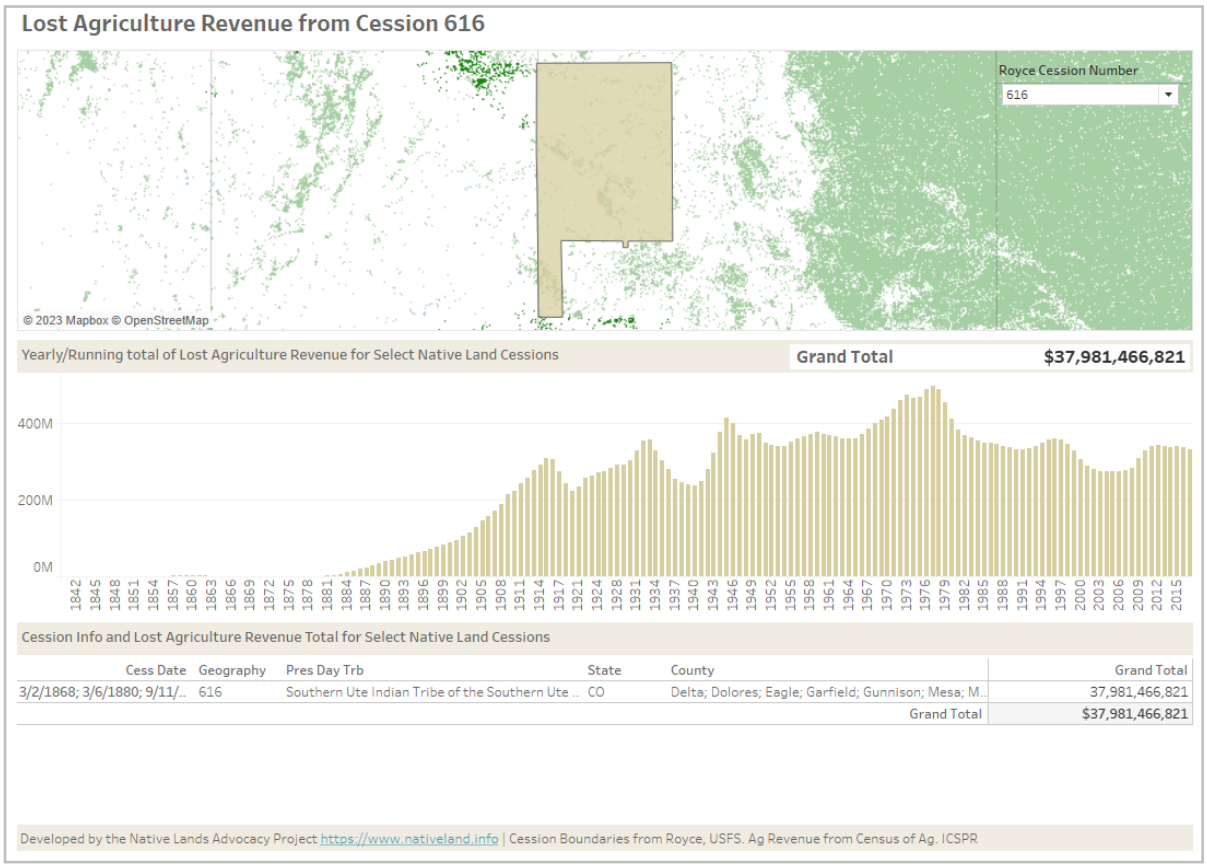


Figure 94. NLAP, *L.A.R.D. Calculations for Cession 616,* NLIS.

Calculations for the ceded lands of the 1880 Agreement with Ute Indians, known by the Royce Cession number 616, are pictured above.

The L.A.R.D. calculates a total of $37,981,466,821 ($38 billion) in lost agricultural revenue for Cession 616.

To view the borders and treaty information of this cession, click the following link: https://digitreaties.org/treaties/cession/616/.

L.A.R.D. for the Seven Ceded Lands

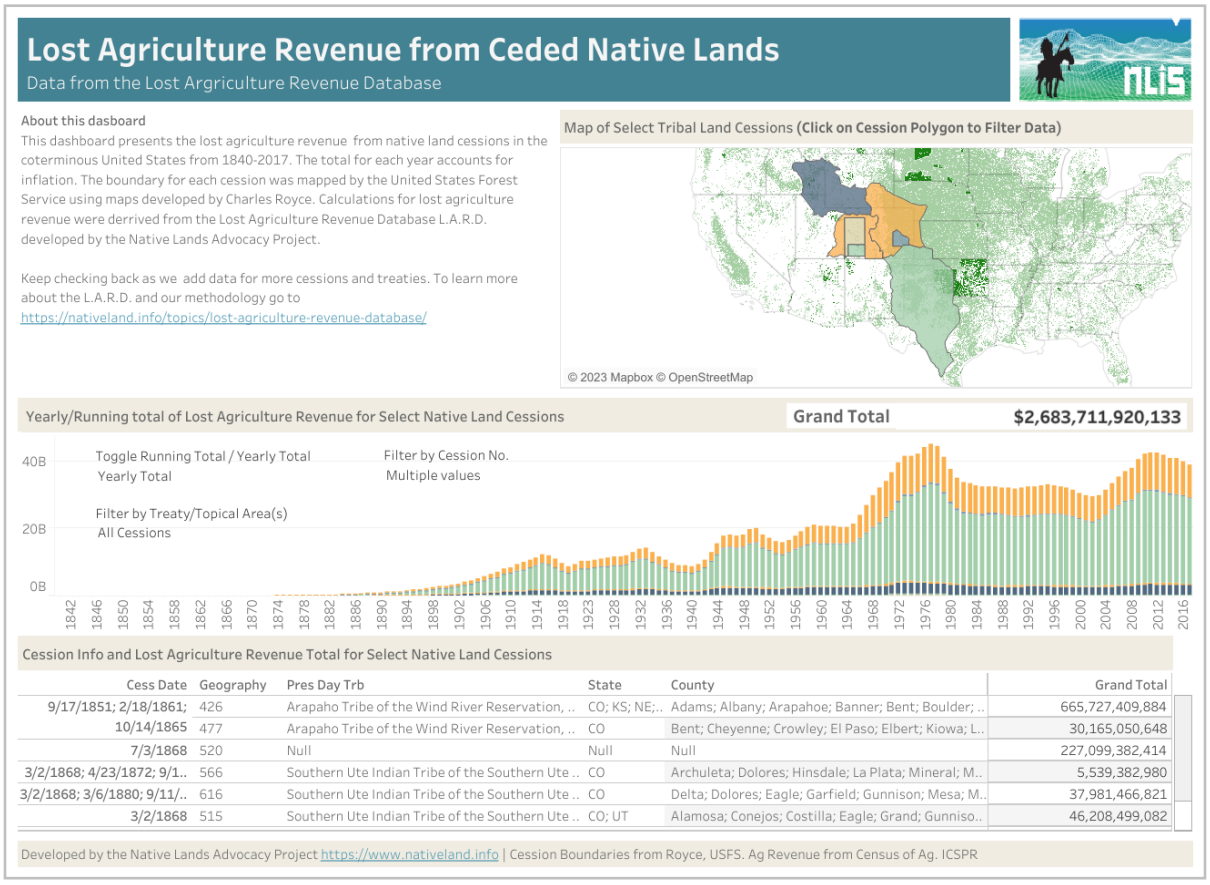


Figure 96. NLAP, *L.A.R.D. Calculations for Seven Ceded Lands,* NLIS.

Calculations for seven ceded lands in Colorado are pictured here.

The L.A.R.D. calculates a total of $2,683,711,920,133 in lost agricultural revenue for all eight ceded lands.

Lost Agriculture Revenue at the Reservation Level: Southern Ute Reservation

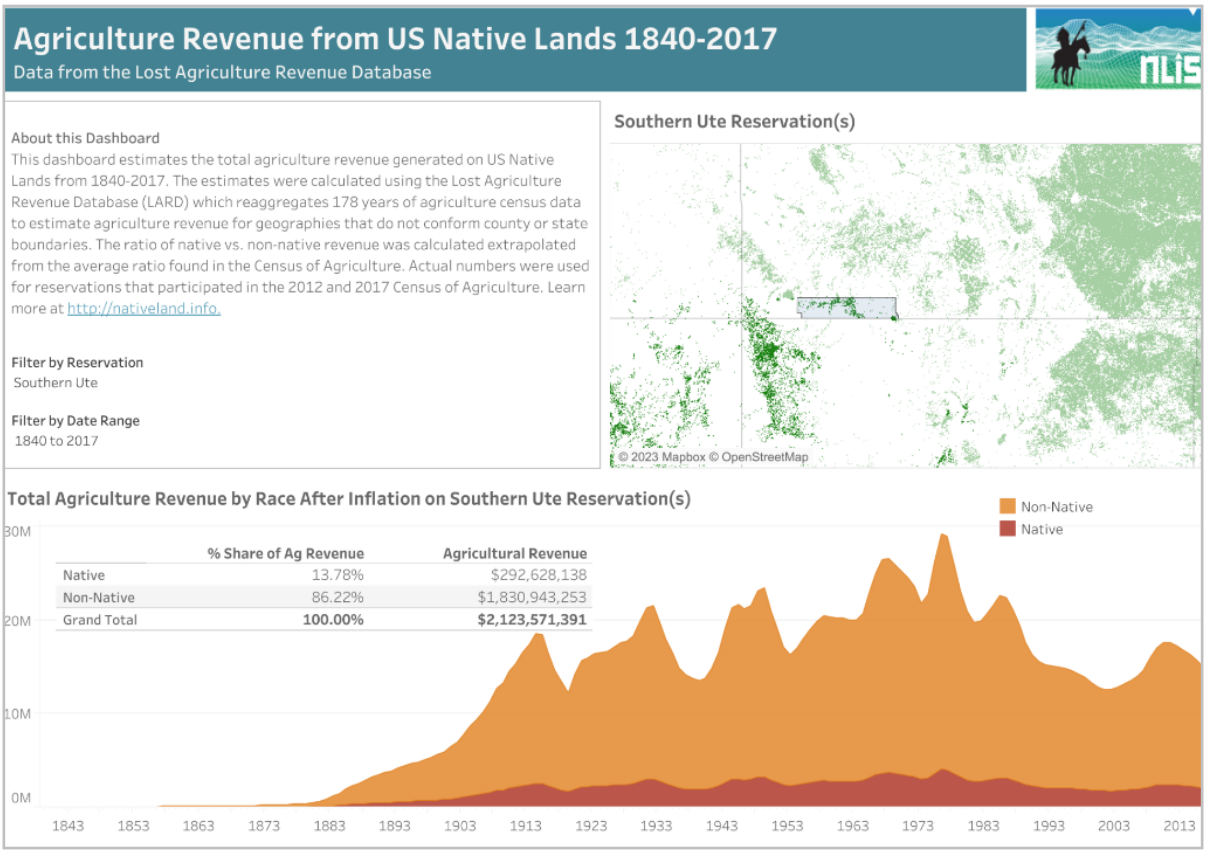


Figure 97. NLAP, *L.A.R.D. Calculations for Southern Ute Reservation,* NLIS.

The L.A.R.D. estimates that Natives on the Southern Ute Reservation have only received 13.78% (or $292,628,138) of agricultural revenue since 1840.

This is compared to the $1,830,943,253 in agricultural revenue received by non-Natives on this reservation.

Lost Agriculture Revenue at the Reservation Level: Ute Mountain Reservation

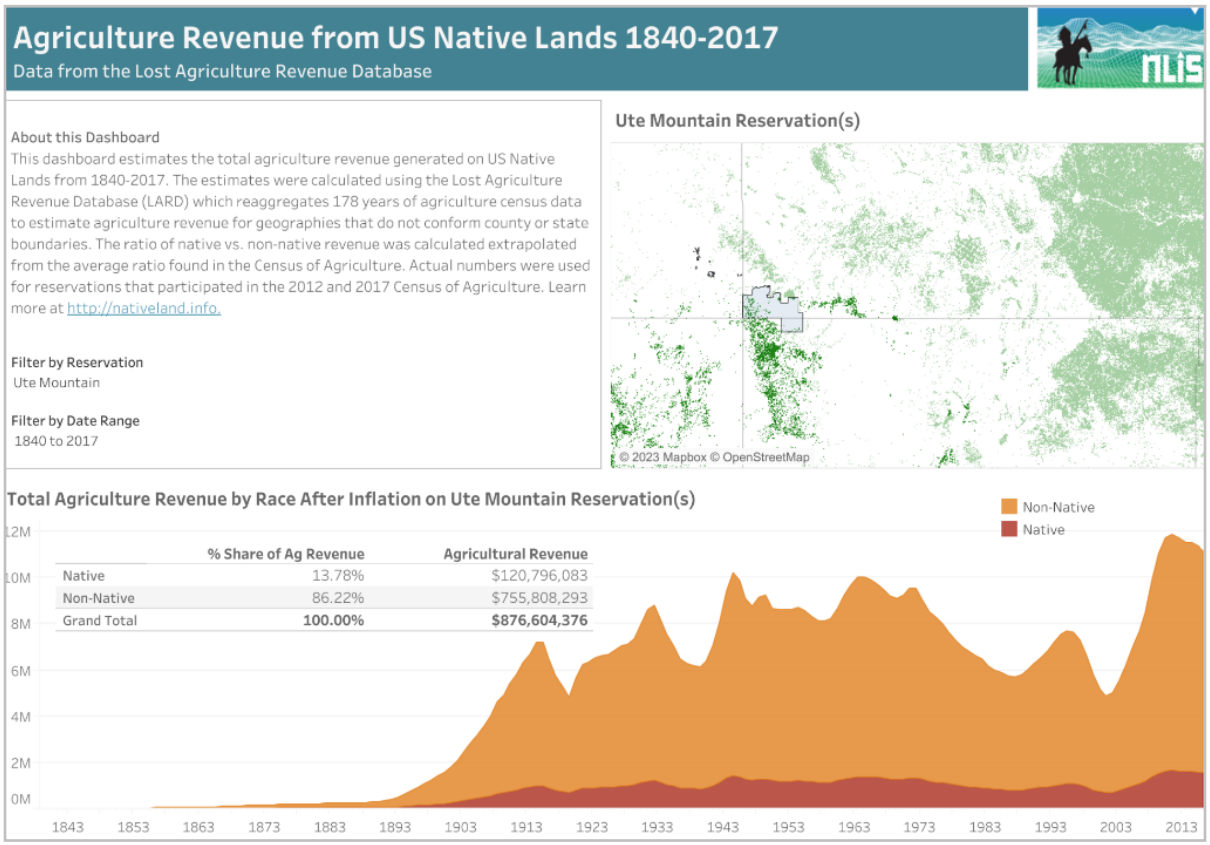


Figure 98. NLAP, *L.A.R.D. Calculations for Ute Mountain Reservation,* NLIS.

The L.A.R.D. estimates that Natives on the Ute Mountain reservation have only received 13.78% (or $120,796,083) of agricultural revenue since 1840.

This is compared to the $755,808,293 in agricultural revenue received by non-Natives on this reservation.

Lost Agriculture Revenue at the Reservation Level: Southern Ute & Ute Mountain

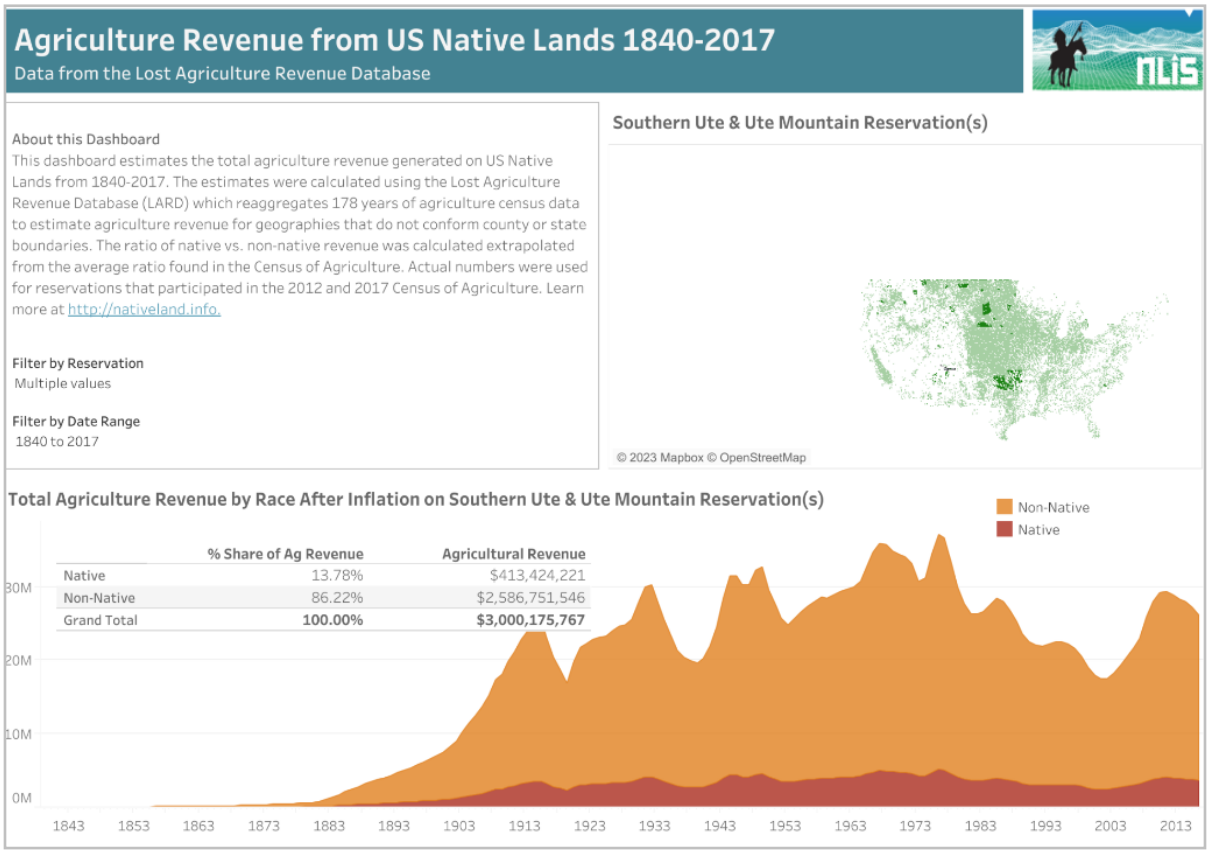


Figure 99. NLAP, *L.A.R.D. Calculations for Southern Ute and Ute Mountain Reservations,* NLIS.

The L.A.R.D. estimates that Natives on both Colorado reservations have only received 13.78% (or $413,424,221) of agricultural revenue since 1840.

This is compared to the $2,586,751,546 in agricultural revenue received by non-Natives on these reservations.

L.A.R.D. for Ceded Lands
Click Here

L.A.R.D. for Reservations
Click Here

Recommendations for Further Research

The L.A.R.D. does not use the new Royce Cession maps created by Dr. Joseph Robertson. It would be interesting to use these new maps to calculate agricultural revenue losses in Colorado's ceded lands (though it is worth noting that we don't anticipate wildly different totals being calculated with these new maps; therefore, the values we have provided above are still useful).

Another area that was outside the scope of our work but could be valuable to research is the impact of allotment on reservation lands and agriculture in Colorado. For a general overview of how allotment affected Native communities in the U.S., you can view our storymap: The Legacy of Allotment on Contemporary Native Agriculture.

The Extermination of Buffalo in Colorado

Figure 100. William T. Hornaday, *Map Illustrating the Extermination of the American Bison ,* 1889, Washington: Government Printing Office, retrieved from https://commons.wikimedia.org/wiki/File:William_T._Hornaday_Extermination_of_the_American_Bison_1889_Cornell_CUL_PJM_1102_01.jpg.

The buffalo slaughter, also known as the "great buffalo massacre," refers to the mass killing of North American buffalo between 1700 and 1890. These unjust killings profoundly devastated the health and livelihoods of the Native peoples of the Great Plains, violently disrupting relationships, Native ecologies, and Native economies.

This section estimates and visualizes losses from the extermination of the southern herd of buffalo using data and maps from *The Extermination of the American Bison* by William T. Hornaday and Frank Roe's *The North American Buffalo*. Although these historical sources help us comprehend the extent of buffalo loss for the region, the **precise** number of buffalo killed remains unknown. Also of note is that the Native communities impacted by this loss were not isolated to modern Colorado boundaries. Considering the significance of the buffalo to Native culture and food systems, we determined that the best approach for articulating the extent of losses would be to use the upper estimates of buffalo killed.

Although this section focuses on the economic impacts of buffalo loss, we must acknowledge that the loss of these precious nonhuman relatives, for Native peoples, is multi-faceted and deeply personal. Though it goes without saying, we want to recognize that measuring economic value, especially values imposed by settler commerce, falls short of communicating the total devastation of this extermination.

A Brief Background of the Significance of Buffalo for Tribes in the Region

Figure 101. Cheyenne & Arapahoe Tribal Tribune, *Buffalo in field*, 2021, retrieved from https://cheyennearapahotribaltribune.wordpress.com/2021/04/03/city-and-county-of-denver-donates-bison-to-tribal-nations/.

Tribes maintained long-lasting cultural, spiritual, and relational ties to buffalo—and these ties are still strengthening today. For thousands of years, buffalo served as the primary food source for Natives in the Great Plains region (and communities in the Northwest and Rocky Mountains). Buffalo fur and hides were used for blankets, clothing, and lodging, and the bones for tools and jewelry. Not a portion of the animal was wasted, not even the bladder which was used for creating water containers, the brain for tanning hides, and the hair for rope. Buffalo was also an integral part of tribes' spiritual and cultural practice.

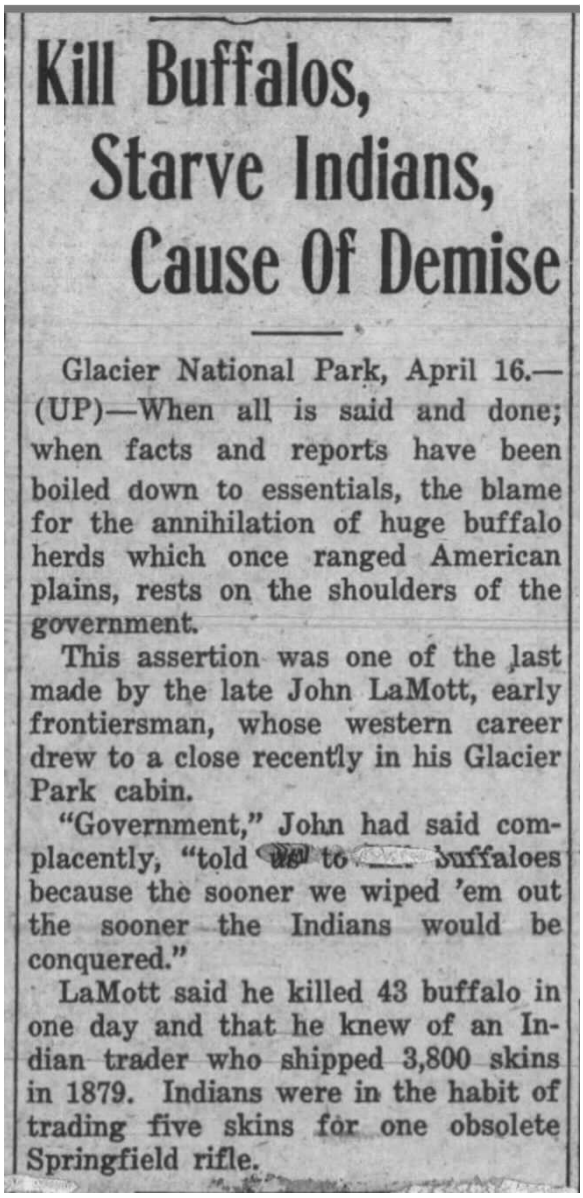
The buffalo was central to the livelihood of Native Nations in the region. Economists suggest that bison-reliant Native societies enjoyed living standards that were, in some cases, better than their European contemporaries.[85]

The Great Buffalo Massacre, 1700-1889

The mass killing of buffalo began in the early 1700s with the arrival of European explorers and settlers who saw the vast herds of buffalo as a valuable resource for food, clothing, and other goods. More than this, however, settlers saw the buffalo as the key to destroying Native livelihoods and solving "the Indian problem."

Killing the buffalo was instrumental in the colonization of the Native peoples of the Great Plains and greatly exemplified settlers' hatred of Native bodies, kinship systems, and ways of knowing.

By the mid-1800s, the rapid expansion of the American West and the growth of the



Kill Buffalos, Starve Indians, Cause Of Demise

Glacier National Park, April 16.—(UP)—When all is said and done; when facts and reports have been boiled down to essentials, the blame for the annihilation of huge buffalo herds which once ranged American plains, rests on the shoulders of the government.

This assertion was one of the last made by the late John LaMott, early frontiersman, whose western career drew to a close recently in his Glacier Park cabin.

"Government," John had said complacently, "told us to ... buffaloes because the sooner we wiped 'em out the sooner the Indians would be conquered."

LaMott said he killed 43 buffalo in one day and that he knew of an Indian trader who shipped 3,800 skins in 1879. Indians were in the habit of trading five skins for one obsolete Springfield rifle.

Figure 102. "Buffalo," *Laurel Outlook*, April 16, 1930. https://www.newspapers.com/article/laurel-outlook-buffalo/68807752/ (accessed January 29, 2021).

railroad industry made it easier than ever to kill large numbers of buffalo, satisfying the government's intentions to starve Native peoples off their lands and into dependency (or death). U.S. Major General William Tecumseh devised much of the strategy for the mass destruction of the buffalo and later mobilized his subordinate, General Philip Sheridan, to continue his efforts.

Buffalo hunters, many of whom were white settlers, would also kill buffalo by the thousands, often wasting their carcasses and leaving them to rot in the sun. The slaughter was so extensive that by the late 1800s, the buffalo population had been reduced from an estimated 30 to 60 million (in the 1500s) to just a few hundred. The southern plains of Colorado were home to one of the last and largest herds.

Buffalo Extermination Animation

This animation created by the Native Lands Advocacy Project projects the historical data from Hornaday's map (on page 112) onto **contemporary** U.S. county boundaries, visualizing what the extermination would have looked like over time.

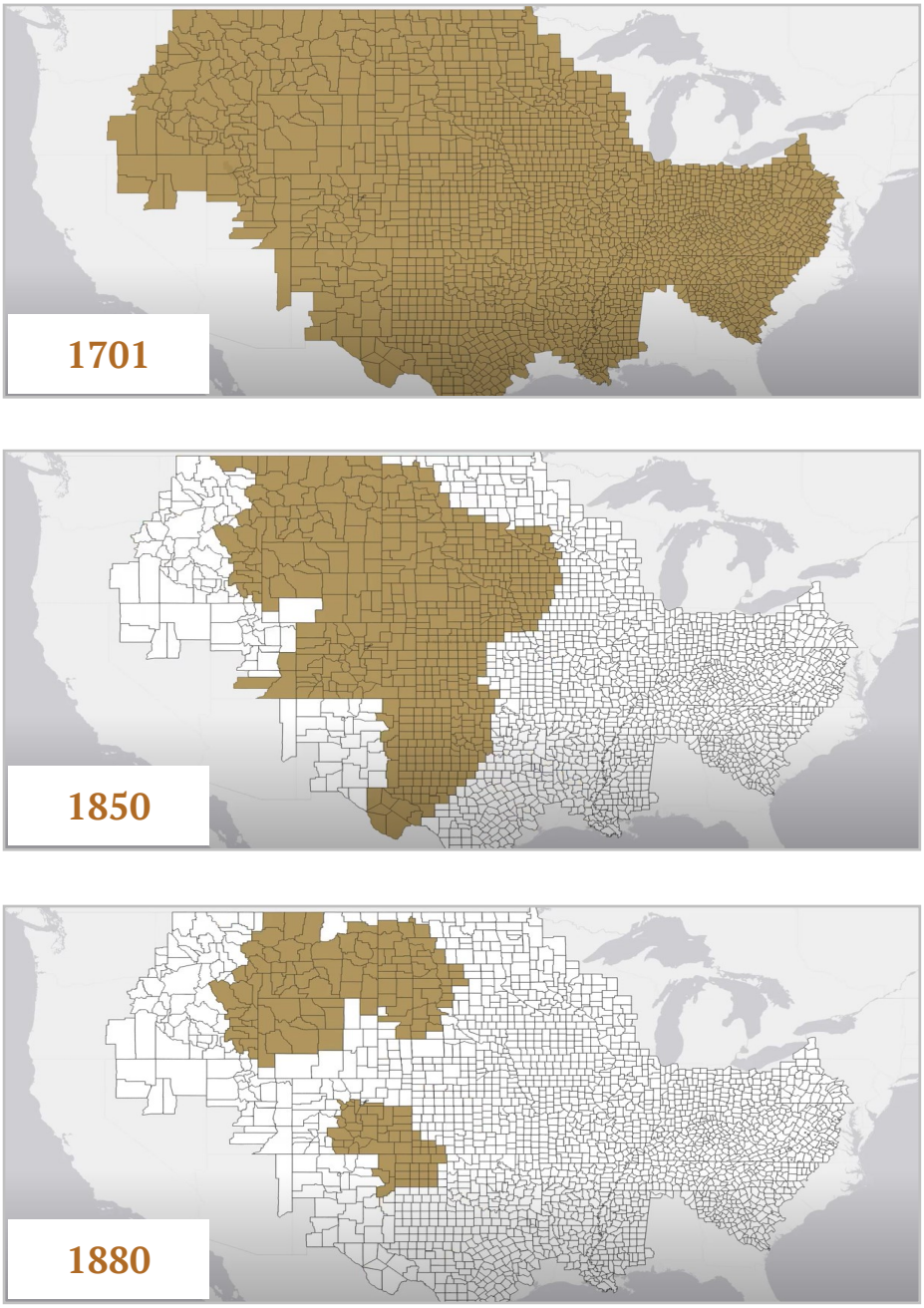


Figure 103. NLAP, Bison Extinction by County in the United States from 1700-1889, NLIS.

Watch the timelapse video:
Click Here

Loss of the Southern Herd in Colorado

Hornaday references buffalo loss in Colorado in *Extermination of the American Bison* (1889):

> **"Unquestionably a great many thousand buffaloes were killed annually by the settlers of Kansas, Nebraska, Texas, New Mexico, and Colorado, and the mountain Indians living west of the great range. The number so slain can only be guessed at, for there is absolutely no data on which to find an estimate. Judging merely from the number of people within reach of the range, it may safely be estimated that the total number of buffaloes slaughtered annually to satisfy the wants of this heterogeneous element could not have been less than fifty thousand and probably was a much higher number."**[86]

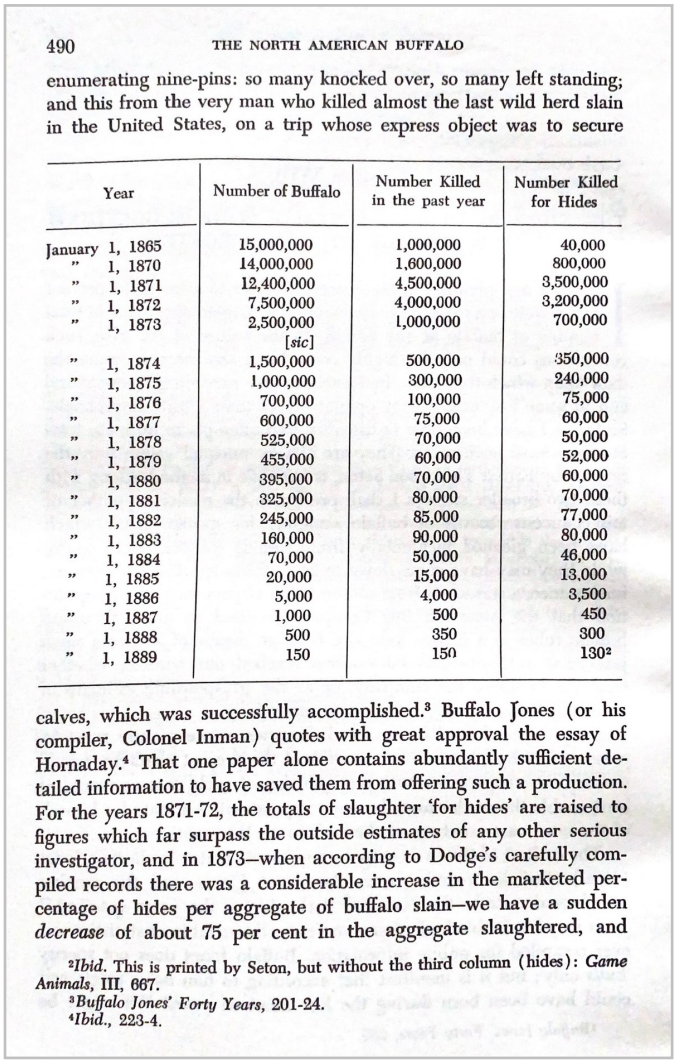
Hornaday also goes on to state that, for this estimate to sustain across three years, the total number of southern buffalo slaughtered would be nearly one hundred and fifty thousand, with the total as follows:[87]

- Killed by "professional" white hunters in 1872, 1873, and 1874: **3,158,730**
- Killed by Indians, during the same period: **390,000**
- Killed by settlers and mountain Indians: **150,000**
- **Total slaughter in three years: 3,698,730**

It has been estimated that, before 1870, nearly ¾ of 1 million buffaloes could have been killed per year. **However, exactly how many were killed and wasted is unknown, and these estimates are conservative**. Each animal had a value estimated by Hornaday at $5.00 during this time (the robe valued at $2.50; the tongue at $0.25; the hind quarter meat at $2.00; and bones and horn in hoofs at $0.25).[88] At this valuation, the total value of buffalos killed between 1872 and 1874 was at least **$18,493,650**.

Notably, a 2016 review of trapper accounts (from this period) by James A. Bailey corroborates Hornaday's estimates.[89]

Buffalo Extermination on the Great Plains from 1860 to 1889



490 THE NORTH AMERICAN BUFFALO

enumerating nine-pins: so many knocked over, so many left standing; and this from the very man who killed almost the last wild herd slain in the United States, on a trip whose express object was to secure

Year	Number of Buffalo	Number Killed in the past year	Number Killed for Hides
January 1, 1865	15,000,000	1,000,000	40,000
" 1, 1870	14,000,000	1,600,000	800,000
" 1, 1871	12,400,000	4,500,000	3,500,000
" 1, 1872	7,500,000	4,000,000	3,200,000
" 1, 1873	2,500,000 [*sic*]	1,000,000	700,000
" 1, 1874	1,500,000	500,000	350,000
" 1, 1875	1,000,000	300,000	240,000
" 1, 1876	700,000	100,000	75,000
" 1, 1877	600,000	75,000	60,000
" 1, 1878	525,000	70,000	50,000
" 1, 1879	455,000	60,000	52,000
" 1, 1880	395,000	70,000	60,000
" 1, 1881	325,000	80,000	70,000
" 1, 1882	245,000	85,000	77,000
" 1, 1883	160,000	90,000	80,000
" 1, 1884	70,000	50,000	46,000
" 1, 1885	20,000	15,000	13,000
" 1, 1886	5,000	4,000	3,500
" 1, 1887	1,000	500	450
" 1, 1888	500	350	300
" 1, 1889	150	150	130[2]

calves, which was successfully accomplished.[3] Buffalo Jones (or his compiler, Colonel Inman) quotes with great approval the essay of Hornaday.[4] That one paper alone contains abundantly sufficient detailed information to have saved them from offering such a production. For the years 1871-72, the totals of slaughter 'for hides' are raised to figures which far surpass the outside estimates of any other serious investigator, and in 1873—when according to Dodge's carefully compiled records there was a considerable increase in the marketed percentage of hides per aggregate of buffalo slain—we have a sudden *decrease* of about 75 per cent in the aggregate slaughtered, and

[2] *Ibid.* This is printed by Seton, but without the third column (hides): *Game Animals*, III, 667.
[3] *Buffalo Jones' Forty Years*, 201-24.
[4] *Ibid.*, 223-4.

Figure 104. Frank G. Roe, *The North American Buffalo*, University of Toronto Press, 1851.

According to estimates gathered from Frank Roe's *The North American Buffalo*, **approximately 1 million buffalo were killed every year from 1860 to 1870, totaling 10 million**. Assuming that half of these killings were by Natives, settlers would be responsible for about 5 million buffalos killed (need source here).

Additionally, we can gather from Roe's chart (Figure 104) that, from 1871 to 1889, there were approximately 11 million buffalo exterminated on the Great Plains. If we account for the 5 million buffalo killed by settlers between 1860-1870 and the 11 million killed from 1871 to 1889, the total buffalo killed during this time is an estimated **16 million**.

At a conservative value of $8.50 per animal, the total loss for the time frame would be approximately $136,000,000. Since this would have been considered a "treaty taking," we can assume that 5% compounded interest would be added from the time of "taking." (need source here)

Today, a head of buffalo is valued at $3000 (need source here). If we apply that value to the number of buffalo lost from 1860-1889 (16 million), the total value would amount to **$48,000,000,000**. However, this estimate does not account for the value of bones, which could add another $40,000,000 to the calculations.

According to LeRoy Barnett's "The Buffalo Bone Commerce on the Northern Plains,"[90] more than two million tons of bones were collected and sold to eastern factories during the course of what is known as the Buffalo Bone Commerce. The bones were sold for rendering into charcoal filters and manurial phosphate, accruing nearly $40,000,000 in commerce.

Other Economic-Related Losses

Economists from Emory University, the University of Toronto, and the University of Victoria quantified the immediate and long-term economic impacts of buffalo extermination on Native tribes in North America. Their findings, published by *The Review of Economic Studies,*[91] suggest that disparities identified in Native economies today can be traced back to buffalo extermination in the late 19th century.

According to this research,

> **"Centuries of human capital were built around the use of the bison, and within 10 to 20 years, this economic underpinning disappeared, and many channels of economic adjustment were cut off for Indigenous populations"**[92]

According to their findings, the income per capita for bison-reliant Native Nations was **25% lower** than nations who were not bison-reliant (comparing the two through the latter half of the 20th century to today).

Recommendations for Further Research

The numbers in this section were primarily sourced from Hornaday's The Extermination of American Bison, Frank Roe's The North American Buffalo, and LeRoy Barnett's "The Buffalo Bone Commerce on the Northern Great Plains." While these works represent a portion of the research conducted on buffalo extermination on the Great Plains, many other sources could be added for a more comprehensive review. A work that would be especially relevant to this analysis, but that we could not fully get to, is Russell Thornton's American Indian Holocaust and Survival (1990). Additionally, much more could be said about other impacts of this loss that fall outside of our scope of work.

Some recommendations for further research into how buffalo extermination impacted Native communities and ecologies in the region are:

- Calculating the historical and present-day value of buffalo bones for the years missing from Hornaday and Roe's analysis,
- Researching not only the immediate impacts of buffalo extermination, but also the persisting impacts of buffalo loss on Native communities in Colorado today; more findings can be pulled from the 2022 paper we mention on page 118 regarding the impact of buffalo loss on Native wellness,
- Examining the ecological effects of buffalo extermination and how it exacerbated the destruction of intact habitat, disrupted prairie ecosystems, and contributed to the loss of key species in the food web.

While there are many facets to how valuable the buffalo were (and are) to tribal communities that cannot be sufficiently realized in number (such as spiritual and relational value), the recommendations above would help provide a more holistic picture.

Other Significant Losses

This section articulates losses related to the destruction of intact habitat and the primary economic systems upheld through habitat connectivity. In including this section as a part of our analysis, we demonstrate how losses in this area truly extend beyond commodity systems and agriculture. Native tribes in Colorado had well established food and resource production systems that were heavily impacted by habitat loss and the imposition of settler agricultural systems.

Loss of Primary Economic System Through Destruction of Habitat

The Native communities in Colorado have subsisted on various resources over time, depending on their specific cultural and geographic contexts. Historically, many Native peoples in Colorado were hunter-gatherers and relied on hunting games such as bison, deer, elk, and antelope, as well as gathering plants and berries for food. Fishing was also an important source of food for some communities living near rivers and lakes.

Agriculture was also practiced by some Native communities in Colorado, including the Puebloans who built elaborate irrigation systems and terraced fields to grow crops such as corn, beans, and squash. Other communities, such as the Ute, practiced a more nomadic lifestyle and relied on gathering wild plants and hunting game for sustenance.

In addition to food, Native communities in Colorado also used the natural resources around them for clothing, shelter, and other materials. For example, they used animal hides and furs to make clothing and tents, and local plants to make baskets, pottery, and other items. They also used rocks and minerals to make tools and weapons.

Loss of Intact Habitat

While the influx of settlers and trappers in Colorado increased pressure on game animals in Colorado, the destruction of habitat through plowing the land for agriculture, deforestation for timber products, mining, and urbanization also had a destructive impact on the intact habitat required by various plant and animal communities.

Intact habitat (or habitat connectivity) refers to the preserved interconnection of landscapes, habitats, and open spaces. Preserving intact habitats promotes and safeguards the biodiversity of native species by ensuring that their natural spaces are unbroken and minimally disturbed by modern infrastructure.

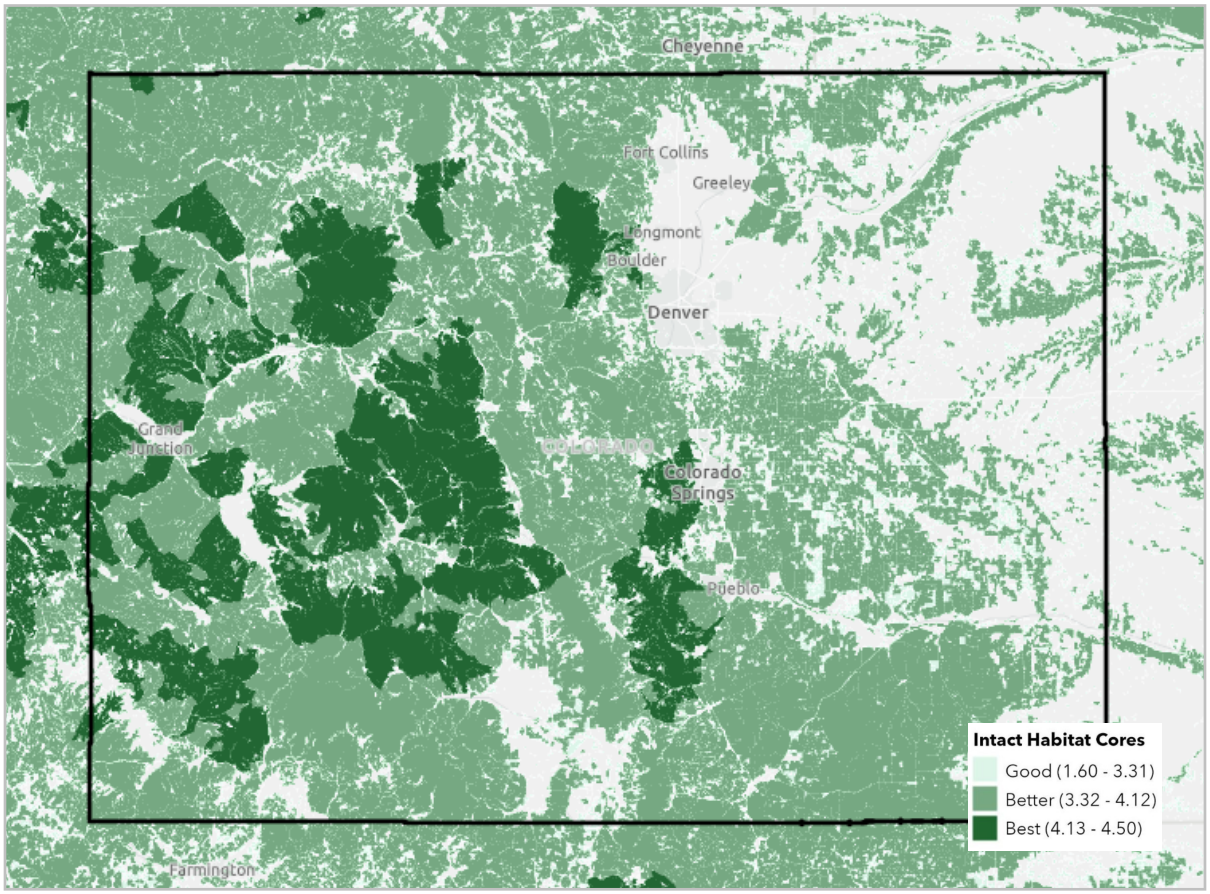


Figure 105. ESRI, *Intact Habitat Cores Map,* ESRI Green Infrastructure Initiative, https://www.esri.com/en-us/industries/green-infrastructure/overview.

We sourced this map from the from ESRI's Green Infrastructure Initiative which shows the intact habitat core layer for Colorado. The Intact Habitat Core Layer presents intact habitat data for the U.S., ranking intact habitat on a scale from 1 to 5. The map legend communicates that darker shades of green indicate better intact habitat cores.

Intact Habitat & Land Cover

These images of ESRI's intact habitat cores (Figure 107) and the USGS's national land cover database (Figure 108) allow users to observe the link between the plowing, deforestation, and mining of Native lands and the fragmentation of intact habitat. We have also provided the cession boundaries for these two maps.

Figure 106. NLAP, *Map Legends for Intact Habitat and Land Cover.*

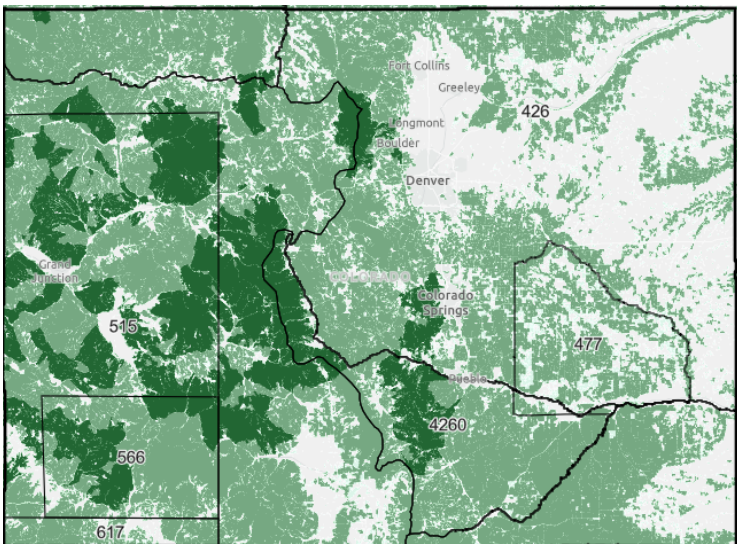


Figure 107. ESRI, *Intact Habitat Cores Map.*

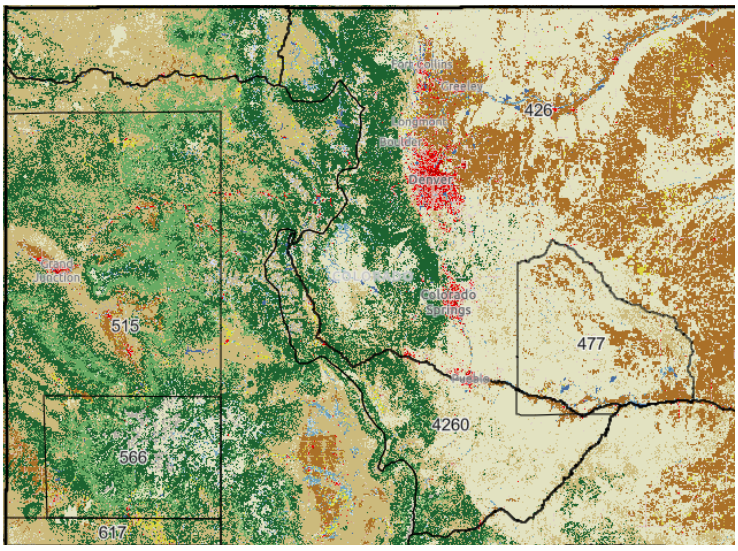
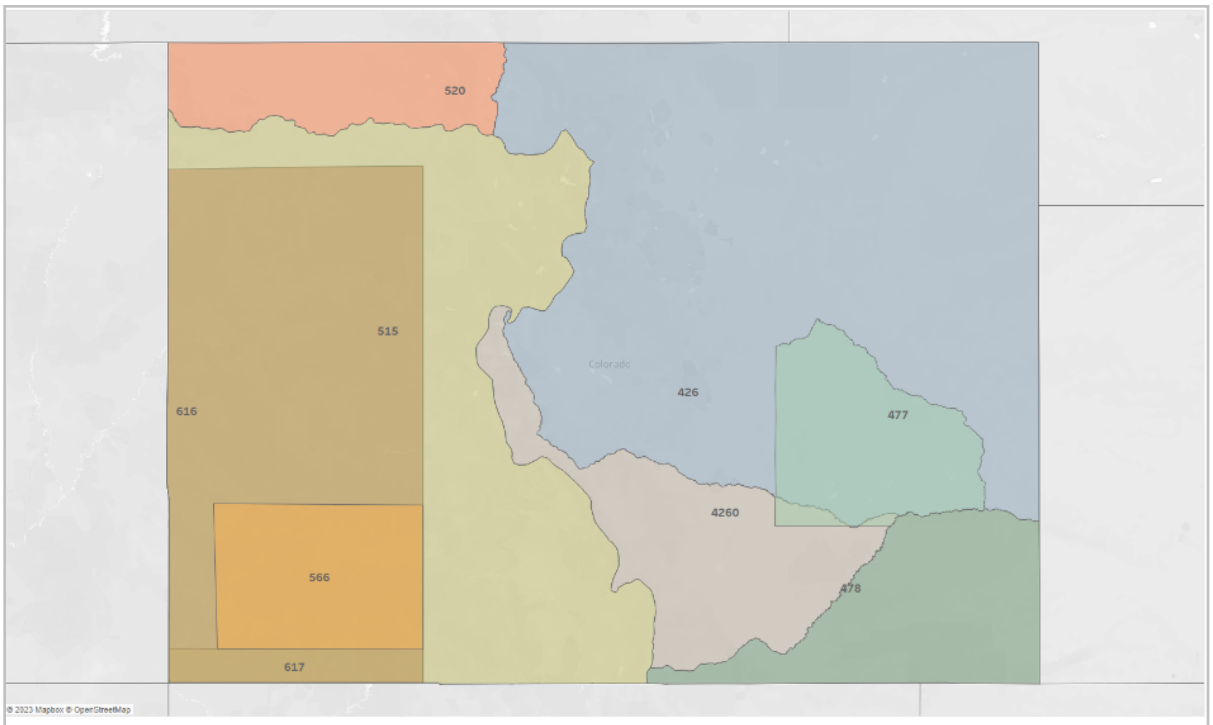


Figure 108. National Land Cover Database, *Map of National Land Cover*, National Land Cover Database

By comparing the two maps, we demonstrate how harvested croplands (the medium reddish-brown in the landcover) and developed land (pink to red) disrupt intact habitat in Colorado. This indicates that agricultural land use is currently a major barrier to preserving intact habitat. In fact, agriculture and urbanization are the biggest threats to intact habitat.

Fragmented Habitat by Land Cession



Acres of Destroyed or Fragmented Habitat by Land Cession

	Acres of Destroyed or Fragmented Habitat
426	10,937,000
4260	1,150,065
477	1,030,881
478	1,490,661
515	7,185,270
520	595,363
566	1,055,039
616	4,247,319
617	284,288

Figure 109. NLAP, *Destroyed or Fragmented Habitat by Land Cession*, Tableau.

This dashboard shows an overview of the amount of fragmented habitat in each land cession in Colorado. Fragmented habitats are areas where the native soils have been plowed and replaced with a monocrop or where urbanization and roads have destroyed the native ground cover.

The following pages will examine intact habitat destruction for each land cession. Though some of these ceded areas (such as Cession 478) now cross multiple states, the numbers here **only represent the portion of those ceded areas that are within Colorado**.

To view the interactive map sliders for the following assessment, contact People of the Sacred Land to access the **Historic Loss Assessment Storymap.**

Intact & Fragmented Habitat in Cession 426

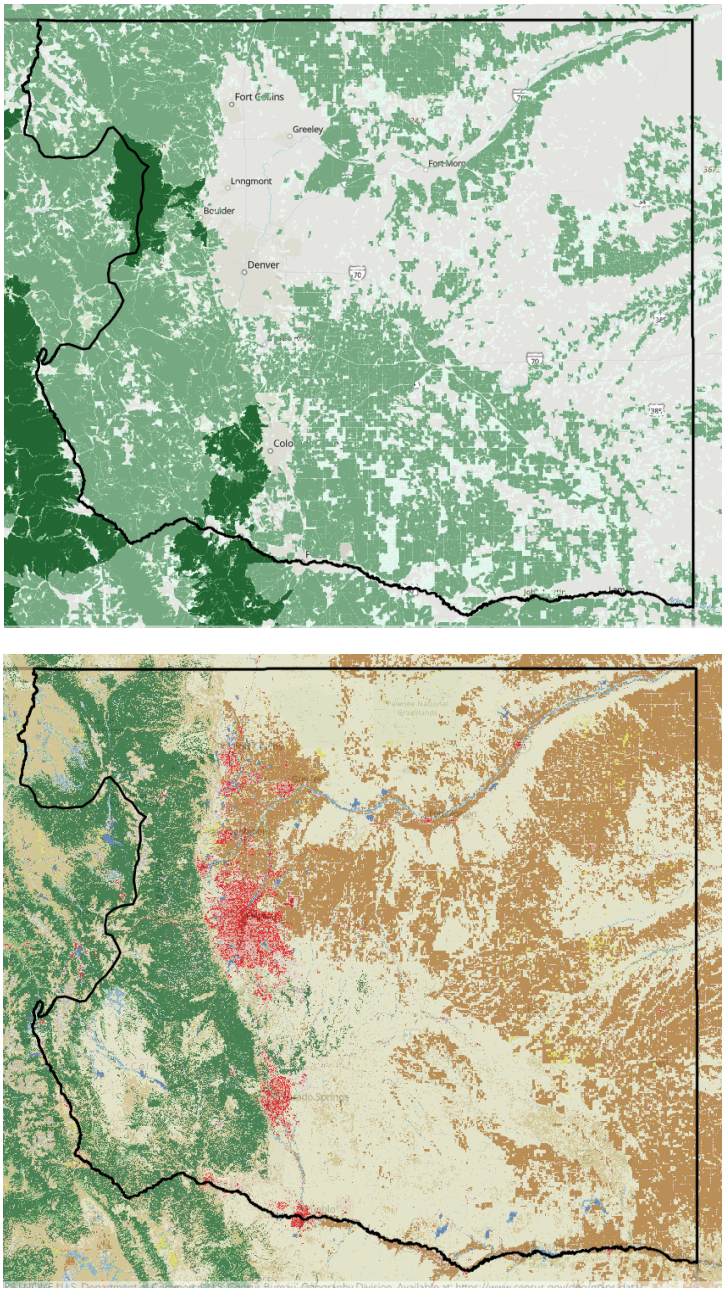


Figure 110. *Map of ESRI Intact Habitat and NLCD Land Cover for Cession 426,* ESRI and USGS.

In Cession 426, there are 10,937,000 acres of destroyed or fragmented habitat (41.5% of the 26,371,843 acres in this cession in Colorado).

The map on the top shows intact habitat from ESI, while the map on the bottom shows land cover from the National Land Cover Database.

Intact & Fragmented Habitat in Cession 4260

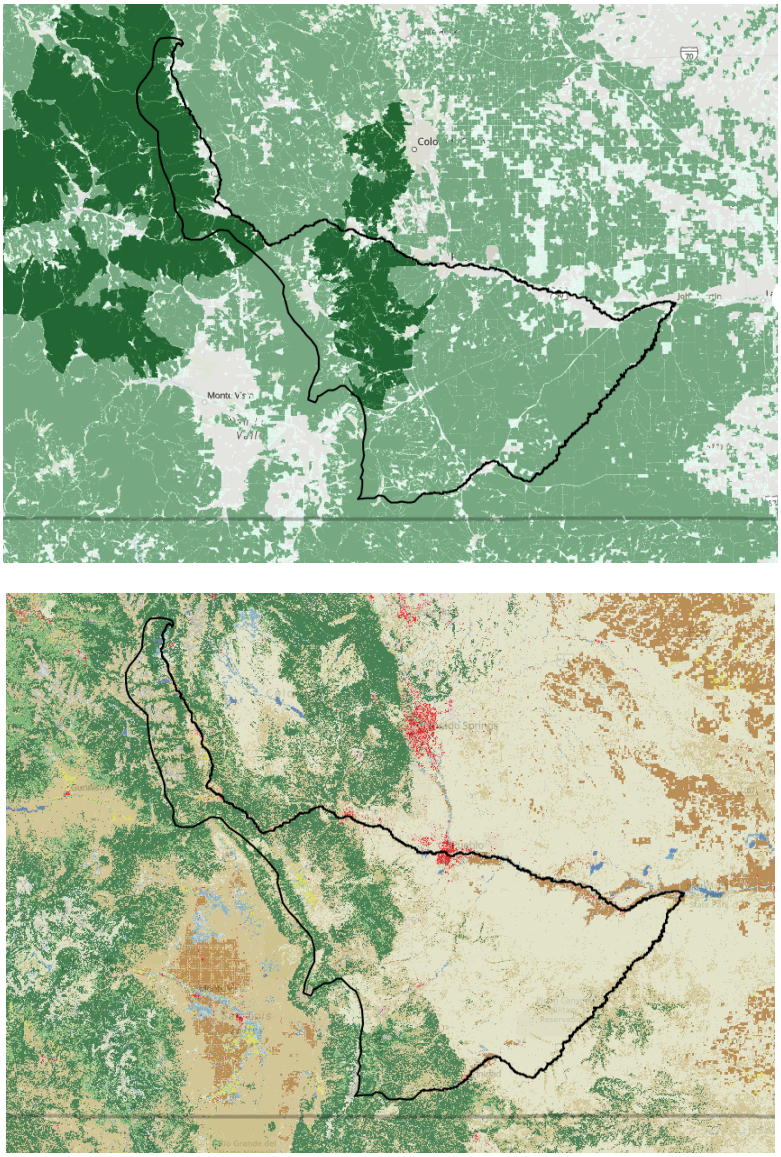


Figure 111. *Map of ESRI Intact Habitat and NLCD Land Cover for Cession 4260,* ESRI and USGS.

In Cession 4260, there are 1,150,065 acres of destroyed or fragmented habitat (21% of the 5,482,463 total acres in this cession).

Intact & Fragmented Habitat in Cession 477

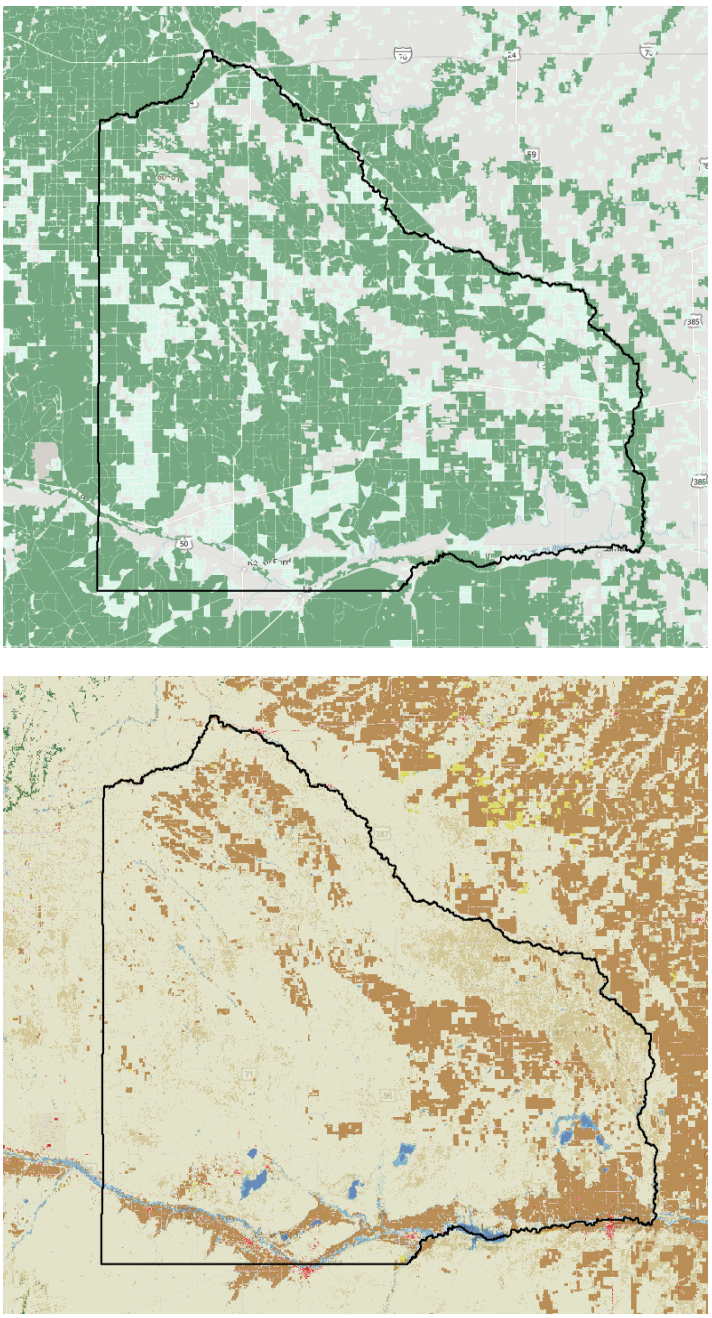


Figure 112. *Map of ESRI Intact Habitat and NLCD Land Cover for Cession 477*, ESRI and USGS.

In Cession 477, there are 1,030,881 acres of destroyed or fragmented habitat (27.5% of the 3,751,344 total acres in this cession).

Intact & Fragmented Habitat in Cession 478

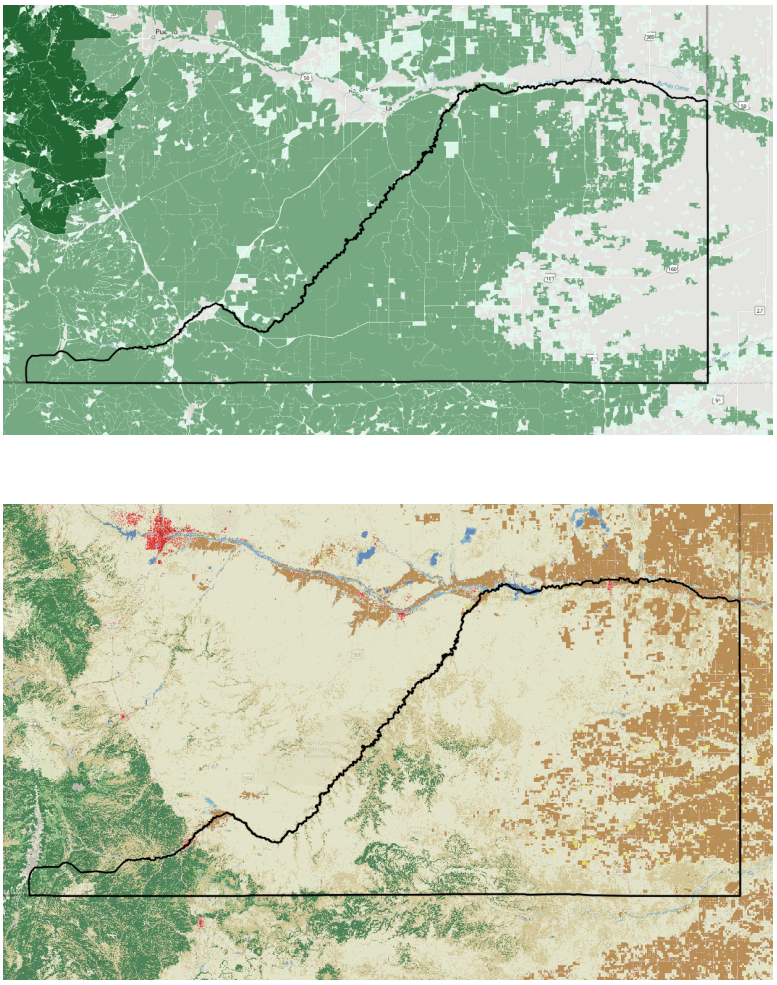


Figure 113. *Map of ESRI Intact Habitat and NLCD Land Cover for Cession 478,* ESRI and USGS.

In Cession 478, there are 1,490,661 acres of destroyed or fragmented habitat (31.5% of the 4,728,722 total acres in this cession).

Intact & Fragmented Habitat in Cession 515

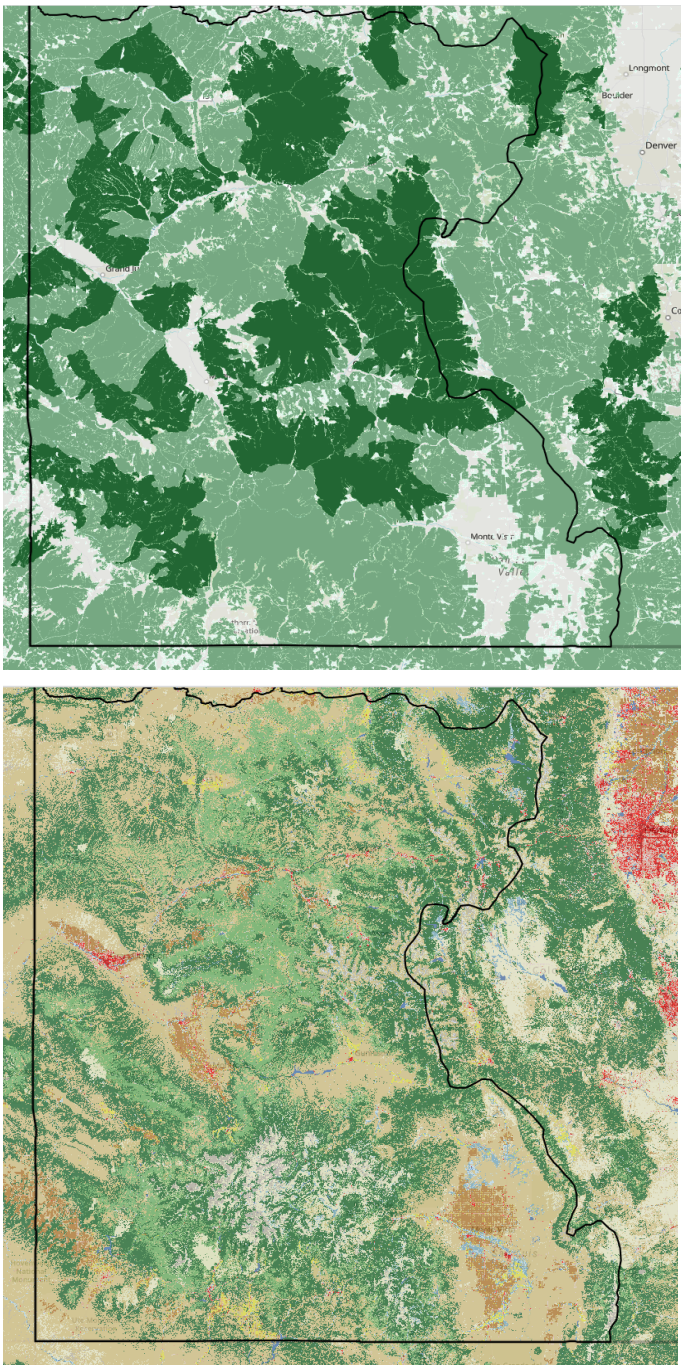


Figure 114. *Map of ESRI Intact Habitat and NLCD Land Cover for Cession 515,* ESRI and USGS.

In Cession 515, there are 7,185,270 acres of destroyed or fragmented habitat (27% of the 26,864,545 total acres in this cession).

Intact & Fragmented Habitat in Cession 520

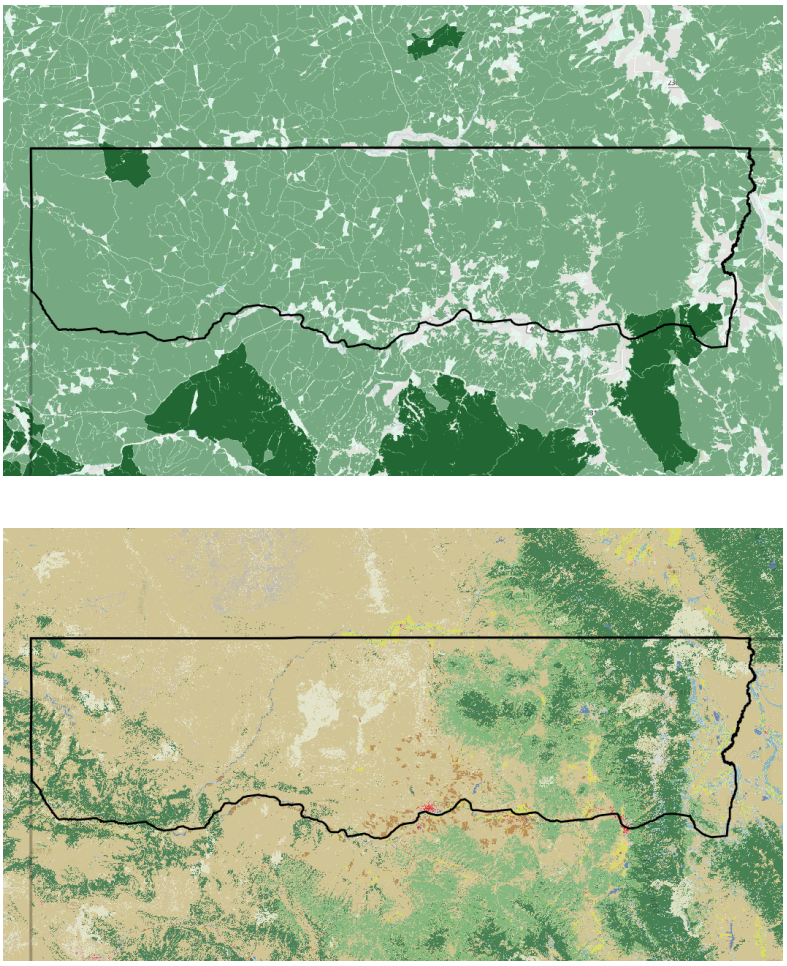


Figure 115. *Map of ESRI Intact Habitat and NLCD Land Cover for Cession 520,* ESRI and USGS.

In Cession 520, there are 595,363 acres of destroyed or fragmented habitat (19% of the 3,167,251 total acres in this cession).

Intact & Fragmented Habitat in Cession 566

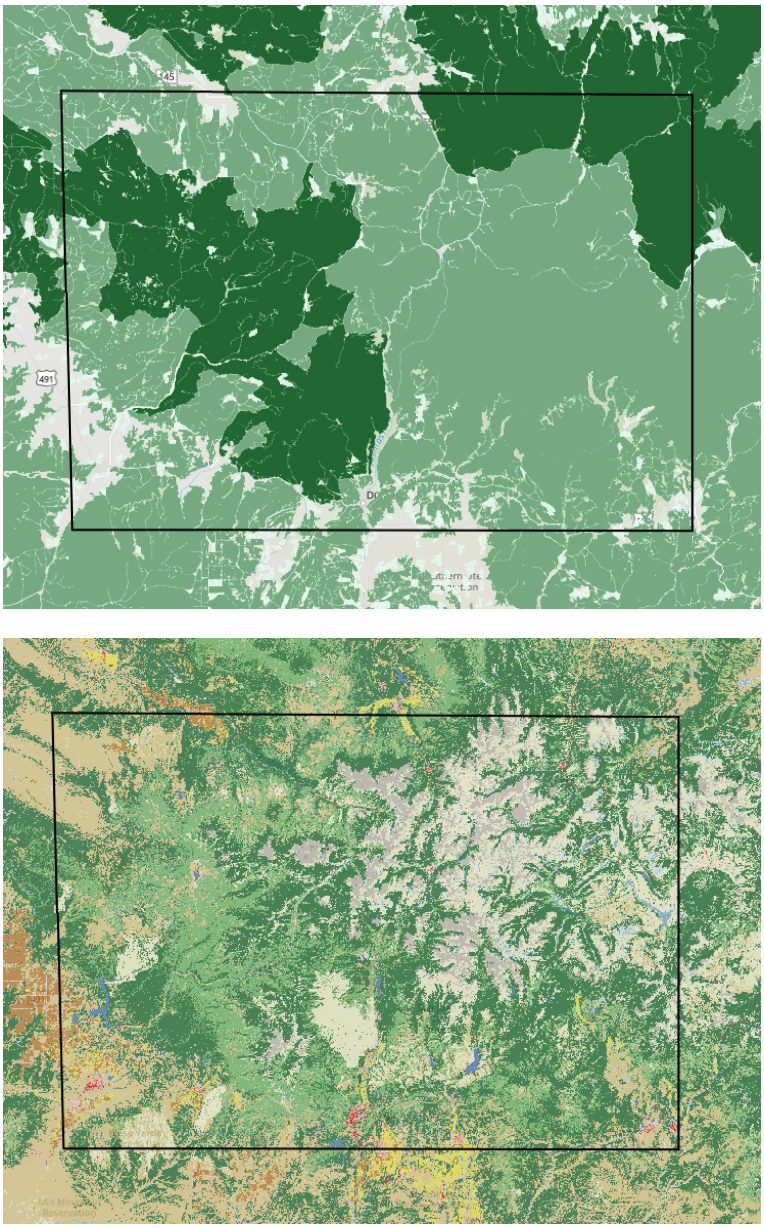


Figure 116. *Map of ESRI Intact Habitat and NLCD Land Cover for Cession 566,* ESRI and USGS.

In Cession 566, there are 1,055,039 acres of destroyed or fragmented habitat (28% of the 3,721,873 total acres in this cession).

Intact & Fragmented Habitat in Cession 616

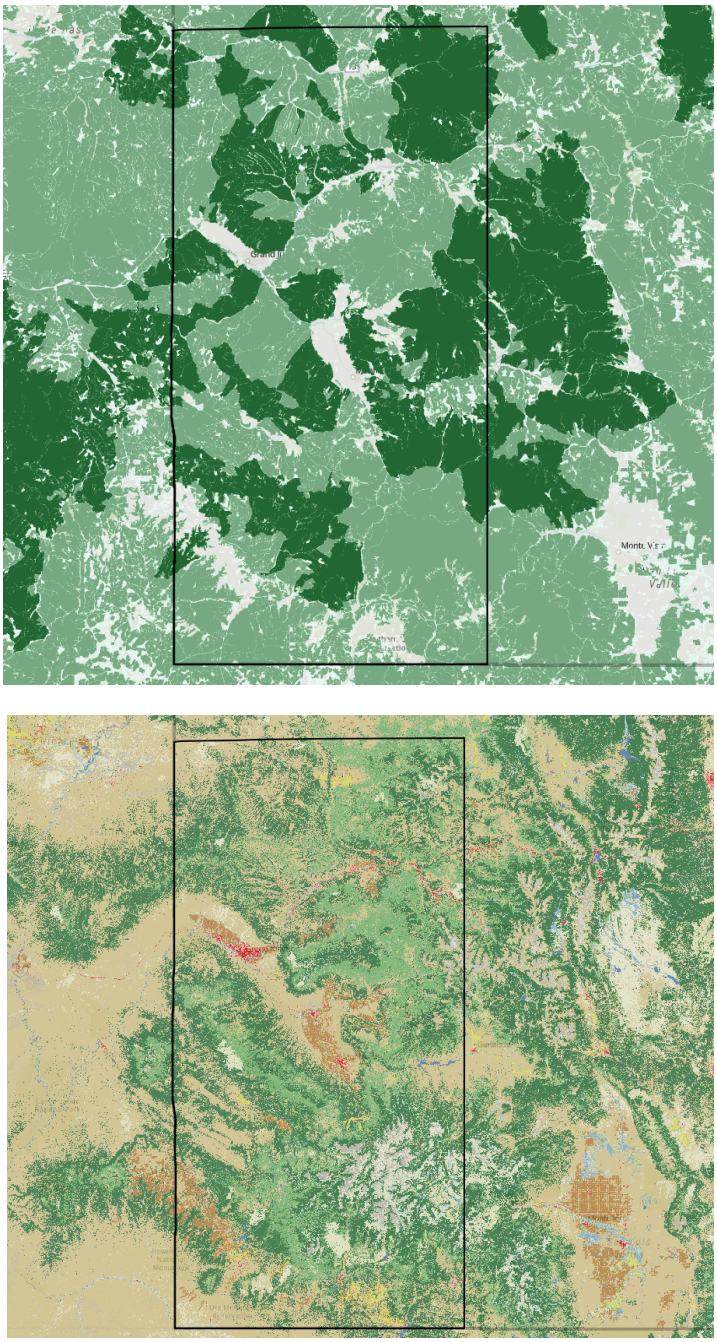


Figure 117. *Map of ESRI Intact Habitat and NLCD Land Cover for Cession 616,* ESRI and USGS.

In Cession 616, there are 4,247,315 acres of destroyed or fragmented habitat (27% of the 15,856,827 total acres in this cession).

Intact & Fragmented Habitat in Cession 617

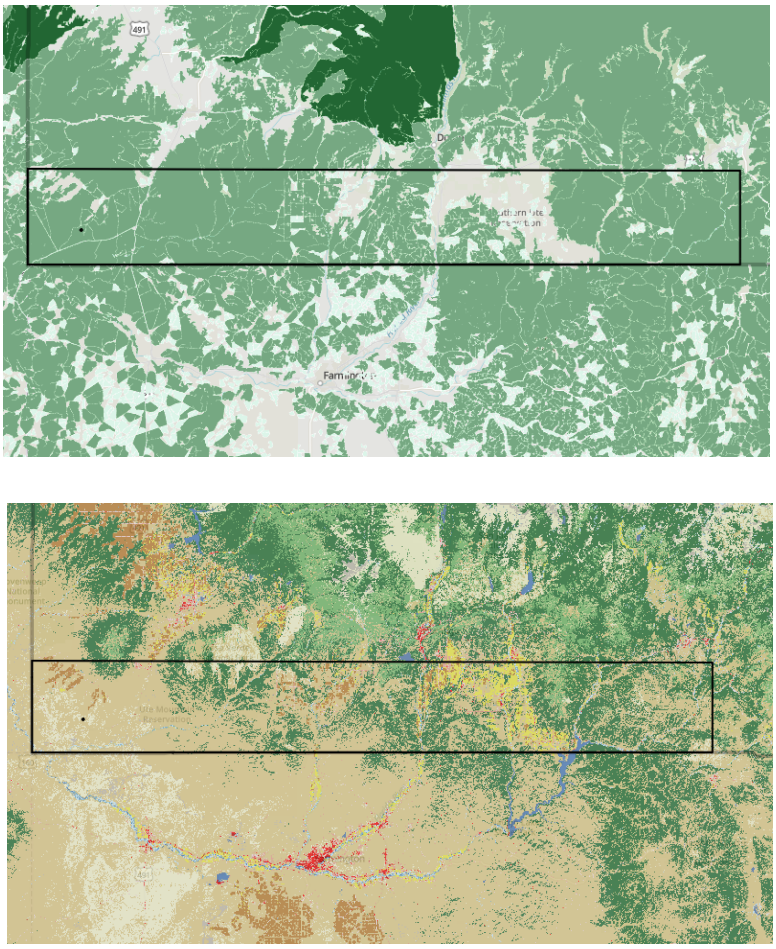


Figure 118. *Map of ESRI Intact Habitat and NLCD Land Cover for Cession 617,* ESRI and USGS.

In Cession 617, there are 284,288 acres of destroyed or fragmented habitat (26% of the 1,084,661 total acres in this cession).

Recommendations for Further Research

This section demonstrated how habitat fragmentation through settlement and settler agriculture led to losses in pre-established, habitat-reliant Native economies. While the maps show a noticeable correlation between habitat fragmentation and settler activity, more opportunities exist to show how Native communities disproportionately suffer from environmental degradation and the loss of biological diversity.

Some recommendations for further research on the impacts of habitat destruction for tribes in Colorado are:

- Conducting a thorough investigation into how habitat fragmentation led to the displacement or loss of culturally significant species and plants; estimations of species and plant losses could be calculated per area by using the data from ESRI's Green Infrastructure Initiative and data on species density
- Mapping the land cover utilizing notes from the GLO database and comparing this to present-day land cover.

SUMMARY TABLE

ACRES OF LAND TAKEN

See: Appendix A (page 151) and Land Cession Timeline (pages 13-19)

65,535,478 Acres

This total was calculated by subtracting the unceded acreage of Cession 617 from Colorado's total acreage. Please note that if you simply add each cession's acreage together, you will get a much higher total because of cession overlap.

LAND PATENTING

See: Appendix C (pages 153-156), Land Patenting (pages 23-39)

278,977 patents issued between 1776-2015, totaling 56,926,317 acres			
Top Three Patent Entry Classes in Colorado:	Homestead Entry Patents:	269,220 patents issued	21,835,708 acres total
	Sale-Cash Entry Patents:	192,813 patents issued	14,241,992 acres total
	Colorado Enabling Act:	21,106 patents issued	4,391,374 acres total

VALUE OF DISPOSSESSED LAND IN 2021

See: Methodology (pages 41-45)

2021 Colorado Assessed Value: **$134,125,968,258**

2021 Estimated Market Value: **$1,166,708,844,839**

VALUE OF DISPOSSESSED LAND AT TIME OF TAKING

See: Value at Time of Taking (pages 46-48)

Cession, Date	GIS Acres	Per Acre Assessed Value Applied to GIS Acres	Assessed Value at 5% Compound Interest
426, 02/18/1861	26,371,843	$109,076,907	$295,392,363,237
4260, 02/18/1861	5,482,463	$26,436,748	$71,593,646,545
477, 10/14/1865	3,751,432	$22,074,899	$49,182,203,055
478, 10/18/1865	4,728,722	$27,825,657	$61,994,717,604
515, 03/02/1868	26,864,545	$158,112,825	$369,884,088,256
520, 07/03/1868	3,167,251	$21,638,942	$50,621,448,909
566, 04/29/1874	3,721,873	$34,278,286	$49,229,413,446
616, 03/06/1880	15,857,639	$196,879,278	$210,993,839,645
TOTAL		**$596,323,542**	**$1,158,891,720,697**

Cession, Date	GIS Acres	Market Value	Market Value at 5% Compound interest
426, 02/18/1861	26,371,843	$1,254,384,429	$3,397,012,177,224
4260, 02/18/1861	5,482,463	$304,022,604	$823,326,935,269
477, 10/14/1865	3,751,432	$253,861,339	$565,595,335,129
478, 10/18/1865	4,728,722	$319,995,060	$712,939,252,442
515, 03/02/1868	26,864,545	$1,818,297,482	$4,253,667,014,950
520, 07/03/1868	3,167,251	$248,847,831	$582,146,662,457
566, 04/29/1874	3,721,873	$394,200,291	$566,138,254,627
616, 03/06/1880	15,857,639	$2,264,111,699	$2,426,429,155,916
TOTAL		**$6,857,720,735**	**$13,327,254,788,014**

LOSS OF LIFE

See: Data & Content Disclaimers (pages 50-51), IWCD Dashboard (page 52)

Loss of Life Between 1848-1887:	**Native Lives Lost:**	**710**
	Non-Native Lives Lost:	207

EXTRACTION OF MINERALS, OIL, AND GAS

See: Data Sources & Limitations (pages 78-80), Appendices G-K (pages 166-176)

Value of Minerals Extracted from Colorado, 1858-2022 (in 2018 dollars):	**Total Value:**	**$546,617,555,108**
	Nonfuel Minerals:	$149,090,345,252
	Fuel Minerals:	$397,527,209,857

ILLEGAL SETTLEMENTS

See: Disclaimer (page 90), Map of Settlements (page 91), & Recommendations for Future Research (pages 97-98)

Illegal Settlements Mapped by NLAP Per Cession *(Not Comprehensive)*:	**Cession 426**	37
	Cession 4260	4
	Cession 477	2
	Cession 478	2
	Cession 515	22
	Cession 520	1
	Cession 566	5
	Cession 616	10
	Cession 617	0

VALUE OF AGRICULTURAL LOSSES SINCE 1840

See: L.A.R.D. Explanation (page 99), L.A.R.D. For Ceded Lands (pages 100-107), L.A.R.D. for Reservations (pages 108-110)

For Ceded Lands:	Total:	$2,683,711,920,134	
For Both Reservations (Southern Ute and Ute Mountain Reservations):	Native Ag Revenue:	$413,424,221	13.78% of All Ag Revenue
	Non-Native Ag Revenue:	$2,586,751,546	86.22% of All Ag Revenue

EXTERMINATION OF BUFFALO

See: Data Sources & Calculations (pages 115-118)

Hornaday's Estimates for Southern Herd Buffalo Killed Between 1872-1874		
3,698,730 Buffalo Killed	Historic Value: $18,493,650	Value Adjusted for Inflation (2023 Value): $448,856,236

Roe's Estimates for Buffalo Killed Between 1860-1889		
16,000,000 Buffalo Killed	Historic Value: $136,000,000	Value With 5% Compound Interest: $237,411,453,046
	Present-Day Value: $48,000,000,000	Present-Day Value Accounting for Bones: $48,040,000,000

FRAGMENTED HABITAT

See: Intact Habitat Explanation (pages 121-123), Fragmented Habitat by Cession (124-132)

Fragmented Habitat Per Cession in Colorado:	**Cession 426**	10,937,000 acres	41.5% of cession land area
	Cession 4260	1,150,065 acres	21% of cession land area
	Cession 477	1,030,881 acres	27.5% of cession land area
	Cession 478	1,490,661 acres	31.5% of cession land area
	Cession 515	7,185,270 acres	27% of cession land area
	Cession 520	595,363 acres	19% of cession land area
	Cession 566	1,055,039 acres	28% of cession land area
	Cession 616	4,247,315 acres	27% of cession land area
	Cession 617	284,288 acres	26% of cession land area

Notes

[1] James Giago Davies, *History: Stealing Lakota Land,* Native Sun News Today, April 3, 2019, https://www.nativesunnews.today/articles/history-stealing-lakota-land/.

[2] History Colorado, "Colorado Hispanic / Latino Historical Overview," History Colorado., https://www.historycolorado.org/colorado-hispanic-latino-historical-overview.

[3] Department of Justice, "Congress Passes the First Indian Trade and Intercourse Act," Department of Justice., 2015, https://www.justice.gov/enrd/timeline-event/congress-passes-first-indian-trade-and-intercourse-act#:~:text=The%20Non%2DIntercourse%20Act%2C%20which,commissioner%20and%20ratified%20by%20Congress.

[4] Ralph Carr Learning Center, "The Rule of Law Through Colorado Legal History: Judicial Milestones," Colorado Supreme Court Library., n.d., https://cscl.colibraries.org/sites/default/files/The%20Rule%20of%20Law%20Through%20Colorado%20Legal%20History,%20Learning%20Center,%20Ralph%20C..._0.pdf.

[5] "Joint Resolution for the Admission of the State of Texas into the Union," https://tile.loc.gov/storage-services/service/ll/llsl//llsl-c29/llsl-c29.pdf.

[6] National Archives, "Kansas-Nebraska Act (1854)," n.d., https://www.archives.gov/milestone-documents/kansas-nebraska-act?_ga=2.150948211.436895053.1681844185-1443979201.1650307303.

[7] *Act of June 30, 1834*, Pub. L. No. 23-161, § 12, 4 Stat. 729, 730 (codified as amended at 25 U.S.C. § 177 (2006)).

[8] Michael D. Troyer, "Treaty of Fort Wise," Colorado Encyclopedia, https://coloradoencyclopedia.org/article/treaty-fort-wise.

[9] Michael D. Troyer, "Treaty of Fort Wise."

[10] Encyclopedia Staff, "Ute Treaty of 1868," Colorado Encyclopedia, https://coloradoencyclopedia.org/article/ute-treaty-1868#:~:text=The%20first%20treaty%2C%20signed%20in,Park%20for%20the%20United%20States.

[11] Encyclopedia Staff, "Little Arkansas Treaty," Colorado Encyclopedia,

Notes

https://coloradoencyclopedia.org/article/little-arkansas-treaty.

[12] Encyclopedia Staff, "Little Arkansas Treaty."

[13] Encyclopedia Staff, "Little Arkansas Treaty."

[14] Encyclopedia Staff, "Little Arkansas Treaty."

[15] Encyclopedia Staff, "Little Arkansas Treaty."

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Appendices

Appendix A

Chart of Total Acreage Values for All Land Cessions within Colorado State Boundaries

Royce #	Tribe	Date	GIS Acres
426	Arapaho and Cheyenne of Upper Arkansas	02/18/1861	26,371,843
426O	Arapaho and Cheyenne of Upper Arkansas	02/18/1861	5,482,463
477	Cheyenne and Arapaho	10/14/1865	3,751,432
478	Comanche and Kiowa	10/18/1865	4,728,722
515	Uta (Tabeguache, Capote, Weeminuchi,Yampa,Grand River, and Uintah Bands	03/02/1868	26,864,545
520	Shoshoni and Bannock (Eastern Bands)	07/03/1868	3,167,251
566	Uta	04/29/1874	3,721,873
616	Uta	03/06/1880	15,857,839
617	Uta	03/06/1880	1,084,682

Data Source: Joseph Robertson Ph.D., Cession Boundaries Remastered for PSL, Mato Ohitika Analytics LLC.

Appendix B

Table Tribes, Lands, and Beneficiaries Impacted by Morrill Act

Morrill Act Lands Table of Tribes, Lands, and Beneficiaries.xlsx

Tribal Nation	University	US Acquired Mode	Acres
Arapaho of Upper Arkansas; Cheyenne of Upper Arkansas	Alcorn State University/Mississippi State University	Ceded by treaty, February 18, 1861	28,649
	Auburn University	Ceded by treaty, February 18, 1861	31,174
	Clemson University/South Carolina State University	Ceded by treaty, February 18, 1861	20,901
	Colorado State University	Ceded by treaty, February 18, 1861	20,825
	Cornell University	Ceded by treaty, February 18, 1861	17,625
	Louisiana State University	Ceded by treaty, February 18, 1861	5,913
	North Carolina State University	Ceded by treaty, February 18, 1861	9,635
	Ohio State University	Ceded by treaty, February 18, 1861	801
	Pennsylvania State University	Ceded by treaty, February 18, 1861	1,599
	Purdue University	Ceded by treaty, February 18, 1861	160
	Texas A&M University	Ceded by treaty, February 18, 1861	12,471
	unidentified	Ceded by treaty, February 18, 1861	160
	University of Arkansas	Ceded by treaty, February 18, 1861	20,956
	University of Delaware	Ceded by treaty, February 18, 1861	4,089
	University of Florida	Ceded by treaty, February 18, 1861	11,653
	University of Georgia	Ceded by treaty, February 18, 1861	6,382
	University of Illinois	Ceded by treaty, February 18, 1861	6,610
	University of Kentucky/Kentucky State University	Ceded by treaty, February 18, 1861	319
	University of Maine	Ceded by treaty, February 18, 1861	2,245
	University of Massachusetts/Massachusetts Institute of Tech	Ceded by treaty, February 18, 1861	640
	University of Rhode Island	Ceded by treaty, February 18, 1861	160
	University of Tennessee	Ceded by treaty, February 18, 1861	12,553
	University of Vermont	Ceded by treaty, February 18, 1861	960
	Virginia Polytechnic Institute/Virginia State University	Ceded by treaty, February 18, 1861	20,659
Arapaho; Cheyenne	Alcorn State University/Mississippi State University	Ceded by treaty, October 14, 1865	160
	Colorado State University	Ceded by treaty, October 14, 1865	44,406
	University of Arkansas	Ceded by treaty, October 14, 1865	1,012
	University of Florida	Ceded by treaty, October 14, 1865	4,566
	University of Georgia	Ceded by treaty, October 14, 1865	160
	Virginia Polytechnic Institute/Virginia State University	Ceded by treaty, October 14, 1865	480
Comanche; Kiowa	Colorado State University	Ceded by treaty, October 18, 1865	879
	University of Arkansas	Ceded by treaty, October 18, 1865	1,120
	University of Florida	Ceded by treaty, October 18, 1865	7,979
	Virginia Polytechnic Institute/Virginia State University	Ceded by treaty, October 18, 1865	1,503
Uta	Colorado State University	Ceded by agreement (former reservat	15,914
		Ceded by agreement (former reservat	3,138
Uta (Tabeguache, Muache, Capote, Weeminuchi, Yampa, Grand River, and Uintah bands)	Alcorn State University/Mississippi State University	Ceded by treaty, March 2, 1868	1,595
	Auburn University	Ceded by treaty, March 2, 1868	160
	Colorado State University	Ceded by treaty, March 2, 1868	3,839
	Ohio State University	Ceded by treaty, March 2, 1868	320
	Pennsylvania State University	Ceded by treaty, March 2, 1868	160
	Texas A&M University	Ceded by treaty, March 2, 1868	1,759
	University of Arkansas	Ceded by treaty, March 2, 1868	960
	University of Florida	Ceded by treaty, March 2, 1868	1,440
	University of Georgia	Ceded by treaty, March 2, 1868	482
	University of Illinois	Ceded by treaty, March 2, 1868	160
	Virginia Polytechnic Institute/Virginia State University	Ceded by treaty, March 2, 1868	1,920
Grand Total			**331,253**

Appendix C

All Land Patents in Colorado Spreadsheet (Page 1 of 4)

Entry Class	Count of accession nr (CO County)	Total Acres	% of Total Total Acres along Entry Class	Distinct count of Entry Class
Homestead EntryOriginal	269,220	21,835,708	0.3835784423	1
Sale-Cash Entry	192,813	14,241,992	0.2501829163	1
Colorado Enabling Act	21,106	4,391,374	0.07714136855	1
Homestead Entry-Stock Raising	57,227	4,187,932	0.07356759089	1
Grant-RR Union and Central	17,403	3,818,105	0.06707099987	1
Private Land Claim	3,469	1,380,556	0.0242516304	1
Timber Culture	10,691	1,126,396	0.01978691156	1
Desert Land Act	11,438	821,233	0.01442624507	1
Acquired-Bankhead Jones	6,817	678,082	0.01191157334	1
Exchange-FS General Ex Act	9,318	602,655	0.01058657984	1
Mineral Patent-Placer	9,382	506,084	0.008890158835	1
Scrip or Nature of Scrip	6,199	501,792	0.008814763126	1
State Grant-Agri College	2,947	299,956	0.005269197373	1
Exchange-State Taylor Act	2,317	276,662	0.004860001746	1
ScripWarrant Act of 1855	3,098	222,658	0.003911336825	1
Sale-Coal Land	3,115	206,779	0.003632397297	1
Mineral Patent-Lode	45,015	204,522	0.003592749554	1
Acquired-Military Purposes	1,027	160,405	0.002817765288	1
Sale-Title 32 Chapter 7	2,991	152,388	0.002676934115	1
Exchange-FS Sec. 206 Flpma	3,138	146,169	0.00256768763	1
Acquired-Ffmc (mineral Int	1,174	123,244	0.002164974066	1
Supplemental Non-Coal Patent	1,467	104,186	0.00183019042	1
Exchange-Natl Forest (lieu)	1,616	86,206	0.001514343533	1
Exchange-Private-Taylor Act	1,302	78,398	0.001377183772	1
Indian Allotment - General	1,203	74,554	0.001309657886	1
Grant-Certain Land to State	382	62,933	0.001105516803	1
Sale-Public Lands-Colorado	571	57,412	0.001008531783	1
Homestead-Reclamation	1,294	55,142	0.0009686556747	1
Indemnity Selections	990	49,957	0.0008775730213	1
Exchange-FS Bankhead Jones	468	44,710	0.0007854012407	1
Carey Act-Irrigation	293	37,706	0.0006623650007	1

Sale-Rec and Public Purposes	669	27,186	0.0004775647088	1
Quit Claim Deed by GSA	86	24,550	0.0004312592364	1
Acquired-Bureau Sport F & W	334	24,174	0.0004246542069	1
Acquired-Bureau of Reclamatio	780	21,166	0.0003718139714	1
Sale-Bureau of Recl-public	605	21,114	0.0003709005099	1
Exchange-Alaska (other)	289	16,671	0.0002928522497	1
Acquired-Corps Of Engineers	301	16,590	0.0002914293577	1
Exchange-State Sec. 206 Flpma	336	15,599	0.0002740208891	1
Sale-Trustee Townsite	209	14,984	0.00026321745	1
Quitclaim Deed to US -Agency	268	14,144	0.0002484615332	1
No Authority Available	906	12,049	0.0002116595739	1
Sale-Public Lands-RS 2455	279	12,027	0.0002112731094	1
Acquired-FS Miscellaneous	289	12,024	0.0002112204097	1
Sale-Public Lands-FLPMA	875	10,565	0.0001855907875	1
Quitclaim Deed	176	10,078	0.000177035869	1
Indian Fee Patent	133	9,883	0.0001736103883	1
ScripWarrant Act of 1850	150	9,411	0.0001653189684	1
Grant-State Specific Laws	63	9,372	0.0001646338722	1
ScripWarrant Act of 1847	98	8,787	0.0001543574301	1
Conveyance Doc Correction	162	8,261	0.0001451174156	1
Acquired-Unknown	115	7,662	0.0001345950415	1
Indian Trust Patent	108	7,552	0.0001326627191	1
Acquired-FS USDA Organic Act	185	6,746	0.0001185040655	1
Placer Patent-Minerals Only	93	5,867	0.0001030630525	1
Acquired-Ffmc	83	5,711	0.000100322668	1
Quitclaim Deed Pvt Laws	62	4,759	0.00008359929556	1
Millsite Patent	1,595	4,626	0.00008126294206	1
Exchange-Private Misc	82	4,037	0.0000709162337	1
Acquired Natl Parks Mon & Mem	108	3,648	0.00006408283887	1
Sale-Sec 203 and 209 Flpma	241	3,607	0.0000633626096	1
Quitclaim Deed to US	35	2,992	0.00005255917048	1

Appendix C

All Land Patents in Colorado Spreadsheet (Page 2 of 4)

Acquired-DOE (AEC and ERDA)	42	2,578	0.00004528661146	1
Donation of Lands to US	37	1,474	0.00002589312075	1
Acquired-USDA	12	1,440	0.00002529585745	1
Forest Lieu Selection-Non	30	1,436	0.00002522559118	1
Indian Allotment-Wyandotte	28	1,427	0.00002506749207	1
Exchange-Specific Public Laws	35	1,388	0.00002438239593	1
Indian Fee Patent-Misc.	21	1,359	0.00002387296547	1
Sale-Pls Unintentional	130	1,305	0.00002292437081	1
Sale-Sec 209 Minerals-FLPMA	22	1,301	0.00002285410454	1
Exchange-State Special Acts	26	1,280	0.00002248520662	1
Sale-Townsite Settlement	194	1,271	0.00002232710751	1
Sale-Small Tract	718	1,261	0.00002215144184	1
Airport Conveyance	28	1,145	0.00002011371999	1
Indian Reissue Trust	13	1,119	0.00001965698923	1
R and Pp Reconveyed	17	1,022	0.00001795303216	1
Exchange-FS Weeks Law	24	902	0.00001584504404	1
Exchange-FS Special Act	20	882	0.00001549371269	1
Sale-Cemetery and Park to Cit	29	874	0.00001535318015	1
Credit - Harrison Land Act	11	786	0.00001380732219	1
Scrip-Certain Homestead E in	14	731	0.00001284116097	1
Cot-Class 1 and 2	28	715	0.00001256009589	1
Exchange-National Park Servic	13	641	0.00001126016988	1
Exchange-National Monuments-n	4	640	0.00001124260331	1
Grant-RR Lieu Selection	1	640	0.00001124260331	1
Occp-Reconveyance to US	6	640	0.00001124260331	1
Acquired-FLPMA	11	504	0.000008853550108	1
Acquired-FS Weeks Law Amend	13	449	0.000007887388886	1
Acquired-FS Clarke-mcnary Act	4	400	0.00000702662707	1
Homestead Entry-Forest	27	399	0.000007009060502	1
Sale-Cemetery Lands	18	396	0.000006956360799	1
Sale-Unintentional Trespass	31	390	0.000006850961393	1

Appendix C

All Land Patents in Colorado Spreadsheet (Page 3 of 4)

Sale-Public Lands-New Mexico	6	332	0.000005832100468	1
Acquired-Taylor Grazing Act	3	320	0.000005621301656	1
ScripWarrant Act of 1812	3	320	0.000005621301656	1
Acquired-FS Weeks Law	19	292	0.000005129437761	1
Acquired-Submarginal Lands	6	282	0.000004953772084	1
Exchange-Natl Wildlife Refuge	7	272	0.000004778106407	1
Exchange-Reclamation	21	263	0.000004620007298	1
Sale-Public Land Sale Act	8	244	0.000004286242512	1
Quitclaim Deed-Public Laws	4	202	0.00000354844667	1
Sale-Presidential Townsite	5	165	0.000002898483666	1
Homestead Entry-Adjoining	10	162	0.000002845783963	1
Grant-RR-Railroad	3	160	0.000002810650828	1
Indemnity List Base-Valid Lie	1	160	0.000002810650828	1
Exchange-Natl Park Sys-Spec	6	120	0.000002107988121	1
Quiet Title to US	3	119	0.000002090421553	1
Rec & Public Purpose Class	11	83	0.000001458025117	1
Acquired Easement	3	81	0.000001422891982	1
Other Title Conveyance	2	50	0.0000008783283837	1
Sale-Public Lands California	1	40	0.000000702662707	1
Airport Reconveyance	1	39	0.0000006850961393	1
Sale-NF Townsites-FLPMA	3	39	0.0000006850961393	1
Sale-FS Small Tract Act	24	23	0.0000004040310565	1
Mining Claim Occupation Act	6	11	0.0000001932322444	1
Acquired-Fish & Wildlife	1	3	0.00000005269970302	1
Exchange-FS Small Tract Act	2	2	0.00000003513313535	1
Grand Total	700,972	56,926,317	1	118

Appendix C

All Land Patents in Colorado Spreadsheet (Page 4 of 4)

Appendix D

Table and Discussion of Statistical "Backcast" Methodology (Page 1 of 7)

Table of Statistical Backcast (1882-1850)

oid	new_ date	FIT	LOWER	UPPER
1	1850	$22,113,598.73	$9,722,985.35	$50,294,352.12
2	1851	$23,242,173.99	$10,222,817.21	$52,842,444.59
3	1852	$24,428,346.48	$10,748,308.19	$55,519,817.75
4	1853	$25,675,055.70	$11,300,773.64	$58,333,040.42
5	1854	$26,985,391.16	$11,881,596.20	$61,289,015.73
6	1855	$28,362,600.06	$12,492,229.31	$64,394,998.06
7	1856	$29,810,095.28	$13,134,200.77	$67,658,611.03
8	1857	$31,331,463.94	$13,809,116.58	$71,087,866.26
9	1858	$32,930,476.18	$14,518,664.92	$74,691,183.20
10	1859	$34,611,094.56	$15,264,620.34	$78,477,409.87
11	1860	$36,377,483.90	$16,048,848.19	$82,455,844.73
12	1861	$38,234,021.53	$16,873,309.26	$86,636,259.68
13	1862	$40,185,308.22	$17,740,064.62	$91,028,924.12
14	1863	$42,236,179.50	$18,651,280.80	$95,644,630.41
15	1864	$44,391,717.71	$19,609,235.11	$100,494,720.48
16	1865	$46,657,264.58	$20,616,321.37	$105,591,113.88
17	1866	$49,038,434.42	$21,675,055.80	$110,946,337.23
18	1867	$51,541,128.10	$22,788,083.29	$116,573,555.20
19	1868	$54,171,547.63	$23,958,183.99	$122,486,603.05
20	1869	$56,936,211.53	$25,188,280.18	$128,700,020.85
21	1870	$59,841,971.03	$26,481,443.55	$135,229,089.41
22	1871	$62,896,026.99	$27,840,902.83	$142,089,868.12
23	1872	$66,105,947.76	$29,270,051.78	$149,299,234.65

Appendix D

Table and Discussion of Statistical "Backcast" Methodology (Page 2 of 7)

Table of Statistical Backcast (1882-1850)

24	1873	$69,479,687.96	$30,772,457.66	$156,874,926.69
25	1874	$73,025,608.17	$32,351,870.02	$164,835,585.90
26	1875	$76,752,495.67	$34,012,230.06	$173,200,803.99
27	1876	$80,669,586.17	$35,757,680.38	$181,991,171.23
28	1877	$84,786,586.76	$37,592,575.28	$191,228,327.44
29	1878	$89,113,699.91	$39,521,491.52	$200,935,015.55
30	1879	$93,661,648.80	$41,549,239.71	$211,135,137.92
31	1880	$98,441,703.86	$43,680,876.23	$221,853,815.54
32	1881	$103,465,710.70	$45,921,715.76	$233,117,450.28
33	1882	$108,746,119.49	$48,277,344.45	$244,953,790.23

Appendix D

Table and Discussion of Statistical "Backcast" Methodology (Page 3 of 7)

Discussion of Methods and Limitations from Joseph Robertson, Mato Ohitika Analytics LLC.

MATO OHITIKA

Mato Ohitika Analytics LLC
Home of the Data Sovereignty Initiative
Joseph C. Robertson, PhD
Chief Data Scientist
Sioux Falls, SD 57103
(605) 691-2248
jrobertson@bravebearanalytics.com

August 11, 2023

To: David Bartecchi, Village Earth

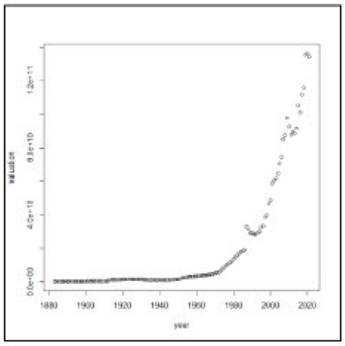
Re: CO Assessment Data Analysis

Dear Dave,

I have completed my preliminary analysis of the Colorado Assessment data you provided me last week. I have provided a short set of results that reflect the statistical methodology I used to perform an *Exploratory Data Analysis* (EDA). I have been provided at small data set with 139 rows with two columns: year and valuation (in dollars) of the state of Colorado from 1883 to 2021. The research hypothesis was to attempt to predict other valuations that go back to the year 1850.

After review, the data had a of number of properties that made a simple linear regression model problematic and thus, other techniques were needed to obtain a reasonable set of estimates for the years 1850-1882 to further fill out the valuation table.

Key points to consider:



1. The data is longitudinal in nature and thus represents a change over time in years.
2. The data source and methods were not provided and thus, it is unclear what methods (if any) were used to calculate the valuation over different decades of Colorado statehood.
3. Predicting values prior to Colorado statehood (1876) could be unreliable and thus care should be taken to consult with Mato Ohitika Analytics LLC regarding how this data analysis should be used in public reporting until a more thorough analysis can be performed to add additional context.

Appendix D

Table and Discussion of Statistical "Backcast" Methodology (Page 4 of 7)

Discussion of Methods and Limitations from Joseph Robertson, Mato Ohitika Analytics LLC.

4. Thus, this predictive model and it results should be used for personal research only.

Methods and Data Structure

As you can see the data is non-linear (figure on the previous page), and it seems to be exponential.

Because of this I had to do some additional model research to see if there was an appropriate model to consider. At this point there are a few possible outcomes for fast turnaround:

1. Option 1: Simple Linear Regression. This failed due to non-linearity
2. Option 2: Exponential Regression. I will provide you some estimates from a simple model fit from this method. Essentially this method helps in wrangling in the huge numbers in the valuation, and the model fit is better and I got some estimates.
3. Option 3: Generalized Linear Model Fit. Since the data is in fact longitudinal a more robust analysis is probably necessary if you want to publish some work related to the actual analysis
4. Option 4: GLM fit with simulation to establish a confidence interval of where the true value may lie.

Considerations: Data is longitudinal, non-linear. The need for the best predictive model will require more time to assess the data for the proper fit.

Option 1: Simple Linear Regression

This method was the first model fit as a baseline of evidence to explore if predictions could be made with a linear fit to the data. Although I will not provide a complete explanation for the model fit numbers; a couple things that provide evidence of a good model fit are:

Linear Regression Model: $y = \beta_0 + \beta_1 x + \varepsilon$

Assumptions

- Linear model is appropriate
- The error terms/residuals are independent
- The error terms/residuals are approximately normally distributed
- The error terms/residuals have a common variance

Appendix D

Table and Discussion of Statistical "Backcast" Methodology (Page 5 of 7)

Discussion of Methods and Limitations from Joseph Robertson, Mato Ohitika Analytics LLC.

The results from the linear model fit:

```
Call:
lm(formula = valuation ~ year, data = x)

Residuals:
       Min         1Q     Median         3Q        Max
-2.663e+10 -1.742e+10 -3.565e+09  1.339e+10  7.297e+10

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept) -1.227e+12  9.125e+10  -13.44   <2e-16 ***
year         6.386e+08  4.674e+07   13.66   <2e-16 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 2.211e+10 on 137 degrees of freedom
Multiple R-squared:  0.5768,    Adjusted R-squared:  0.5737
F-statistic: 186.7 on 1 and 137 DF,  p-value: < 2.2e-16
```

As you can see the y-intercept and fitted coefficient year are statically significant, however the R^2 value is .5768 meaning the parameters of the model only explain 57% of the variation of the data.

As you can see the model predictions from 1850 to 1882 are negative since the y-intercept of the model when x=0 is also negative and predicting values along the model fit line also become negative. The lwr and upr prediction intervals provide where the predictions falls in with 95% confidence.

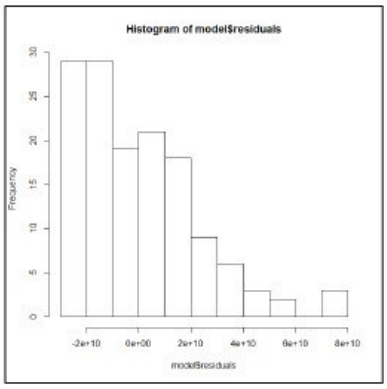
Obviously, this does not make sense in the context of a money valuation and thus, we see this model is not appropriate. In addition, you can see the plots on the next page: the residuals are skewed right (not normally distributed) and the qqplot shows the linear fit is problematic at the tails, further evidence that this is not the correct model.

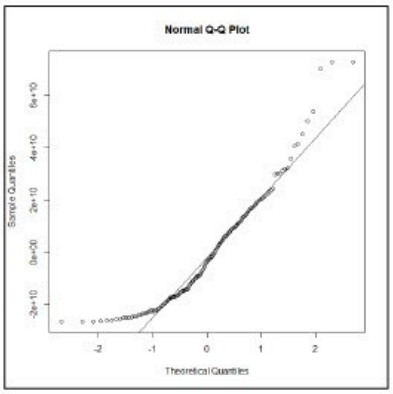
	new_date	fit	lwr	upr
1	1850	-45295332778	-90172346678	-418318879
2	1851	-44656755295	-89514448074	200937483
3	1852	-44018177813	-88856731623	820375997
4	1853	-43379600330	-88199197558	1439996898
5	1854	-42741022847	-87541846111	2059800417
6	1855	-42102445364	-86884677511	2679786783
7	1856	-41463867881	-86227691987	3299956225
8	1857	-40825290398	-85570889764	3920308968
9	1858	-40186712916	-84914271067	4540845236
10	1859	-39548135433	-84257836117	5161565251
11	1860	-38909557950	-83601585134	5782469235
12	1861	-38270980467	-82945518338	6403557404
13	1862	-37632402984	-82289635944	7024829976
14	1863	-36993825501	-81633938168	7646287165
15	1864	-36355248018	-80978425220	8267929183
16	1865	-35716670536	-80323097313	8889756242
17	1866	-35078093053	-79667954654	9511768549
18	1867	-34439515570	-79012997450	10133966310
19	1868	-33800938087	-78358225906	10756349732
20	1869	-33162360604	-77703640224	11378919015
21	1870	-32523783121	-77049240604	12001674361
22	1871	-31885205638	-76395027245	12624615968
23	1872	-31246628156	-75741000344	13247744032
24	1873	-30608050673	-75087160094	13871058748
25	1874	-29969473190	-74433506688	14494560308
26	1875	-29330895707	-73780040316	15118248902
27	1876	-28692318224	-73126761166	15742124717
28	1877	-28053740741	-72473669423	16366187941
29	1878	-27415163259	-71820765273	16990438756
30	1879	-26776585776	-71168048895	17614877344
31	1880	-26138008293	-70515520470	18239503885
32	1881	-25499430810	-69863180176	18864318556
33	1882	-24860853327	-69211028186	19489321532

Appendix D

Table and Discussion of Statistical "Backcast" Methodology (Page 6 of 7)

Discussion of Methods and Limitations from Joseph Robertson, Mato Ohitika Analytics LLC.

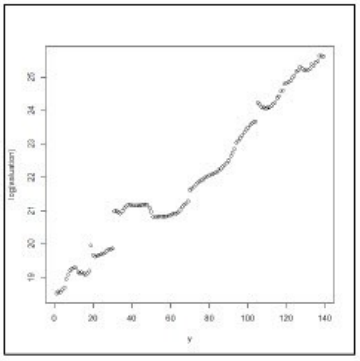




Option 2: Exponential Regression

The second model fit was to take the natural log of y to see if this fit would provide a more realistic model fit. The results from the linear regression above is a way to compare this fit to the original fit for comparisons.

The figure to the right is the plot when we transform the data using the natural log of y=valuation: As you can see when we transform y the plot becomes more linear and thus we can test a second linear model using this technique. Essentially we are using the model fit to express as an exponential function to linearize the data:



ln(y)=B0+B1*X can be exponentiated to :

$Y=e^{B0}*(e^{B1})^{X}$

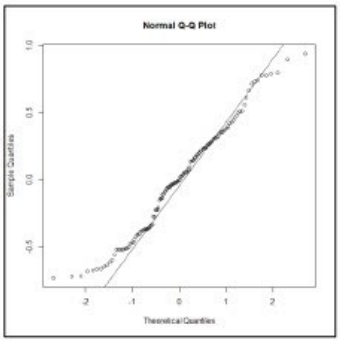
The model fit on the right shows a better model fit and the residuals follow a more linear pattern in the qqplot and the residuals are more normally distributed, meaning the model fit is significantly better using the natural log transformation.

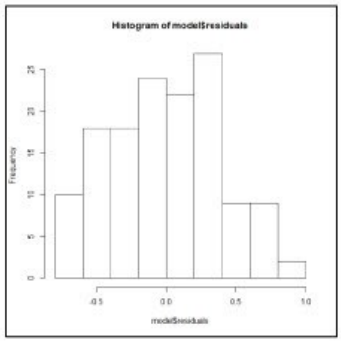
```
Call:
lm(formula = log(valuation) ~ year, data = x)

Residuals:
     Min       1Q   Median       3Q      Max
-0.73558 -0.36393 -0.00221  0.27677  0.94307

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept) -7.517e+01  1.671e+00  -44.99   <2e-16 ***
year         4.978e-02  8.557e-04   58.17   <2e-16 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.4048 on 137 degrees of freedom
Multiple R-squared:  0.9611,    Adjusted R-squared:  0.9608
F-statistic:  3383 on 1 and 137 DF,  p-value: < 2.2e-16
```

Appendix D

Table and Discussion of Statistical "Backcast" Methodology (Page 7 of 7)

Discussion of Methods and Limitations from Joseph Robertson, Mato Ohitika Analytics LLC.





The final table of estimates were then predicted and then exponentiated to convert to the money values. Notice the prediction interval are very wide so the true value with an alpha of .05 means the predicted values could be close or far away from the true value.

This information was uploaded to the excel of original values for further study. Further follow up will be needed to discuss these preliminary results.

This ends the analysis.

	new_date	fit	lwr	upr	fit1	lwr1	upr1
1	1850	16.91170	16.09000	17.73340	22113599	9722985	50294352
2	1851	16.96148	16.14013	17.78283	23242174	10222817	52842445
3	1852	17.01125	16.19026	17.83225	24428346	10748308	55519818
4	1853	17.06103	16.24039	17.88168	25675056	11300774	58333040
5	1854	17.11081	16.29050	17.93111	26985391	11881596	61289016
6	1855	17.16058	16.34062	17.98055	28362600	12492229	64394998
7	1856	17.21036	16.39073	18.02999	29810095	13134201	67658611
8	1857	17.26013	16.44084	18.07943	31331464	13809117	71087866
9	1858	17.30991	16.49095	18.12887	32930476	14518665	74691183
10	1859	17.35968	16.54105	18.17832	34611095	15264620	78477410
11	1860	17.40946	16.59115	18.22777	36377484	16048848	82455845
12	1861	17.45924	16.64124	18.27723	38234022	16873309	86636260
13	1862	17.50901	16.69134	18.32669	40185308	17740065	91028924
14	1863	17.55879	16.74143	18.37615	42236179	18651281	95644630
15	1864	17.60856	16.79151	18.42562	44391718	19609235	100494720
16	1865	17.65834	16.84159	18.47508	46657265	20616321	105591114
17	1866	17.70811	16.89167	18.52456	49038434	21675056	110946337
18	1867	17.75789	16.94175	18.57403	51541128	22788083	116573555
19	1868	17.80767	16.99182	18.62351	54171548	23958184	122486603
20	1869	17.85744	17.04189	18.67299	56936212	25188280	128700021
21	1870	17.90722	17.09195	18.72248	59841971	26481444	135229089
22	1871	17.95699	17.14202	18.77197	62896027	27840903	142089868
23	1872	18.00677	17.19208	18.82146	66105948	29270052	149299235
24	1873	18.05655	17.24213	18.87096	69479688	30772458	156874927
25	1874	18.10632	17.29218	18.92046	73025608	32351870	164835586
26	1875	18.15610	17.34223	18.96996	76752496	34012230	173200804
27	1876	18.20587	17.39228	19.01947	80669586	35757680	181991171
28	1877	18.25565	17.44232	19.06898	84786587	37592575	191228327
29	1878	18.30542	17.49236	19.11849	89113700	39521492	200935016
30	1879	18.35520	17.54239	19.16801	93661649	41549240	211135138
31	1880	18.40498	17.59242	19.21753	98441704	43680876	221853816
32	1881	18.45475	17.64245	19.26705	103465711	45921716	233117450
33	1882	18.50453	17.69247	19.31658	108746119	48277344	244953790

Appendix E

Table of Per Acre Values Based on 1883 Patented Acres and Statistical Backcast

Table of CO Cessions and Acreage and Values at Time of Taking

Royce No.	Tribe	Date	Stat. Reference	Description	Acres	Backcast Total	Based on Total Acres in 1883	Per Acre Assed Value Applied to Cession Acres	Assessed Value at 5% Compound Interest	Market Value	Market Value at 5% Compound Interest
426	Arapaho and Cheyenne of Upper Arkansas	02/18/1861	Stat. L., XII, 1163	Fort Wise, Kansas Territory	22,620,411	$38,234,022	$4.82	$109,076,906.87	$295,392,363,237	$1,254,384,429	$3,397,012,177,224
4260	Arapaho and Cheyenne of Upper Arkansas	02/18/1861	Stat. L., XII, 1163	Fort Wise, Kansas Territory	5,462,463	$38,234,022	$4.82	$26,436,748.16	$71,593,646,845	$304,022,604	$823,326,935,269
477	Cheyenne and Arapaho	10/14/1865	Stat. L., XIV, 703	Camp on Little Arkansas River, Kansas	3,751,432	$46,657,265	$5.88	$22,074,899.01	$49,182,203,055	$253,861,339	$565,595,335,129
478	Comanche and Kiowa	10/18/1865	Stat. L., XIV, 717	Camp on Little Arkansas River, Kansas	4,728,722	$46,657,265	$5.88	$27,825,657.36	$61,994,717,604	$319,995,060	$712,939,252,442
515	Uta (Tabeguache, Capote, Weeminuchi, Yampa,Grand River, and Uintah Bands	03/02/1868	Stat. L., XV, 619	Washington, D.C.	23,142,672	$54,171,548	$6.83	$158,112,824.55	$369,884,088,256	$1,818,297,482	$4,253,667,014,950
520	Shoshoni and Bannock (Eastern Bands)	07/03/1868	Stat. L., XV, 673	Fort Bridger, Utah Territory	3,167,251	$54,171,548	$6.83	$21,638,941.83	$50,621,448,909	$248,847,831	$582,146,662,457
566	Uta	04/29/1874	Stat. L., XVIII, 36	Act of Congress	3,721,873	$73,025,608	$9.21	$34,278,286.15	$49,229,413,446	$394,200,291	$566,138,254,627
616	Uta	03/06/1880	Stat. L., XXI, 199	Agreement	15,857,639	$98,441,704	$12.42	$196,879,278.18	$210,993,839,645	$2,264,111,699	$2,426,429,155,916
617	Uta	03/06/1880	Executive Order	Executive Order	1,084,682	$98,441,704	$12.42	$13,466,788.92	$14,432,242,577	$154,868,073	$165,970,789,639
	Grand Total							**$609,790,331.04**	**$1,173,323,963,274**	**$7,012,598,807**	**$13,493,226,577,652**

Appendix F

Table of Market Value of Ceded Lands At Time of Taking

Table of CO Cessions and Acreage and Values at Time of Taking

Royce No.	Tribe	Date	GIS Acres	Premption Act Value	Inflation Factor	Total w/ Simple Inflation	Total with 5% Compounding Interest Since Cession Date
426	Arapaho and Cheyenne of Upper Arkansas	02/18/1861	26,371,843	$32,964,804	0.0360	$34,151,536	$89,272,344,701
4260	Arapaho and Cheyenne of Upper Arkansas	02/18/1861	5,482,463	$6,853,079	0.0360	$7,099,790	$18,558,897,234
477	Cheyenne and Arapaho	10/14/1865	3,751,432	$4,689,290	0.0660	$4,998,783	$10,447,595,969
478	Comanche and Kiowa	10/18/1865	4,728,722	$5,910,903	0.0660	$6,301,022	$13,169,311,692
515	Uta (Tabeguache, Capote, Weeminuchi,Yampa,Grand River, and Uintah Bands	03/02/1868	26,864,545	$33,580,682	0.0660	$35,797,007	$64,629,510,248
520	Shoshoni and Bannock (Eastern Bands)	07/03/1868	3,167,251	$3,959,063	0.0650	$4,216,402	$7,619,628,476
566	Uta	04/29/1874	3,721,873	$4,652,341	0.0470	$4,871,001	$6,681,548,771
616	Uta	03/06/1880	15,857,639	$19,822,049	0.0420	$20,654,575	$21,243,120,738
617	Uta	03/06/1880	1,084,682	$1,355,853	0.0420	$1,412,799	$1,453,056,033
	Grand Total			**$113,788,064**		**$119,502,917**	**$233,075,013,862**

Appendix G

Chart of All Withheld Mineral Values from 1934-2019 (Page 1 of 2)

An 'X' in the column means that mineral value was withheld for that year.

	Arsenious Oxide	Barite	Beryllium Concentrate	Bismuth	Cement	Clays	Columbium Tantalum Concentrate	Copper	Feldspar	Ferro-Alloys	Fluorspar	Fuller's Earth	Gemstones	Gold	Gypsum	Helium	Iron Ore	Lead	Lime	Lithium Minerals	Magniferous Ore	Manganese Ore	Mica	Molybdenum	Nickel	Peat	Perlite	Pumice	Pyrites	Radium	Rare-earth & Thorium Concentrates	Salt	Sand & Gravel	Silver	Stone (Crushed & Dimension)	Sulfur Ore	Tin	Tungsten & Tungsten Concentrate	Uranium	Vanadium	Vermiculite	Zinc
2019					X	X								X	X	X			X					X										X							
2018					X									X	X	X			X					X										X							
2017					X									X	X	X			X					X										X							
2016					X									X	X	X			X					X										X							
2015					X									X	X	X			X					X										X							
2014					X									X	X	X			X					X										X							
2013					X									X	X	X			X					X										X							
2012					X									X	X	X			X					X										X							
2011					X									X	X	X			X					X										X							
2010					X									X	X	X			X					X										X							
2009					X									X	X	X			X					X										X							
2008					X									X	X	X			X					X										X							
2007					X									X	X	X			X					X										X							
2006					X									X	X	X								X										X							
2005					X									X	X	X								X										X							
2004					X									X	X	X								X										X							
2003					X									X	X	X								X										X							
2002					X									X	X	X								X										X							
2001					X									X	X	X								X										X							X
2000					X									X	X	X								X										X							X
1999					X									X	X	X		X						X										X							X
1998					X									X	X	X		X						X		X								X							X
1997					X									X	X	X		X						X		X								X							X
1996					X									X	X	X		X	X					X		X															X
1995					X									X	X	X		X	X					X		X								X							X
1994					X									X	X	X		X	X					X		X								X							X
1993					X			X						X	X	X		X	X					X		X	X							X							X
1992					X			X							X	X		X	X					X			X							X							X
1991					X			X							X	X		X	X					X			X														X
1990					X			X							X	X		X	X					X		X	X													X	X
1989					X			X							X			X	X				X	X			X							X						X	X
1988					X										X			X	X					X		X	X													X	X
1987					X			X							X			X	X					X		X	X	X												X	X
1986					X			X							X			X	X					X		X	X													X	X
1985					X			X									X	X	X					X		X	X		X							X				X	X
1984					X			X							X		X	X	X					X		X	X		X			X				X				X	X
1983					X			X							X		X	X	X					X		X	X											X		X	X
1982			X		X												X	X	X								X		X			X				X		X		X	X
1981					X			X									X		X								X		X			X				X		X		X	X
1980					X												X		X								X		X			X				X		X		X	
1979					X												X		X					X			X		X			X				X		X		X	
1978			X		X				X								X		X					X			X	X	X			X				X		X		X	
1977					X				X								X							X			X	X	X			X				X		X	X	X	

Appendix G

Chart of All Withheld Mineral Values from 1934-2019 (Page 2 of 2)

	Arsenious Oxide	Barite	Beryllium Concentrate	Bismuth	Cement	Clays	Columbium Tantalum Concentrate	Copper	Feldspar	Ferro-Alloys	Fluorspar	Fuller's Earth	Gemstones	Gold	Gypsum	Helium	Iron Ore	Lead	Lime	Lithium Minerals	Magniferous Ore	Manganese Ore	Mica	Molybdenum	Nickel	Peat	Perlite	Pumice	Pyrites	Radium	Rare-earth & Thorium Concentrates	Salt	Sand & Gravel	Silver	Stone (Crushed & Dimension)	Sulfur Ore	Tin	Tungsten & Tungsten Concentrate	Uranium	Vanadium	Vermiculite	Zinc
1976					X			X									X						X			X	X	X			X					X	X	X	X			
1975					X			X									X						X			X	X	X			X					X	X	X	X			
1974					X			X		X							X						X			X	X	X			X					X	X	X	X			
1973					X			X		X							X						X			X	X	X			X					X	X		X			
1972			X		X			X		X					X		X						X			X	X	X			X					X	X		X			
1971			X		X					X					X		X						X			X	X	X			X					X	X		X			
1970			X		X					X					X		X					X	X			X		X			X					X	X		X			
1969			X		X					X							X									X				X	X							X			
1968			X		X			X		X							X									X				X	X										
1967			X		X					X							X					X				X		X		X	X										
1966			X		X					X																X		X		X	X										
1965			X		X					X																X					X								X		
1964			X		X			X		X																X		X			X							X	X		
1963			X		X			X		X							X									X		X			X					X	X		X		
1962			X		X			X		X							X									X		X			X					X	X		X	X	
1961			X		X					X																X		X			X					X	X		X		
1960					X			X		X									X							X		X		X	X						X		X		
1959					X			X		X									X							X		X			X						X		X		
1958					X					X							X		X				X			X											X		X		
1957					X		X			X					X		X						X		X	X		X				X							X		
1956					X		X			X							X						X			X		X											X		
1955					X					X							X						X			X		X		X						X			X		
1954					X			X					X				X			X			X	X	X	X	X	X								X			X	X	
1953					X		X						X							X				X	X	X		X								X			X		
1952					X		X						X		X						X		X	X		X	X	X											X		
1951					X		X						X		X					X				X		X	X												X		
1950					X		X						X							X				X			X	X								X			X	X	
1949					X		X						X		X				X					X											X		X		X	X	
1948			X		X								X		X				X					X		X		X							X				X		
1947			X		X								X		X				X	X	X			X		X		X	X						X					X	
1946	X			X	X								X		X		X		X	X				X		X									X					X	
1945	X			X	X								X		X		X		X	X	X			X		X			X											X	
1944	X			X	X								X		X				X					X					X												
1943	X			X	X								X		X				X																X						
1942	X		X	X	X							X	X		X				X	X	X	X		X								X							X		
1941	X	X		X	X								X		X				X			X	X	X	X	X			X			X							X		
1940	X	X	X	X	X							X	X								X	X	X	X		X						X							X	X	
1939	X	X	X		X							X	X								X		X	X		X			X			X							X	X	
1938					X						X	X	X								X			X		X			X			X						X		X	X	
1937					X		X					X	X										X	X		X			X							X		X		X	X	
1936					X						X	X	X		X				X		X		X	X		X			X							X				X	X	
1935					X						X	X	X		X				X		X		X	X		X			X							X					X	
1934					X				X			X	X		X									X		X			X													

Appendix H

Fuel Commodity Price Values by Year (Page 1 of 6)

Fuel Commodity Prices by Year.xlsx

YEAR	Coal Commodity Price ($ per short ton)	Coal Prices Source	Gas Price Dollar per (Tcf)	Gas Prices Source	Oil Prices	Oil Prices Source
1851	NA		NA			
1852	NA		NA		NA	
1853	NA		NA		NA	
1854	NA		NA		NA	
1855	NA		NA		NA	
1856	NA		NA		NA	
1857	NA		NA		NA	
1858	NA		NA		NA	
1859	NA		NA		NA	
1860	NA		NA		NA	
1861	NA		NA		NA	
1862	NA		NA		NA	
1863	NA		NA		NA	
1864	NA		NA		NA	
1865	NA		NA		NA	
1866	NA		NA		NA	
1867	NA		NA		NA	
1868	NA		NA		NA	
1869	NA		NA		NA	
1870	NA		NA		NA	
1871	NA		NA		NA	
1872	NA		NA		NA	
1873	NA		NA		NA	
1874	NA		NA		NA	
1875	NA		NA		NA	
1876	NA		NA		NA	
1877	NA		NA		NA	
1878			NA		NA	
1879			NA		NA	
1880			NA		NA	

The **coal prices from 1900-1948** were sourced from "Growth of the Bituminous Coal Mining Industry in the United States 1900 -1971," https://nma.org/wp-content/uploads/2016/08/Historic-Bituminous-Coal-Production.pdf.

Coal prices from 1949-2022 were sourced from the U.S. Energy Information Administration, https://www.eia.gov/coal/annual/pdf/tableES4.pdf.

Gas prices from 1922-2022 were sourced from The U.S. Energy Information Administration, https://www.eia.gov/dnav/ng/hist/n9190us3a.htm.

Oil prices from 1900-2022 were sourced from The U.S. Energy Information Administration, https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=pet&s=f000000__3&f=a.

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Fuel Commodity Prices by Year (Page 2 of 6)

Fuel Commodity Prices by Year.xlsx

YEAR	Coal Commodity Price ($ per short ton)	Coal Prices Source	Gas Price Dollar per (Tcf)	Gas Prices Source	Oil Prices	Oil Prices Source
1881			NA		NA	
1882			NA		NA	
1883			NA		NA	
1884			NA		NA	
1885			NA		NA	
1886			NA		NA	
1887			NA		NA	
1888			NA		NA	
1889			NA		NA	
1890			NA		NA	
1891			NA		NA	
1892			NA		NA	
1893			NA		NA	
1894			NA		NA	
1895			NA		NA	
1896			NA		NA	
1897			NA		NA	
1898			NA		NA	
1899			NA		NA	
1900	1.04	https://nm	NA		1.19	https://v
1901	1.05	https://nm	NA		0.96	https://v
1902	1.12	https://nm	NA		0.8	https://v
1903	1.24	https://nm	NA		0.94	https://v
1904	1.10	https://nm	NA		0.86	https://v
1905	1.06	https://nm	NA		0.62	https://v
1906	1.11	https://nm	NA		0.73	https://v
1907	1.14	https://nm	NA		0.72	https://v
1908	1.12	https://nm	NA		0.72	https://v
1909	1.07	https://nm	NA		0.7	https://v

Appendix H

Fuel Commodity Prices by Year (Page 3 of 6)

Fuel Commodity Prices by Year.xlsx

YEAR	Coal Commodity Price ($ per short ton)	Coal Prices Source	Gas Price Dollar per (Tcf)	Gas Prices Source	Oil Prices	Oil Prices Source
1910	1.12	https://nm	NA		0.61	https://v
1911	1.11	https://nm	NA		0.61	https://v
1912	1.15	https://nm	NA		0.74	https://v
1913	1.18	https://nm	NA		0.95	https://v
1914	1.17	https://nm	NA		0.81	https://v
1915	1.13	https://nm	NA		0.64	https://v
1916	1.32	https://nm	NA		1.1	https://v
1917	2.26	https://nm	NA		1.56	https://v
1918	2.58	https://nm	NA		1.98	https://v
1919	2.49	https://nm	NA		2.01	https://v
1920	3.75	https://nm	NA		3.07	https://v
1921	2.89	https://nm	NA		1.73	https://v
1922	3.02	https://nm	0.11	https://w	1.61	https://v
1923	2.68	https://nm	0.1	https://w	1.34	https://v
1924	2.20	https://nm	0.09	https://w	1.43	https://v
1925	2.04	https://nm	0.09	https://w	1.68	https://v
1926	2.06	https://nm	0.1	https://w	1.88	https://v
1927	1.99	https://nm	0.09	https://w	1.3	https://v
1928	1.86	https://nm	0.09	https://w	1.17	https://v
1929	1.78	https://nm	0.08	https://w	1.27	https://v
1930	1.70	https://nm	0.08	https://w	1.19	https://v
1931	1.54	https://nm	0.07	https://w	0.65	https://v
1932	1.31	https://nm	0.06	https://w	0.87	https://v
1933	1.34	https://nm	0.06	https://w	0.67	https://v
1934	1.75	https://nm	0.06	https://w	1	https://v
1935	1.77	https://nm	0.06	https://w	0.97	https://v
1936	1.76	https://nm	0.06	https://w	1.09	https://v
1937	1.94	https://nm	0.05	https://w	1.18	https://v
1938	1.95	https://nm	0.05	https://w	1.13	https://v

Appendix H

Fuel Commodity Prices by Year (Page 4 of 6)

Fuel Commodity Prices by Year.xlsx

YEAR	Coal Commodity Price ($ per short ton)	Coal Prices Source	Gas Price Dollar per (Tcf)	Gas Prices Source	Oil Prices	Oil Prices Source
1939	1.84	https://nm	0.05	https://w	1.02	https://v
1940	1.91	https://nm	0.05	https://w	1.02	https://v
1941	2.19	https://nm	0.05	https://w	1.14	https://v
1942	2.36	https://nm	0.05	https://w	1.19	https://v
1943	2.69	https://nm	0.05	https://w	1.2	https://v
1944	2.92	https://nm	0.05	https://w	1.21	https://v
1945	3.06	https://nm	0.05	https://w	1.22	https://v
1946	3.44	https://nm	0.05	https://w	1.41	https://v
1947	4.16	https://nm	0.06	https://w	1.93	https://v
1948	4.99	https://nm	0.07	https://w	2.6	https://v
1949	4.90	https://wv	0.06	https://w	2.54	https://v
1950	4.86	https://wv	0.07	https://w	2.51	https://v
1951	4.94	https://wv	0.07	https://w	2.53	https://v
1952	4.92	https://wv	0.08	https://w	2.53	https://v
1953	4.94	https://wv	0.09	https://w	2.68	https://v
1954	4.54	https://wv	0.1	https://w	2.78	https://v
1955	4.51	https://wv	0.1	https://w	2.77	https://v
1956	4.83	https://wv	0.11	https://w	2.79	https://v
1957	5.09	https://wv	0.11	https://w	3.09	https://v
1958	4.87	https://wv	0.12	https://w	3.01	https://v
1959	4.79	https://wv	0.13	https://w	2.9	https://v
1960	4.71	https://wv	0.14	https://w	2.88	https://v
1961	4.60	https://wv	0.15	https://w	2.89	https://v
1962	4.50	https://wv	0.16	https://w	2.9	https://v
1963	4.40	https://wv	0.16	https://w	2.89	https://v
1964	4.46	https://wv	0.15	https://w	2.88	https://v
1965	4.45	https://wv	0.16	https://w	2.86	https://v
1966	4.56	https://wv	0.16	https://w	2.88	https://v
1967	4.64	https://wv	0.16	https://w	2.92	https://v

Appendix H

Fuel Commodity Prices by Year (Page 5 of 6)

Fuel Commodity Prices by Year.xlsx

YEAR	Coal Commodity Price ($ per short ton)	Coal Prices Source	Gas Price Dollar per (Tcf)	Gas Prices Source	Oil Prices	Oil Prices Source
1968	4.70	https://wv	0.16	https://w	2.94	https://v
1969	5.02	https://wv	0.17	https://w	3.09	https://v
1970	6.30	https://wv	0.17	https://w	3.18	https://v
1971	7.13	https://wv	0.18	https://w	3.39	https://v
1972	7.78	https://wv	0.19	https://w	3.39	https://v
1973	8.71	https://wv	0.22	https://w	3.89	https://v
1974	16.01	https://wv	0.3	https://w	6.87	https://v
1975	19.79	https://wv	0.44	https://w	7.67	https://v
1976	20.11	https://wv	0.58	https://w	8.19	https://v
1977	20.59	https://wv	0.79	https://w	8.57	https://v
1978	22.64	https://wv	0.91	https://w	9	https://v
1979	27.31	https://wv	1.18	https://w	12.64	https://v
1980	29.17	https://wv	1.59	https://w	21.59	https://v
1981	31.51	https://wv	1.98	https://w	31.77	https://v
1982	32.15	https://wv	2.46	https://w	28.52	https://v
1983	31.11	https://wv	2.59	https://w	26.19	https://v
1984	30.63	https://wv	2.66	https://w	25.88	https://v
1985	30.78	https://wv	2.51	https://w	24.09	https://v
1986	28.84	https://wv	1.94	https://w	12.51	https://v
1987	28.19	https://wv	1.67	https://w	15.4	https://v
1988	27.66	https://wv	1.69	https://w	12.58	https://v
1989	27.40	https://wv	1.69	https://w	15.86	https://v
1990	27.43	https://wv	1.71	https://w	20.03	https://v
1991	27.49	https://wv	1.64	https://w	16.54	https://v
1992	26.78	https://wv	1.74	https://w	15.99	https://v
1993	26.15	https://wv	2.04	https://w	14.25	https://v
1994	25.68	https://wv	1.85	https://w	13.19	https://v
1995	25.56	https://wv	1.55	https://w	14.62	https://v
1996	25.17	https://wv	2.17	https://w	18.46	https://v

Appendix H

Fuel Commodity Prices by Year (Page 6 of 6)

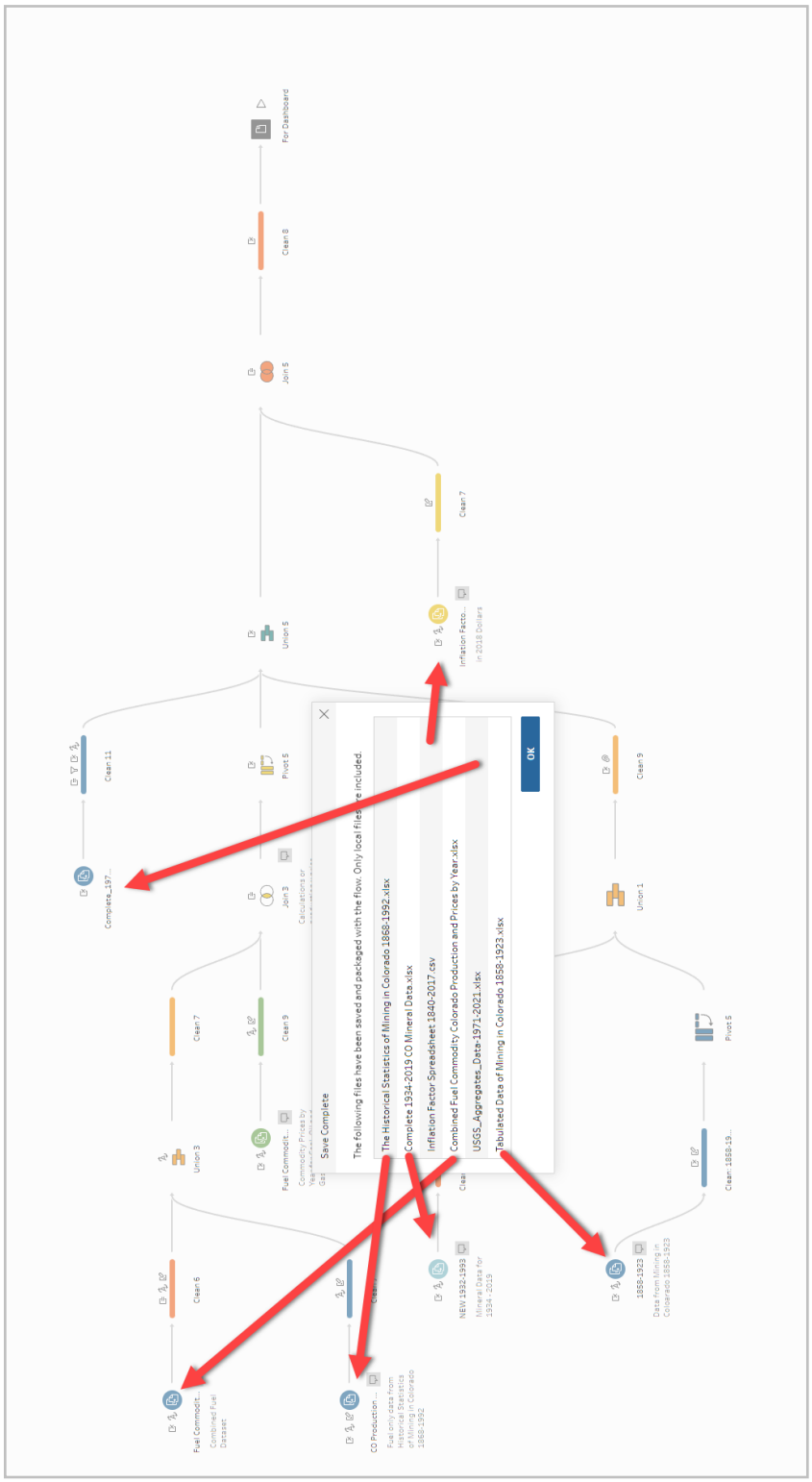
Fuel Commodity Prices by Year.xlsx

YEAR	Coal Commodity Price ($ per short ton)	Coal Prices Source	Gas Price Dollar per (Tcf)	Gas Prices Source	Oil Prices	Oil Prices Source
1997	24.64	https://wv	2.32	https://w	17.23	https://v
1998	24.87	https://wv	1.96	https://w	10.87	https://v
1999	23.92	https://wv	2.19	https://w	15.56	https://v
2000	24.15	https://wv	3.68	https://w	26.72	https://v
2001	25.67	https://wv	4	https://w	21.84	https://v
2002	26.54	https://wv	2.95	https://w	22.51	https://v
2003	26.77	https://wv	4.88	https://w	27.56	https://v
2004	30.75	https://wv	5.46	https://w	36.77	https://v
2005	36.70	https://wv	7.33	https://w	50.28	https://v
2006	39.61	https://wv	6.39	https://w	59.69	https://v
2007	41.24	https://wv	6.25	https://w	66.52	https://v
2008	51.39	https://wv	7.97	https://w	94.04	https://v
2009	55.44	https://wv	3.67	https://w	56.35	https://v
2010	60.88	https://wv	4.48	https://w	74.71	https://v
2011	68.50	https://wv	3.95	https://w	95.73	https://v
2012	66.04	https://wv	2.66	https://w	94.52	https://v
2013	60.61	https://wv	3.73	https://w	95.99	https://v
2014	55.99	https://wv	4.37	https://w	87.39	https://v
2015	51.55	https://wv	2.62	https://w	44.39	https://v
2016	48.24	https://wv	2.52	https://w	38.29	https://v
2017	55.60	https://wv	2.99	https://w	48.05	https://v
2018	59.43	https://wv	3.15	https://w	61.4	https://v
2019	58.93	https://wv	2.56	https://w	55.59	https://v
2020	50.05	https://wv	2.03	https://w	36.86	https://v
2021	61.68	https://wv	3.89	https://w	65.84	https://v
2022			6.45	https://w	93.97	https://v

Appendix I

Fuel Production Chart Sources and Methods

This Tableau Prep Flow Chart describes the extract, transform, load (ETL) process to extract, transform (clean, sanitize, and scrub), and load the different datasets into Tableau which were used to calculate and visualize the fuel commodity data.



Appendix J

Summary Table of Annual Total Values of Mineral Extraction in Colorado

Annual Value of Mineral Extraction, 1858-2022

Year	
1858-1867	430,981,746
1868	40,134,211
1869	71,180,278
1870	71,704,885
1871	96,743,878
1872	98,114,388
1873	87,514,667
1874	115,972,783
1875	119,835,477
1876	136,102,163
1877	165,418,429
1878	227,711,950
1879	464,625,625
1880	574,570,976
1881	545,560,293
1882	573,736,902
1883	631,551,450
1884	589,042,308
1885	554,058,359
1886	588,908,211
1887	556,456,868
1888	619,470,711
1889	717,394,973
1890	816,128,861
1891	883,431,417
1892	886,461,583
1893	906,896,000
1894	828,455,500
1895	947,992,206
1896	989,694,206
1897	1,104,938,879
1898	1,310,857,333
1899	1,469,792,212
1900	1,667,836,882
1901	1,597,754,941
1902	1,580,064,559
1903	1,386,875,429

Year	
1904	1,357,689,972
1905	1,556,033,143
1906	1,543,903,306
1907	1,373,843,158
1908	1,187,511,703
1909	1,267,934,194
1910	1,246,694,263
1911	1,185,284,000
1912	1,300,611,205
1913	1,144,953,625
1914	1,048,372,100
1915	1,372,064,775
1916	1,461,072,636
1917	1,403,962,647
1918	1,108,106,150
1919	761,011,420
1920	766,161,800
1921	564,025,417
1922	681,595,940
1923	754,225,147
1924	349,096,324
1925	332,187,429
1926	379,294,648
1927	328,611,286
1928	318,684,706
1929	302,122,206
1930	237,921,343
1931	183,240,328
1932	151,256,182
1933	146,446,538
1934	663,694,704
1935	739,481,964
1936	916,432,625
1937	1,076,124,655
1938	1,006,030,625
1939	1,076,073,500
1940	1,052,824,714
1941	1,170,637,271
1942	1,394,149,215
1943	1,191,882,232

Year	
1944	1,054,175,300
1945	1,009,346,708
1946	957,869,359
1947	1,126,866,292
1948	1,348,779,271
1949	1,439,955,695
1950	1,580,523,417
1951	1,717,293,250
1952	1,757,996,934
1953	1,955,693,084
1954	2,310,421,852
1955	2,608,024,299
1956	2,873,828,716
1957	2,927,863,571
1958	2,476,776,121
1959	2,542,203,190
1960	2,699,752,203
1961	2,660,146,833
1962	2,348,902,479
1963	2,394,939,918
1964	2,454,376,613
1965	2,484,690,159
1966	2,574,771,385
1967	2,411,302,687
1968	2,413,405,612
1969	2,336,571,837
1970	2,403,352,516
1971	2,310,970,988
1972	2,432,371,317
1973	2,761,413,090
1974	3,641,461,523
1975	3,881,575,070
1976	4,204,791,886
1977	4,638,701,281
1978	4,926,202,912
1979	5,998,705,690
1980	7,512,106,353
1981	7,048,965,041
1982	5,447,056,503

Year	
1983	4,076,037,337
1984	4,235,524,554
1985	3,892,949,395
1986	2,685,316,370
1987	2,693,919,824
1988	2,560,563,932
1989	2,841,428,427
1990	2,877,974,149
1991	4,160,650,202
1992	4,349,953,476
1993	3,836,182,180
1994	3,896,748,179
1995	3,971,236,125
1996	4,446,268,054
1997	4,737,171,340
1998	4,575,751,779
1999	4,703,389,219
2000	6,553,464,151
2001	7,135,546,003
2002	6,556,822,490
2003	9,523,135,421
2004	11,645,702,781
2005	15,919,191,652
2006	14,732,794,045
2007	15,169,257,744
2008	19,672,778,107
2009	11,396,620,490
2010	14,215,829,679
2011	14,919,286,652
2012	13,659,974,728
2013	15,772,576,541
2014	19,319,874,467
2015	12,355,967,679
2016	11,019,007,042
2017	13,979,384,653
2018	18,752,184,050
2019	17,245,361,200
2020	10,515,260,660
2021	18,051,156,050
2022	11,735,942,700

Grand Total	546,617,555,108

Appendix K

Summary Table of Individual Minerals Extracted from Colorado

Value (in 2018 Dollars) Commodities Extracted from Colorado Lands, 1858-2022

Commodity Class	Commodity	
Fuel Commodities	Coal Value	79,234,855,126
	Natural Gas Value	173,144,953,628
	Petroleum Value	142,936,054,251
	Uranium	2,211,346,851
Non-fuel Commodities	All witheld mineral values	62,605,431,188
	Arsenious Oxide	
	Barite	
	Beryllium Concentrate	5,525,581
	Bismuth	
	Cement	
	Clays	767,112,442
	Columbium tantalum concentrate	247,343
	Copper	1,987,527,831
	Duplication Adjustment	-2,302,471,919
	Feldspar	53,608,861
	Ferro-alloys	
	Fluorspar	204,641,993
	Fuller's Earth	
	Gemstones	29,842,201
	Gold	21,478,159,170
	Gypsum	102,541,800
	Helium	
	Iron ore	19,795,416
	Lead	7,071,404,676
	Lime	339,692,864
	Lithium Minerals	114,286
	Magniferous Ore	1,039,629
	Manganese Ore	1,527,674
	Mica	5,234,881
	Molybdenum	12,217,406,539
	Nickel	
	Peat	28,114,153
	Perlite	2,189,300
	Pumice	16,114,456
	Pyrites	8,488,644
	Radium	93,884
	Rare-earth and thorium concentrates	735,640
	Salt	324,016
	Sand & Gravel	15,021,557,488
	Silver	15,576,275,760
	Stone (Crushed & Dimension)	5,547,181,640
	Sulfur Ore	147,810
	Tin	6,076,924
	Tungsten & Tungsten Concentrate	371,947,350
	Vanadium	608,400,722
	Vermiculite	668,205
	Zinc	7,313,646,803
Grand Total		**546,617,555,108**