LEARNING FROM THE LANDSCAPE: INDUSTRIAL PROCESSES AND PLACER MINING LANDSCAPES IN THE ELK CREEK MINING DISTRICT, WESTERN MONTANA

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LEARNING FROM THE LANDSCAPE: INDUSTRIAL PROCESSES AND PLACER MINING LANDSCAPES IN THE ELK CREEK MINING DISTRICT, WESTERN MONTANA

By

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Thesis

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In 1865 gold was discovered in the Garnet Mountains of Western Montana. This was one of the last of a series of gold rushes in the American West that began with the California Gold Rush in 1849. During this time period miners carried knowledge of geology of placer deposits and placer mining techniques out of California and into the interior west where they encountered quite different geologic conditions. This study examines how miners perceived and learned from these new environments during the construction of placer landscapes in the Garnet Mountains, especially in the Elk Creek Mining District, through a process called landscape learning. This study is also intended to be an industrial archaeological guide to interpreting placer mining landscapes and techniques.
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Chapter 1 Introduction

Prologue
On August 31, 2007 fellow graduate student Christopher Merritt and I set out from Missoula headed for the Garnet Mountains of West Central Montana in search of placer mining features. During the course of conducting a literature review of mining related archaeological sites in the Garnet Range the previous spring at the Montana State Historic Preservation Office (MTSHPO), I had noticed numerous references to placer mining features that people had labelled as “bedrock flumes.” This nomenclature did not make sense. Why would someone make a flume (a water carrying apparatus) out of bedrock? After puzzling over references to bedrock flumes in the archaeological literature, I consulted with Missoula Bureau of Land Management (BLM) Archeologists Terri Wolfram and Maria Craig to inquire about access to one of these bedrock flume sites near Coloma in order to further investigate this quandary. These bedrock flumes were in the headwaters of McGinnis Creek.

On that hot dry August morning, Merritt and I dropped a car at the bottom of McGinnis Creek and then proceeded to drive to the Coloma area where we pulled off onto a rough BLM road to start our hike to the bottom of the drainage. From our parking spot we gazed out over the McGinnis and Elk Creek Valleys (Figure 1.1) where over 150 years ago prospectors certainly eyed the same terrain looking for gold. As we descended into McGinnis Creek, we first observed water retention dams and then the ditches that they supplied. As we continued the descent, we came across our first “bedrock flume.” It was not carved out of bedrock but instead was constructed of granitic cobbles formed into
Figure 1.1. McGinnis Creek Location Map, showing the general project area.
Figure 1.2. Bedrock Flume, more properly known as a ground sluice, in upper McGinnis Creek.
stacked rock walls in the approximate location of the former creek bed with the walls varying from 6 to 15 feet tall. The channel itself was consistently approximately three feet wide. Someone placed rubble behind the stacked rock on either side and extended from the stacked walls to where it met the natural slope paralleling the channel. As we continued toward the bottom of the McGinnis Creek drainage, we encountered more of these “flumes”; and the lower in elevation we went, the larger they became. By the time we were almost back to our dropped car we encountered “flumes” that were like miniature canyons—sometimes 25 feet deep—with entire systems of side “flumes” entering in to the main channels (Figure 1.2).

Questions raced through my mind—why would someone build a flume to carry water down a creek bed? Why were people putting so much effort into moving so much rock? How did miners move so much rock? Why were there no artifacts except lard cans? Why had archaeologists previously working in the Garnet Range called these features bedrock flumes? It became obvious to me that day: while archaeologists are quite adept at interpreting the material aspects of placer gold mining rushes, we have a less comprehensive understanding of the industrial processes of small scale placer mining. This thesis seeks to address this problem by surveying, documenting, and analyzing archaeological signatures of small scale placer mining landscapes in western Montana’s Garnet Range in tandem with an examination of relevant archival and archaeological resources. As will be elaborated below, the goal is to provide other archaeologists with a case study from the Northern Rockies that includes a field guide for documenting and interpreting such complex forms of cultural heritage.
Placer Mining Research Problems and Thesis Objectives

While archaeological examinations of mining rushes in Western North America have been covered at length (Hardesty 2010, Spude 2011, Obermayr and McQueen 2016, White 2017), studies of placer mining are underrepresented in both published and grey literature. Moreover, investigations of placer mining require a multifaceted context of theoretical perspectives that explain human decision-making processes during the establishment of mining districts and aid interpretations and management of placer mining sites as cultural resources. Many broad scale, “meta” studies of mining exist from both historical (Young 1970, Paul 2001, Brands 2003), and material (Francaviglia 1991, White 2017) perspectives. Large-scale archaeological studies of mining in the American West tend to focus on hard rock mining (Hardesty 2010, Obermayr and McQueen 2016). When the archaeological focus is placer mining, rarely are the processes of small-scale placer mining given any attention. Instead, researchers have focused on topics such as world systems theory’s application to placer mining bonanzas and related transportation systems, industrial processes of large scale dredge placer mining (Purdy 2007), as well as social histories of placer mining such as gender, class, ethnicity, vice, foodways, and social structure in mining camps (Dixon 2005, Dixon 2006, Larkin and McGuire 2009, Dixon 2011, Timmons and Dixon 2011, Merritt 2017). Additionally many avocational guides to exploring mining camps exist (Sagstetter and Sagstetter 1998, Meyerriecks 2003, Twitty 2005). Despite this extensive and impressive body of archaeological literature pertaining to mining in Western North America, with a few exceptions (e.g., Baeten 2012), there is an overall lack of literature pertaining to the processes of small-scale placer mining.
These small-scale processes, in the form of discovery and varying degrees of intensification, are the first things that happen after gold is initially identified in a locality. Understanding such processes is key to comprehending how miners viewed and transformed the vast western landscapes they encountered as mining settlements developed during the nineteenth century in the North American West. One way to understand these landscapes is in the form of landscape learning, a subfield of landscape archaeology that has largely been applied to prehistoric archaeological sites (Rockman and Steele 2003, Rockman 2010). Landscape learning is defined as “a new approach to environmental archaeology and a process by which humans (individuals and groups) gather, share, and used environmental information so that it can be communicated to others and subsequent generations as an established sense of ‘this is how we live here’” (Rockman 2010:4). While there have been a few studies (Hardesty and Fowler 2001, Hardesty 2003, Hardesty 2007) that approached landscape learning in the context of western mining rushes, studies focusing specifically on placer mining in this context are virtually non-existent.

Additionally there is a chronic lack of knowledge of placer processes among Federal land management agency and Cultural Resource Management archaeologists that has contributed to uninformed decision making by land managers regarding the existence and significance of placer mining sites. Archaeologists need to understand that the presence of stacked rock at a placer mining site does not necessarily indicate the cultural presence of Chinese miners, a common misconception among archaeologists (see discussion in Merritt 2017:xv), as any efficient small scale placer system will have extensive amounts of stacked rock. Such uninformed interpretations of placer mine sites
are all too common in grey literature and in popular culture of the American West, and this thesis is committed to addressing this issue.

The goal of this thesis is to provide guidelines and context for documenting and interpreting small scale placer mining operations within the context of historic industrial processes so that archaeologists working in the American West can better understand placer mining sites. Tools from historical and landscape approaches to archaeology are used to form the framework of landscape learning and applied to examples representing placer mining locations in the Garnet Mountain Range of West Central Montana so that archaeologists can better understand, interpret, and effectively manage placer mining cultural resources.

**Research Methods**

During the summer of 2008 I was advised of several intriguing placer mining features in the head of McGinnis Creek. In order to investigate those features myself and fellow graduate student Chris Merritt walked the entirety of McGinnis Creek to document the placer mining features of the drainage. The focus was on the creek bottom itself as that is the highest probability area for encountering placer mining features. Once features such as ground sluices and tailings piles were encountered it was planned to then work outward from the creek bottom to record the water delivery systems. An attempt was made to document placer mining features with a GPS unit supplemented with hand drawn sketch maps and extensive digital photo documentation. However this did not get the comprehensive spatial results that were anticipated. First of all, the mining features encountered were massive in scale with some ground sluices being one quarter mile in length. Secondarily, my own knowledge of placer mining was not as comprehensive as it
needed to be to understand what components of the mining site were the most important for interpreting. Let’s call this hand stacked rock distraction error—a common error in recording placer mining sites that will be discussed more in Chapter 5. In other words, the field recording methods focused too much on approaching the mining sites like an archaeologist would approach recording a historic cabin site where the height and thickness of the walls are measured precisely. Instead these mining features needed to be documented from the air where the measurements won’t be as precise but the overall picture of how the miners moved through the landscape would be captured.

The field portion of this project did not capture the spatial data needed so the research methods were adjusted to take in to account the massive amount of information that is contained in documentary resources about the construction of mining landscapes. Documentary records accessed during this project include mining claim records at the Deer Lodge and Missoula County Courthouses, water rights records at the Deer Lodge County Courthouse, historic newspaper databases, Elk Creek Mining District Records and oral histories at the Montana Historical Society, General Land Office records, historic map records at the National Archives and Records Administration, and consultation of general mining histories of the American West.

**Theoretical Framework**

Historical archaeology has the potential to integrate the material record from archaeological sites with existing documentary evidence to understand individual and small scale collective decision making processes. Some historical archaeologists are taking this concept even further by expanding their archaeological investigations beyond
the traditional boundaries of archaeological sites and considering the landscapes in which those sites were created.

All landscapes are ‘historical’, provided that they are now—or were once—altered, inhabited, visited, or interpreted by people. Indeed, the problematic and theoretically flawed use of the terms ‘historical landscapes’ and ‘historical archaeology’ presume that only societies with written sources have ‘history’ embedded in, and mediated through, their landscapes. In fact, it can be argued that very few parts of the world do not fulfill the criterion of being ‘historical landscapes’; landscapes in which the past accumulates or is created through human action. Since landscapes can embody memories, and therefore be ‘historical’ in many different ways, this historical dimension of practically all landscapes can be actualized through material remains or knowledgeable understanding, evoking the past in the mind of the beholder and through social practice and inhabitation. [Holtorf and Williams 2006:235]

This MA research study of mining settlements in the Elk Creek drainage of the Garnet Mountain Range in Western Montana exemplifies Holtorf and William’s (2006:235) point. The Elk Creek drainage is located in present-day Granite, Missoula, and Powell counties. This area was chosen because most mineral extraction technologies that are typically found in Montana are represented within the Elk Creek drainage.

Landscape learning is the process of perceiving the natural landscape or previously human modified landscape and applying previous learned knowledge to
extracting resources from that landscape. Holtorf and Williams believe that “we cannot even restrict historical landscapes to the study of human action and transformation since the ‘natural’ landscape is often itself ‘read’ by people as the result of the actions of past generations” (Holtorf and Williams 2006:235).

Hardesty provides several good examples of agency’s role in landscape learning (e.g. Hardesty and Fowler 2001, Hardesty 2003, Hardesty 2007). Hardesty believes that mining landscapes provide very good examples of landscape learning, reflecting “cultural representations that convey ideas and meaning through signs and symbols” (Hardesty 2007:6). In this context, signs could be simple things such as claim markers that allow the archaeologist to catch a glimpse of how miners perceived the geology of a given landscape. A claim marker also conveys ideas about mining laws (Hardesty and Fowler 2001:83). Symbols on the other hand often include elements of the landscape that “unintentionally evoke emotions deeply embedded within a specific historical and cultural context” that remind individuals of “culturally based images or past personal experiences” (Hardesty 2007:6).

Working from a process of landscape learning, a group of miners enter a new environment bringing with them the cultural norms and values which guide the way they perceive their environment. Such “knowledge” controlled the ways in which they perceived geology, weather, and resources representing the natural (or previously modified) landscape. This hypothetical group of miners acted (i.e. demonstrated agency) in ways that reflected these perceptions. Thus those miners also presumably left “signs and symbols” on the landscape that reflect these perceptions in the form of physical remains such as mining claim markers and tailings. For example, settlement patterns in
nineteenth-century Nevada reflect the miners’ belief during the Comstock era that all
gold bearing veins should be found within 500 feet of the surface. This assumption
obviously came with the miners from where ever they came from before the original
Comstock rush. Eventually through new learned experiences, the miners discovered that
the Comstock Lode gold and silver was very deep. As a result, when miners figured this
out, their settlement and land use patterns changed (Hardesty 2007:6). Other previously
learned settlement patterns that the miners brought with them to the Comstock were
European notions of laying out towns in city blocks. Both historical information and
signatures on the landscape today provide evidence of the ways in which people making a
living on the Comstock took previous patterns and applied them to the new landscape.

To explore this concept further and to provide language that can be applied to the
landscape learning process in all landscapes, Rockman argued that landscape knowledge
can be divided in to three categories—locational knowledge, limitational knowledge, and
social knowledge (Rockman 2003:3). Locational knowledge is related to the physical
location as well as the basic physical characteristics of a particular resource. This type of
knowledge is the easiest type of knowledge to acquire and is learned relatively quickly as
a new landscape is colonized. In a mining landscape an example of this type of
knowledge is a deposit where placer gold is found, a place where rock containing ore
outcrops, or where a water supply is that can be exploited to wash placer gravels.
Limitational knowledge is a more complex knowledge that takes more time to acquire,
including information about boundaries of how resources can be exploited and what costs
are associated with acquiring such resources. In a mining landscape limitational
knowledge about placer mining is only acquired after digging in to different types of
deposits to understand the stratigraphy of those deposits to better understand the location of the placer gold. Another example of limitational knowledge is learning season after season where snow pack falls in a particular mountain range in order to build better water control structures so that mining becomes more efficient. The third category of knowledge, social knowledge, “comes from the attribution of names and meanings to natural features, and the storage of locational and limitational knowledge in a form that is remembered and transmitted by the group to succeeding generations” (Rockman 2010:5). Ultimately the development of social knowledge is final step in transforming an unknown environment into a human landscape (Rockman 2003:4). In a placer mining context this plays out in the form of the creation of new technologies to better exploit placer deposits. Also at this stage miners take what they learn from one mining rush and apply it to subsequent mining rushes. Placer rushes often happen on such a compressed time scale that the generational knowledge transfer that Rockman refers to often happens between an initial group of miners that pass on a particular “nugget” of knowledge to subsequent miners. The latter may come the following season and create this collective body of knowledge by moving from place to place among mining communities throughout an entire region, such as the American West.

Placer mining landscapes often have very few artifacts that are left for archeologists to learn about the people who created those landscapes. Therefore it is essential for placer mining researchers to have a means to interpret the landscape features that are left behind to better understand the people that created these landscapes. Recognizing landscape learning frameworks is essential for understanding and interpreting the vast scale and archaeological signatures of placer mining landscapes.
Thesis Chapter Summaries

In this introduction to my thesis, I have presented research problems relating to small scale placer mining sites and laid out the basic framework of the landscape learning model. In Chapter 2 I present a general historical and archaeological context for mining in the American West and then narrow the focus to the Northern Rockies and the Garnet Range in Montana, offering an overview of the historical context of placer mining within the Elk Creek drainage. Chapter 3 presents an overview of documentary resources relevant to the study of small scale placer mining sites. In Chapter 4 I describe what placer mining is and provide an overview of how small scale placer mining operations develop through industrial intensification from the first discovery to large scale hydraulic operations.

Chapter 5 presents a description of the various types of placers mining features to help other archaeologists identify and interpret cultural resource sites related to placer mining. Finally, Chapter 6 takes the reader to McGinnis Creek in the Garnet Range where there are good examples of placer mining features, especially features related to ground sluicing, often found throughout the American West. An analysis of those features is conducted here, as well as a description of how those features were created using the framework of landscape learning. Additionally, an Appendix includes a glossary of placer mining terminology to aid the reader’s understanding of placer mining processes.
Chapter 2 Historical Context and History of Placer Mining in North America

The Beginnings of Placer Mining in the American West

On August 27, 1847 John Sutter and James Marshall agreed to a contract at Sutter’s Fort in the Mexican Territory of California that drastically changed the history of western North America (Brands 2003: 5). The contract was to build an undershot saw mill on the Rio de los Americanos, or American River (Gardner and Johnson 1934a: 4). Sutter was a Swiss immigrant who came to California in 1839 to build an agricultural empire in the fertile Sacramento River Valley of central California (Young 1970: 102). Marshall was a Mormon carpenter who fled the oppressive anti-Mormon pogroms of Illinois and Missouri and ended up in California on his way to join his fellow Mormons near the Great Salt Lake (Brands 2003: 1-2). Marshall was charged with finding a suitable site for the saw mill with an ample head of water near plentiful timber reserves. He found a likely mill site approximately forty miles up the American River from Sutter’s Fort at a place the local Indigenous people called Coloma. At this particular location, the river went around a large bend. Marshall realized he could dam the river at the beginning of the bend and run a mill race in a straight line to the point where the river rejoined its original course, thus increasing the speed of the water velocity and hence the power of the water (Brands 2003:8-9). Marshall received approval from Sutter and commenced construction in the fall of 1847 using labor from the Mormon Battalion which had fought for the Americans during the Mexican War.

Although he had never built a mill before, Marshall knew that one of the keys for the mill to be successful was to have the perfect amount of water flowing through the
head race. Too much and the water would spill over and wash out the foundation of the mill—too little and the water would not contain enough force to power the saw. However unlike a professional mill wright, Marshall saw no need to build a tail race and instead chose to let the water naturally carve its own channel back to the American River (Brands 2003:14-15). The decision to allow the tail race to carve itself is quite possibly one the most fateful decisions mill construction foremen have ever made: Marshall had unknowingly created California’s first hydraulic placer mine.

On the morning of January 24, 1848 1Marshall went to stop the water from entering the head race so that the workers could continue construction work on the mill. As Marshall inspected the progression of the gravity-cut tail race, he observed a few shining flakes in a puddle. Then he saw more flakes in another pool of water near the tail race’s confluence with the American River where he started digging the flakes out of the ground. Marshall took what he presumed to be gold back to camp to have the cook Jennie Wimmer boil the flakes in lye to see if they would discolor. He then tested the malleability of his discovery on an anvil (Young 1970: 102-103). On January 27, 1848 still not convinced that what he had discovered was gold, he travelled to New Helvitia where Sutter’s Fort was located to consult with Sutter. Sutter consulted his Encyclopedia Americana for suggestions of more tests to confirm the discovery and eventually performed Archimedes’s specific gravity test which also confirmed that the find was indeed gold (Young 1970:102). This simple discovery forever changed the history of California and the American West, sparking the California Gold Rush and the stampeding of thousands of fortune-seekers to gold fields throughout the region. It also

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1 The date of January 24 is approximate since Marshall’s later recollections provided slightly different dates.
opened up the California gold fields to a generation of miners who acquired immense amounts of knowledge about how to identify and exploit placer deposits; they subsequently transmitted such knowledge throughout the American West.

**Brief History of Placer Mining**

The type of gold deposit that John Marshall had discovered was a placer gold deposit. The term placer is descended from the Spanish term *placer*, which means alluvial sand. While alluvial sand is not the most geologically accurate way of defining a placer gold deposit, it is fairly close because placer deposits are indeed alluvial and usually contain sand. The process of placer mining is defined as “the mining and treatment of alluvial deposits for the recovery of their valuable minerals” (Gardner and Johnson 1934a:3). To understand a placer deposit, it is important to understand the origins of how gold deposits are formed from gold’s existence as an element dissolved in magma deep in the earth’s convective currents to how gold is deposited, exposed, and eventually weathered in to placer deposits. Rather than delving deep in to geologic theory, I will illustrate how placers are ultimately created by using the Garnet Range in the Northern Rockies of western Montana, the context of this MA thesis, as an example.

The story of placer mining in the Garnet Range began over a billion years ago. The origins of gold on planet earth are unclear with some theories indicating that gold has existed on the planet since the formation of earth and others that theorize that gold arrived on earth via asteroids. Either way, the important point is that gold ended up as an element dissolved in magma located in the Earth’s mantle. In the Garnet Range the story of the gold deposits goes back 1.5 billion years ago, when a large sea, called the Belt Sea, formed in the region that is now the Northern Rocky Mountains. For nearly 800 million
years, as paleo climates changed sea levels fluctuated, a variety of sedimentary deposits formed in various environmental contexts. Around 80 million years ago, a mass of molten magma, known as a batholith and in this case specifically the Idaho Batholith, rose up out of the mantle towards the earth’s crust in what is now the Bitterroot and Salmon River Mountains. A part of the Idaho Batholith, known as the Sapphire block, broke off and plowed into the Garnet Mountain Region intruding the Precambrian Belt Formation with granitic magma. This event thrust these Belt Formation rocks skyward, creating the Garnet Mountains. In the zone of contact, where the molten granitic magma of the Sapphire Block were touching the sedimentary rocks, rapid cooling of the magma occurred. Where this happened metaliferous elements such as gold, silver, copper, lead, etc. solidified once they cooled below their melting point, forming metaliferous geologic deposits in the zone of contact.

These contact zones were still buried deeply in the earth. Over time the overlying Belt sedimentary layers that covered the highest peaks of the Garnet Range eroded away, exposing the underlying granitic intrusion and its contact zones; contact zones are also known as contact lodes if they contain precious metals. A lode is defined as “strictly a fissure in the country rock filled with mineral; usually applied to metalliferous lodes” (Hall et al. 1997:146). These contact lodes are present in the form of veins that are both within the intrusive granitic rocks and the intruded sedimentary rocks. As the granitic and sedimentary layers at the crest of the Garnet Mountains weathered away, these contact lodes were also exposed to weathering. When rock is weathered, the debris is called clastic material. As the clastic material from the various rock strata made its way down through the various drainages associated with the Garnet Range, it was sorted by
gravity. The lighter weight clastic particles (e.g. clays and sands) were carried far
downstream to the Clark Fork and Blackfoot Rivers. The heavier clastic materials were
deposited much closer to their source. Included in the heavier clastic material were
pebbles, cobbles, gravels, and precious metals—especially gold.

Gold is very heavy, and with an atomic weight of 196.96, it takes a large amount
of erosive energy to carry gold away from its native lode. Placer deposits are the
sedimentary deposits where this “free gold” has been freed from its native lode, and
alluvially deposited, often in gravels and sand. The process of gold and ultimately placer
deposit formation plays out in a similar fashion all over the world. For example, the
California placer deposits are descended from the contact lodes of the Sierra batholith,
while the placer deposits of southwest Montana are descended from the contact lodes of
the Boulder Batholith, etc. Before circling back to the Garnet Range’s placer mining
history, a broader history of placer mining is presented.

*Placer Mining in the Americas*

John Marshall’s 1848 discovery of gold in Coloma, California was by no means
the first discovery of Placer Gold in the North America. In fact, one of the main driving
forces in the European colonial powers attempting to explore and colonize the Americas
was the belief that there was wealth in precious metals throughout these lands. One of
the missions of Christopher Columbus’s second voyage to the Americas in 1493 was to
survey the Island of Hispaniola to find the source of gold that he had encountered while
trading with the Indigenous people of the island on his first voyage in 1492 (Resendez
2016:19).
Despite the fact that traditional American history narratives suggest the founding of the first two English Colonies was inspired by the search for a new way of life in Virginia and the chance for religious freedom in Plymouth, Massachusetts, the reality is that those two colonies were started to explore the mineral wealth of North America. For example, in 1606, the London and Plymouth companies were granted a charter by King James I of England that mandated that a fifth of all precious metals (i.e. gold and silver) and a fifteenth of any copper found in the New World was to be sent to the English Crown. T.A. Rickard (1932:2) believes that when John Smith arrived in Virginia at Jamestown, he had come seeking gold and copper mines but that he would be content with other resources such as furs and fish only in default of the more valuable precious metals. Although John Smith claimed to have found gold on an expedition up the Chickahominy River, the discovery turned out to be mica (Rickard 1932: 3).

While there were a few minor copper lodes discovered in the North American Colonies, the first placer gold was not exploited until mines started opening on the east slope of the Appalachian Mountains of North Carolina in the late 1700s. The United States Mint reports show that all of the gold produced in the United States from 1793-1828 came from North Carolina (Rickard 1932: 19). In 1829 the first actual placer rush occurred in the United States in the state of Georgia. From 1804 to 1866 the southern Appalachian goldfield included five states and produced $19,375,890 of gold which Rickard believes that “retrospectively, that it was relatively unimportant, but it played a useful part in preparing miners for the bigger developments in the West” (Rickard 1932: 19). There was only one other major placer deposit in what is the present day U.S. that was worked before John Marshall’s 1848 discovery in California, and that deposit was
discovered in 1828 near Golden, New Mexico; at that time that area was under Mexican control (Gardner and Johnson 1934a: 4).

**Discovery of Gold in California**

After Marshall’s discovery of gold was confirmed in 1848 (as mentioned above), Sutter tried to keep the news of the discovery under wraps for fear of losing the small agricultural empire that he had built for himself (Young 1970:103). Keeping this discovery a secret quickly proved impossible and many California residents streamed to the American River region to confirm the discovery for themselves. Colonel Richard Barnes Mason, who had headed the California occupational forces during the Mexican American War, quickly reported to the War Department that gold had been discovered in the newly won California Territory. The War Department then of course reported the discovery to President James K. Polk, commonly known as Napoleon of the Stump, who eagerly publicized the news of the discovery to offset the low public opinion of the Mexican War. In the spring of 1849, nearly 50,000 people acted on the news and set off on sea and land routes to California (Young 1970: 103; Paul and West 2001; Brands 2003). As the hordes arrived these “Forty-niners” or “Argonauts” as some called them quickly scoured California for additional gold deposits. By 1849 additional placers were discovered on both the Trinity and Klamath Rivers. By the end of 1849 the California Gold Rush had already yielded $40,000,000 in gold (Gardner and Johnson 1934a: 4).

**Moving Out of California**

The California Gold Rush forever changed the concept of the “frontier” in North America. Traditionally the frontier had been the ever west-moving zone where Euro-American settlement overlapped with areas still primarily occupied by the continent’s
Indigenous peoples. Most popular narratives of the settlement of the American West prefer to portray the Manifest Destiny narrative as being the only way that Western North America was settled. Those narratives often idealize rugged families heading across the Great Plains on the Oregon Trail (or some other such means) into the wide, open unsettled spaces to set up homesteads. While undoubtedly some of the settlers coming to the area west of the Great Plains did just that, a significant portion of the settlers during the mid-nineteenth century came by sea and came through the Goldfields of California.

By sea a miner could travel from New York to California via the Isthmus of Panama in as little as five weeks while at that time those traveling over land routes may take as long as five months (Paul 2001:7). Those settlers coming through California then streamed elsewhere into western North America, setting up new communities based on mining where the “frontiers” were more like islands of settlement rather than a westward moving line. They took with them new found locational and limitational knowledge of placer deposits and mining techniques that they then dispersed throughout the American West.

By 1858, ten years after the initial rush, gold seekers started a hard push out of California in search of gold. Until this point only a few minor gold mining operations had occurred beyond California, including in the Rogue River of Oregon, the Carson River Basin of western Nevada, and the lower Colorado and Gila River areas of what is present day Arizona (Paul and West 2001:37). However, that changed greatly when in the spring of 1858 word reached California of a massive gold strike in the Fraser River drainage of British Columbia. During the spring and summer of 1858 between 25,000 and 30,000 miners ended up in Fraser River with the vast majority coming from California. By October of the same year, nearly all of the migrants to Fraser River had
returned to California realizing that there was not enough gold for everyone who had made the trip and that it was extremely expensive to live in such an overcrowded and remote place that had only been a fur trader outpost a few months before (Paul and West 2001:38). The Fraser River rush however established a pattern that was repeated again and again, with miners who got their start in California taking their knowledge of mining and trying to apply it to different landscapes throughout western North America. Miners that had gained experience in California would go on to be the dominant force in pioneering gold fields in Nevada, Oregon, Washington, and British Columbia, accumulating knowledge about these landscapes and becoming more efficient as they migrated to each new region. The process of landscape learning was on display as locational knowledge turned into limitational knowledge and ultimately the more experienced miners certainly had a social knowledge of gold deposits. In 1859 however, the ideas about mining that were developed in California became challenged by mining fields to the east.

In 1858 gold was discovered at Pike’s Peak in Colorado which kicked off a major rush the following year. With the vast deserts of the Colorado Plateau and the Great Basin separating Colorado from the previously established mining frontiers, the Pike’s Peak rush broke the pattern from the rushes of the previous ten years. For example, the miners predominantly came from the Southeast and Midwest, traveling through the Missouri “frontier” region overland to reach the Colorado gold fields (Paul and West 2001). Improved transportation systems in the form of railroads allowed people to travel quickly from the southeast in to the heart of the Great Plains where supply lines were rapidly established to reach Colorado.
These two groups of miners—one group of which gained large amounts of experience in California and the Pacific Northwest and the other group being less experienced miners who cut their teeth in Colorado—would finally meet with the commencement of the first mining rushes in the Northern Rocky Mountains. Additionally a new demographic appeared in the gold rushes of the Northern Rockies—refugees and deserters fleeing the horrible violence of the American Civil War. In 1860 gold was discovered in Pierce, Idaho with a subsequent rush occurring the following year. With the news spreading of gold strikes in the Northern Rockies, miners flocked to that region, which was one of the last areas of the continental U.S. to be explored for gold. The first reports of gold occurred in the Montana Territory in the Deer Lodge Valley in 1858 with the first major gold rush occurring along a small tributary of the Jefferson River called Grasshopper Creek on July 28, 1862, when two miners who had just come from the Colorado goldfields, John White and William Eades, stopped to test their luck (Merrill-Maker 2006: 94-95). Many more gold rushes followed in the coming years. In 1863 gold was found on Alder Gulch which led to the establishment of one of Montana’s most famous boomtowns, Virginia City (Merrill-Maker 2006: 109). By the end of 1862 and even more so in 1863 fortune seekers began exploring every nook and cranny in Montana for gold.

Background on Mining in Garnet Range

Once news of those first few gold rushes reached other parts of the U.S., many prospecting parties scoured the gulches and creeks throughout Western Montana in search of precious metals. Even though fur traders had inhabited the region for some time, the 1860s witnessed a much larger wave of settlement resulting from the discovery
of other precious resources in the form of minerals—particularly gold and silver. While Indigenous Americans had lived as hunter-gatherers in this region for at least 11,000 years (MacDonald 2012, Davis 2019), the major influx of nineteenth-century gold-seekers significantly changed the way people made a living in the Garnet Range, with extractive industries altering natural landscapes in relatively short amounts of time.

In early 1865, a prospecting party² discovered placer gold deposits along the main stem of Elk Creek in the Garnet Range. Later that same year miners discovered more gold deposits on Bear Creek, which was a major drainage on the south side of the Garnet Range. By the spring of 1866, mining camps and boom towns began to spring up

² Most literature credits George W. Morse with the discovery of gold in Elk Creek. However, Morse himself credits “Walker’s party, from the Kootenea [sic]” for the discovery of gold in Elk Creek (Morse 1915:2).
throughout the Elk Creek and Bear Creek drainages (Figure 2.1). This began the boom and bust mining cycle in the Garnet Range that continues today. Eventually more than gold would be taken from the Garnet Range, with profitable deposits of silver, copper, lead, and barite additionally mined in the region. Since the present study is dealing with the evolution of historic mining landscapes, only the history of metals mining (gold, silver, copper, and lead) will be discussed in this section. This is not to say that the barite mining has not been a factor in the evolution of the mining landscapes of the Garnet Range. Barite mining has occurred in the Garnet Range only in the last half century. As a result, barite mining sites are not considered “historic” by Federal law and do not appear in unpublished, or grey, literature that describes the archaeological record of the region. As far as metals mining is concerned, there were three phases (placer, lode, and dredge mining) in the Garnet Range, each with their own set of characteristic landscape features.

Each of the three phases—placer mining, lode mining, and dredge mining—left signatures on the landscape of the Garnet Range. Each was initiated as a result of decision making processes that were influenced by the landscape learning of miners living in the Garnet Range at the respective time. Below is a description of the development of the mining sequences in this region that has been found in records on file at the Bureau of Land Management Missoula Field Office and the Mike and Maureen Mansfield Library at the University of Montana.

**Placer Mining in the Garnet Range**

Placer mining began along the main stem of Elk Creek in 1866 with the establishment of two mining camps: Reynolds City and Yreka. Reynolds City was...
named after Jack Reynolds and was located on the Henry Mulkey Toll Road that connected the Clark Fork River to Reynolds City (Figure 2.3).

Figure 2.3. Zoom in of 1883 GLO map showing the locations of Yreka, Reynolds City, and Bear Town. The area had not been platted by the GLO at this time.

From Reynolds City the toll road continued down Elk Creek to Yreka and then onto the Blackfoot River (Taylor 1982:9). Yreka was believed to have a post office between 1871 and 1882 and was reportedly occupied into the twentieth century. Reynolds City on the other hand, was already abandoned by 1873 (Taylor 1982:9). Reynolds City and Yreka functioned as seasonal outposts for the miners during the warm months of the year. Both certainly had typical mining camp establishments, such as saloons and general stores, but these places were likely largely seasonally abandoned during the snowy winter months with miners retreating to the major regional supply centers of Missoula, Helena, and Deer
Lodge (Figure 2.4). Once Beartown was established, some miners may have also overwintered there.

Figure 2.4 Postal Route Map of Montana from 1884. Notice that Reynolds City had already disappeared.

During the initial phase of placer mining, extraction technology consisted primarily of pans, rocker boxes, and sluices. Taylor gives a description of landscape features associated with a placer mining site just south of where Reynolds City was located:

This system lies south of the remaining portion of the town and consists of an over 500 meter length of bedrock flume and two water retention dams built of stone which tie into the system. The appearance of a bedrock flume resembles that of a channeled stream banked with square, dry lain rock walls. This appearance is deceptive in that the bedrock flume is not a
structure per se, rather very efficient method of stockpiling waste tailings on a relatively short linear claim. In a placer mine only the sediments and gravel yield gold and virtually all large boulder, rock, and cobbles are non-mineral waste. It was law during the 1860’s to stockpile waste on one’s own claim and rather than spending time and effort moving waste piles to various locations before placering, a practice evolved which efficiently stacked wastes, enabling the miner to dig to deeper level in a stream bottom without resorting to the dangerous coyote shaft (Taylor 1982:11-12).

The two factors limiting placer mining at this time included the ability to efficiently store waste rock and water availability. One of the most important parts of the placer mining process involved diverting water from a creek into wooden flumes or ditches in order to transport it to the site where gravels would be washed. This was often a major problem in a region such as the Garnet Range that does not always receive steady, year-round precipitation.

To regulate water for sluicing was the biggest problem of the miners…To preserve the supply, reservoirs were built at the head of the gulches and water released for only a couple of hours daily. It was necessary to close the reservoir gate to store enough water to work gravel the next day. Early in 1866, some fights occurred over water rights, but generally the miners worked in unison, each using the water in turn as it flowed past his claim (Pardee 1931:1).
Although, Pardee does not cite her sources, she likely obtained this information from miners on visits to the Garnet Range with her father J.T. Pardee, a well-known geologist at the time who published a geologic bulletin on the region (see Pardee 1918).

Not much is known about precipitation totals in this region during the mid-nineteenth century but the water supply was always on the minds of miners in this part of Montana. The lack of water supply is reflected in local newspapers during this time period, such as this Deer Lodge newspaper report:

Maginnis, Hearrick, Granite, Shanghae, Cunningham and other tributaries of Elk Creek will continue to furnish their accustomed supplies of the precious metal; although it is feared that their productiveness will be limited, on account of a scarcity of water, unless they have rain during the next two months (Weekly Independent 1868:2).

Not only did the water supply have an effect on the miners; it also had an effect on all of the communities that served as shipping points for precious metals. Deer Lodge, located approximately 40 miles to the southeast, heavily relied on the production of the mines in the Garnet Range. Deer Lodge seemed to feel the economic impact of the lack of water almost as much as the mining camps themselves did, as illustrated in the Saturday May 29, 1869 issue of The Weekly Independent:

The prospect for an abundant harvest of gold was never brighter in this county than at the present time. The rains of the past week have thoroughly saturated mother earth, and the bountiful fall of snow upon the high mountains insures an abundance of water for the miners…The late storm is sufficient to add a hundred thousand dollars to the circulating
medium of this county within the next thirty days. Business of all kinds has languished, and the miners have been comparatively idle. But now a change has taken place. Plenty of water has set the miners at work, and soon our business men will feel the effect of the flow of the yellow metal from the hands of the producer to their own. The long faces of a week ago are now changed to radiant smiles (Weekly Independent 1869:3).

It appears that desperation for water must have set in during the spring of 1869. Another article from the Weekly Independent states “they [miners] have been waiting patiently for the past six weeks for rain, and many had begun to despair, and were preparing to seek some place where they could be at work” (1869:3). Various accounts given in the Deer Lodge Weekly Independent between 1870 and 1873 indicate that there was enough precipitation in the Elk Creek drainage to continue to profitably operate placer mines even though the “mining season” was often short. It appears that most placer miners abandoned the Elk Creek drainage by 1870 (BLM:2); however, more documentary evidence is needed to fully substantiate this claim.

Taylor argues that the partial abandonment of the Elk Creek drainage in the early 1870s allowed for different placer mining techniques to be used.

The general abandonment of Elk Creek by the early 1870’s meant that hydraulic mining became an economic option. Most of the placer bearing drainages by that time must have had the bedrock flumes constructed by individuals or small partner groups working under the constraints of water availability and space. Major water developments such as retention dams
were abandoned and the relinquishment of claims permitted a larger exploitation of space. All that was required was the manpower to excavate the ditches required to carry water to an area to be mined hydraulically, and to remove the bedrock flumes and other, often large, waste rock away from the working face. Hydraulic placer mining could be a relatively major operation or fairly minimal and to some degree it has continued to the present day (Taylor 1982:14).

During the most basic form of hydraulic placer mining, water was channeled through ditches to a particular mine’s face where it was used to erode the gold bearing gravels and carry them into a collection area. From there the gravels and sediments were run through either a sluice box or a long tom in order to extract the metals. A more refined hydraulic placer mining technique was also used that involved either a pressurized hose or a monitor that was elevated by some sort of framework. “Water from an elevated source was led to the highest point overlooking a site, dropped into a headbox into a metal pipe known as a penstock and thence to the monitor, or giant, which directed water at high pressure across the working face” (Taylor 1982:15). Hydraulic mining tended to cause much sedimentation in the waters downstream of an operation which is still evident today in the Elk Creek Drainage.

The lack of a steady supply of water year after year and the influx of larger, more capitalized mining companies were factors that caused a shift away from placer mining techniques. Water availability and its limiting ability on placer mining requires additional research, but was outside the scope of this initial effort. Future research on

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3 Here Taylor seems to not understand that the bedrock flumes were not strictly for carrying waste water but also the locations of sluice boxes.
water availability should be focused on weather observation data, personal accounts of weather during this time period for Western Montana, and scientific environmental reconstruction techniques. If they exist, historical weather station records could provide quantitative data for extrapolation to potentially reconstruct precipitation patterns for the Garnet Range. Qualitative analysis of accounts in newspapers and personal correspondence can provide another source of data for water pattern reconstruction. Some of this work has been done by archaeologists at the BLM’s Missoula Field Office as part of their documentation efforts related to placer mining systems in the Garnet area (see 24GN994 Anderson Hill Placer Ditch System, 24GN1032 MS751 Placer System, 24GN1033 Upper 1st Chance Placer #1, 24GN1041 - Upper 1st Chance Placer #2, 24GN1046 McManus Placer Ditch System, and 24GN1050 Upper 1st Chance Placer #3).

Preliminarily there seems to be a lack of weather stations at the time in the Northern Rockies. In the future, to supplement what documentary data is available, techniques from the natural sciences will have to be employed. In particular, an analysis of tree ring and palynological data should be particularly useful. Additionally, the Northern Pacific Railroad kept precipitation records and those would certainly be useful for constructing models of past precipitation patterns in the Garnet Range.

**Lode Mining in the Garnet Range**

Following the pattern of mining throughout the American West, once the easily extracted placer deposits had all been claimed or exploited, miners transitioned to lode mining to extract the source hardrock deposits. The first lodes were discovered in the Garnet Range in 1866 during the height of the placer mining rush. By 1868 a total of eight lode claims had been filed including the Lead King, Grant and Hartford, and
Shamrock lodes, along the Bear Creek drainage. Despite being the first lodes to be located in the district, large-scale mining at these locations did not occur until 1896 (Pardee 1918:171). The first actual lode mine to open in the Garnet Range was the Henry Grant mine in 1882 followed by the Haparanda Mine, which began operations in 1886. The Haparanda Mine was started by B. A. C. Stone and is located “on the slope west of Elk Creek about half a mile southeast of the Dandy” (Pardee 1918:203). There are numerous, possible explanations for the lag time between the discovery of lodes and the extraction of those lodes. Many miners, such as George Morse had been in the Garnet Range continually mining since the inception of the original rush in 1865. Certainly, they held working social knowledge of placer deposits. Did that knowledge of placer deposits not carry over to lode deposits? Perhaps during the years between the initial placer mining rush and the initiation of lode mining there was a sufficient enough water supply for placer mines to produce well enough that the capital investment to start lode mining was considered unnecessary. Another possibility could be that transportation systems that accessed the Garnet Range (and western Montana in general) were not developed enough to allow the transportation of the equipment used to process the ore produced from lode mines. Taylor provided comment [to some degree] on the transportation systems in the Garnet Range, addressing how they related to the development of lode mining in the region. Taylor argues that B. A. C. Stone’s pioneering effort at the Haparanda lode and milling its ore demonstrated to other miners that the lodes could be mined despite the short life span of the Haparanda mine (Taylor 1982:18).

A wagon road had been constructed down Bear Gulch to the Mullan Road south of the Clark Fork River by 1880 and in 1884 Bearmouth was an
operating station on the Northern Pacific Railroad. All that was needed was sufficient capital to develop mines and especially the milling capacity to refine ores to the point where shipment and smelting costs did not consume most of the profits. Stone himself did not apparently continue this milling venture for very long and reverted to placer mining at Stone’s Flat (Taylor 1982:18).

Unfortunately, Taylor does not more explicitly develop the connection of transportation systems with access to capital (primarily mining equipment), making broad generalizations without citing his information. Taylor continues the development of his arguments concerning the rise of lode mining in the Garnet Range by talking about broad economic trends in the U. S. during the late nineteenth century.

Events in 1893 made the exploitation of lodes within the Garnet Range economically desirable. A depression swept the country by June and the price of silver crashed. Silver mines in the Flint Creek Valley and other areas in Montana and Idaho closed. On August 1, 1893, for example, the mines at Granite closed and more than 3,000 people left the camp in one day, leaving it a ghost town overnight (McMillan 1964:72-73). Skilled miners were jobless and surplus lode mining and milling equipment was surplus. By 1894 plans for lode mining had begun (Taylor 1982:18-19).

Here Taylor’s argument of surplus equipment and labor caused by economic depression seems reasonable. However, this passage points out another liability in using Taylor as a source. He tends to cite sources that do not show up in his bibliography such as the
McMillan sources cited above. Taylor also tends to cite sources that are obviously using exaggerating quantities of objects, people, etc.

Although no extensive historical accounts of lode mining in the Elk Creek drainage exist, Pardee’s Ore Deposits of the Northwestern Part of the Garnet Range, Montana provides at least a description (along with some maps) of where all of the lode mining had occurred in the Elk Creek drainage up to 1918. By 1918 there had been significant lode claims in three districts that were either fully or partially in the Elk Creek drainage. In the Elk Creek District there was the Dandy, Ohio, Buckeye, Haparanda, Masculine, Arkansaw, Idaho, Alabama, Independence, and Lynx lode claims. The Coloma district contained a large complex of mines owned by the Montana Gold Mines Co. and the Comet mine. The Top O’ Deep district contained numerous lode claims, however Pardee did not differentiate between the lode claims that were in the Elk Creek drainage component of the Top O’ Deep district from the ones that are in the Deep Creek drainage. The quality and quantity of the descriptions Pardee gives for each of the lode claims varies widely. For some lode claims, Pardee goes describe the geologic makeup of the claim, the spatial location and setting of the claim and individual mines, the equipment available to process the ore, where the metals or unprocessed ore were shipped to, and descriptions of the actual physical details of the underground mine workings (see Pardee 1918:201-203 for Dandy Claim as an example). For other claims though, Pardee provided hardly any information. Other than geologic data, Pardee does not explain how he obtained the information he presents, although it is assumed that he consulted with various mining superintendents.
**Dredge Mining in the Garnet Range**

Just like placer and lode mining, dredge mining leaves its own unique signature on the landscape. Virtually nothing in the archaeological literature is written about dredge mining in the Garnet Range. Most of the grey literature for the Elk Creek drainage was written in the late 1970s and early 1980s for timber sales. At that time features associated with dredging might not have been 50 years old yet and hence would not have been included in the archaeological literature. Taylor reported on “a drag line dredge worked the Yreka Meadows in 1939 and 1940, and again in 1946” (1982:22). Taylor did not mention the dredge mining because he thought it was not an archaeological site. He mentioned the dredge mining because it destroyed part of the Yreka town site, which was officially considered an archaeological site. In the future, more documentary research needs to be conducted to create a historic context for dredge operations. This information seems to be readily available in mining industry journals published throughout the twentieth century.

With the initial discovery of placer gold in the 1860s, the Garnet Range transitioned through the three main phases of gold mining districts. Placer settlements of Reynold’s City and Yreka boomed, reaching populations of several hundred each. Water shortages by the early 1870s hampered the placer mining efforts, leading to a short bust in the 1870s and 1880s throughout the district. Hard rock lode mining surged in the last part of the 1880s and by the 1890s new settlements emerged to support these mines including Garnet and Coloma. By the 1920s most of the hard rock mines had played out but renewed placer mining commenced with the introduction of dragline dredges in Elk Creek.
Chapter 3 Documentary Research Methods and Resources Related to Placer Mining

Placer mining has been well documented in popular media in the form of Hollywood westerns, historical fiction, professionally written histories, and archaeological social histories. It is even referenced in sports culture a la San Francisco 49ers. However, very few historians and archaeologists are aware of the vast amount of primary resources available to researchers relating to placer mining. In this chapter, I include a guide to primary and secondary resources available pertaining to placer mining. This guide will include primary resources related Federal, state, and local governments in order to build a legal and historical context for placer mining cultural resources. With the exception of White 2017 and some grey literature by government agencies very few studies of industrial placer mining include records research and instead focus only on the physical aspects of such resources.

Federal Resources

During the nineteenth century, virtually all of the western United States was at one point owned by the Federal Government. The Federal Government stole land from Native Americans, bought land from European colonial powers, and won land through wars. After over two centuries of land ownership in the West the Federal Government has produced and continues to produce tremendous amounts of records. Federal records of interest to placer miner researchers can be found primarily in four locations. They include the General Land Office (GLO) historic database, the National Archives and Records Administration (NARA), the Library of Congress, and the various land
management agencies that still manage vast acreages across the West (i.e. BIA, BLM, BOR, NPS, USFWS, and USFS).

*General Land Office*

The GLO was founded in 1812 to manage the Public Land Survey System (PLSS) and distribute (or in the words of Congress “dispose of”) the “public lands” of the United States. While in modern popular parlance the term public lands is often used to describe any lands owned by the Federal Government, from a legal and historical context that is not correct. Public lands are legally defined as lands that have not been designated for a specific use. To accomplish its mission to manage the PLSS and distribute public lands the GLO was directed by Congress, through various laws including the Homestead Act, the Preemption Act, and later the General Mining Law, to map these lands and implement a system of patents to document the distribution of said lands.

GLO records contain a vast amount of useful documentation for use by placer mining researchers including survey plats, patent records, and mining claim records. The BLM GLO records website describes survey plats as being:

part of the official record of a cadastral survey. Surveying is the art and science of measuring the land to locate the limits of an owner's interest thereon. A cadastral survey is a survey which creates, marks, defines, retraces or re-establishes the boundaries and subdivisions of Federal Lands of the United States. The survey plat is the graphic drawing of the boundaries involved with a particular survey project, and contains the
official acreage to be used in the legal description.

(Source: [https://glorecords.blm.gov/default.aspx](https://glorecords.blm.gov/default.aspx))^4^ Survey plat records generally include a map and accompanying field notes. The maps often, but not always, show sketched topography, trails, roads, claims, patented land, large-scale mining features, ditches, dams, and township boundaries. The content of the field notes that accompany the maps vary wildly depending on the surveyor. At a minimum, they give a description of the survey process including a detailed account of the survey methods, the instrumentation used, and the names of the individuals involved in the survey. Some surveyors however extensively documented the areas they were surveying by including information on roads, mining features, general access to the area, etc. While that level of content in the survey notes is somewhat rare when very detailed notes are encountered they are invaluable to anyone researching placer mines.

In addition to the survey plat records, the GLO produced tract books also contain relevant information for research like that addressed here. Tract books contain listings of all transactions involving surveyed public lands including how, when, and to whom public lands were transferred. Unfortunately for researchers in Montana, these books have not been digitized and the BLM state office in Billings must be visited to view these documents.

Federal Land Patents issued by the GLO contain information about the original transfer of land from the Federal Government to a patentee (i.e. an individual, corporation, etc.). These records can be used to tie individuals to a

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^4^ [https://glorecords.blm.gov/default.aspx](https://glorecords.blm.gov/default.aspx) is the web address for all digitized records related to the GLO. Paper copies of these records are housed by the National Archives.
specific plot of land, with a legal description, at a specific time, which can be useful to placer mining researchers. Patents were granted based on certain conditions being met by the patentee. These conditions were determined by which legal authority the patent was being granted under and usually included conditions such as an upfront fee followed by annual “improvements” amounting to a certain dollar value for a predetermined period of time to be implemented on the land being patented. After all of the conditions were met the patent was permanently granted to the private entity. If the conditions were not met in the specified period of time the land would return to Federal ownership. The legal notions of patents were not implemented until the passage of the 1862 Homestead Act. This act however did not address the patenting of land for mining purposes. Congress chose to address the patenting of land for mining purposes in later acts including the Lode Mining Law of 1866, the Placer Mining Law of 1870, and ultimately the General Mining Law of 1872, which clarified discrepancies in the previous two laws and became the authority for the patenting of all mining lands. It is unfortunate for placer mining researchers that these laws were passed so late in time relative to the original gold rushes in the West. Prior to the passage of these laws mining claims were recorded in in a variety of ways from formal documentation at local courthouses to informal documentation by localized associations of miners. Placer mines created after the 1872 mining law often have more documentation associated with them and are easier to research.
The NARA holds all of the archived documents of the U.S. Government. Many of these documents have been digitized and are in a much more retrievable format from dedicated websites of both private (i.e. www.ancestery.com for census records) and public origin (i.e. https://glorecords.blm.gov/default.aspx for GLO records). Instead of focusing on documents that can be found easily in digital databases elsewhere I will focus on documents available at NARA that are useful to the placer mine researcher that are not digitized including postal records.

The U.S. Postal Department was founded in 1792 (replaced by current U.S. Postal Service in 1970) and expanded constantly as the U.S. increased its territory westward to deliver mail to its inhabitants. To logistically make this happen, post offices were opened even in some of the most remote outposts including Yreka. To ensure that they efficiently delivered the mail, the U.S. Postal Department Division of Topography created detailed maps of transportation routes for delivering mail to even the most remote locations. These rural delivery route maps include post office locations, mail delivery routes, mail-carrying railroads, frequency of mail service, and distances between post offices. They can be an excellent source of information for understanding the transportation networks that both supplied mining camps and allowed mining camps access to outside markets.

The Library of Congress (LOC) contains one the largest book collections in the world, however these vast collections are of no use to researchers unable to
visit the LOC’s Washington, D.C. location. What the LOC does offer the placer mining researcher is a vast digitized collection of photography that visually illustrates the progression of mining rushes across the American West.

Additionally, the LOC houses the Historic American Building Survey (HABS) and Historic American Engineering Record (HAER). Both of these contain records relating to mining.

**Federal Land Management Agencies**

Federal land management agencies, including the Bureau of Land Management (BLM), U.S. Forest Service (USFS), National Park Service (NPS), U.S. Fish and Wildlife Service (USFWS), Bureau of Reclamation (BOR), and U.S. Army Corps of Engineer (USACOE), control more than 25% of the surface area of the U.S., with most of this being in the American West where the majority of placer mining occurred. Federal Law requires these agencies to manage archaeological sites within their jurisdictions; this has produced a large dataset including an untold number of placer mining related sites for archaeologists. However, there are several major problems with this dataset, including the fact(s) that the information is not consolidated, reporting standards vary widely based on jurisdiction/agency, and there is the variability among archaeologists populating this data.

**State of Montana Resources**

There are a number of resources available to placer miner researchers at the state level in Montana (similar resources exist in other western states). These
resources include the Montana Historical Society (MHS), the Montana Memory Project, and the Montana Department of Environmental Quality.

Based in Helena, MHS was founded in Bannock in 1865 and is the state agency in Montana responsible for managing many aspects relating the state’s history. This includes operating the state museum, the state library, MHS press, and the Montana State Historic Preservation Office (MTSHPO). Of particular interest to the placer mining researcher are the state library and the MTSHPO. The state library is by far the largest source of information available on Montana history. It contains a vast archival collection including thousands of manuscripts, letters, business records, state government and legislative records, oral histories, maps, Montana newspapers, and photos. The second resource of use at MHS is the MTSHPO, which houses all of the records related to known recorded archaeological and architectural sites in Montana.

The Montana Memory Project (MMP) is an online digital archive of resources relating to Montana history submitted by various cultural heritage institutions around the state including local historical societies, museums, etc. Items contained in the digital collection include maps, photographs, historic documents, out of print books, diaries, oral histories, audiovisual resources, illustrations and art. As mentioned, various cultural institutions usually submit the resources contained within the MMP, and because these institutions voluntarily submit items to the database the records sometimes feel very ad hoc; for example, some portions of the state and/or times in history are well represented while others are very poorly represented. As the MMP continues to
grow it will likely become a resource of value to researchers of placer mining in Montana.

The last state level resource of interest to placer mining researchers is the Montana Department of Environmental Quality (MTDEQ) Abandoned Mine Lands (AML) program, which maintains an online collection of historical narratives (http://deq.mt.gov/Land/AbandonedMines/linkdocs) for every mining district in Montana. While at first this collection of historical narratives may seem comprehensive, much of the information is out of date and somewhat dubiously sourced. The most useful portion of these narratives are the bibliographies at the end of each district’s description. These bibliographies, while not exhaustive, can often be a good starting point for researching a particular area.

**County Level Resources**

County court houses may be one of the best sources of documentary information for researching physical features at placer mining sites as well as constructing timelines of development at placer mining sites. Records can vary drastically between counties but almost all counties have some variant of these three types of resources—real estate transaction records, claim records, and water right records. Virtually all counties keep records relating to real estate transactions. This can be useful for placer mining researchers as patented mining claims are considered private real estate and are usually required to be recorded at the county court house. It should be noted that some counties keep track of mining real estate transactions in separate files from most other real estate
transactions. Additionally, some counties in the nineteenth century also attempted to keep track of unpatented claims—while others did not—and the ones that did often lumped them all together in the same filing system which themselves vary widely between counties. All of this is confusing considering that patented claims should have a clear chain of custody whereas unpatented claims often have “loose ends” associated with their files. The fact that court houses often kept track of unpatented claims is often very useful for building more complete landscape histories of mining districts as the GLO did not document such claims. To complicate things further, there is the issue of mineral estate vs. real estate and when doing county court house research one has to keep this in mind—as some counties document those transactions separately. Although from my experience in Western Montana, it seems that the notion of mineral estate did not seem to come about until the early twentieth century.

The other records of importance at county court houses are water rights records. Water is the most important resource to have access to in any placer mining district, and so people often meticulously documented water rights. Water rights records can vary widely between counties but often contain information relating to the area claimed, the type and sometimes locations of water utilizations structures (i.e. ditches and dams), and the ownership histories of the claims. This information is especially useful in understanding the developmental histories of placer districts—especially complex districts where ditches and dams seem to be everywhere. County court houses can often be frustrating places to do research because the organization of the records is often not intuitive like they are at
formal archives and libraries. However, they often yield some of the most
important information relating to placer mining of all of the aforementioned
resources. As mentioned above, little research has been conducted on placer
mining, with the exception of some gray literature and White (2017), and even
that has been lacking in documentary public records research. Mining itself is a
destructive process that destroys much of the evidence of its creation. This makes
documentary records a key component of building the legal and historical
contexts of placer mining landscapes. While this is not a comprehensive list of
public records for placer mining research, it is intended to function as a jumping
off point for future placer mining researchers.
Chapter 4 What is Placer Mining and How Does it Work?: Process of Placer Mining

Exploration

In order to placer mine, one has to possess a basic geological knowledge of the potential location of gold deposits. As illustrated throughout this thesis, the process in which one acquires this knowledge is landscape learning. Once a suitable alluvial deposit is located, it is essential to sample or test the deposit, which is far more complicated than a simple gold pan and some water as commonly depicted. In hardrock mining, the process of sampling was quite easy and consists of taking a chunk of rock to an assayer for a series of chemical tests. Placer mining, on the other hand, required a miner to invest a substantial amount of labor to test a deposit. This was arguably the most crucial step in the entire placer mining process. In fact, “a large portion of all placer operations failed because the gold in the gravel was insufficient to repay the cost of even the most efficient mining, not to mention the return of money invested or interest thereon” (Gardner and Johnson 1934: 26). In other words, if a miner was not intimately familiar with or did not sufficiently sample the deposit, which many miners failed to do because of lack of knowledge and experience, then they were destined to fail at placer mining.

While there were many methods to sample or test placer deposits, during the latter half of the nineteenth-century techniques such as panning, drifting, and test-pitting were probably the most common. As the easily accessible shallow placer deposits were worked out, additional techniques such as shaft-sinking were used to test deeper deposits. Panning in its most basic form consisted of scooping up gravel with a gold pan and gradually working the lighter pieces of gravel out of the pan by hand, so all that was left was gold and rock that miners generally referred to as “black sand” (which in some cases
was not sand at all). Generally panning was done along the banks of a body of water or in a body of water (i.e. stream bed or river bed). Quite often the miner needed to use a pick and a shovel to dig into a bank, peeling away the surface layer off in order to remove the weathered top layers of gravel. A miner then had to make their own determination as to whether to continue mining that particular location or move to a new one based on how much gold appears in their gold pan. Advantages to panning over other techniques, included the relatively inexpensive nature of the equipment, as there was not much equipment involved; the fact that such equipment is mobile allowing an individual to test many locations in one day, and the fact that panning can be done by one person with no specialized experience. Although there seems to be no sources available that give statistics on the most common prospecting methods in the late nineteenth century, it seems safe to assume that panning was the most common.

Another common form of testing an alluvial deposit for placer gold was test-pitting. This technique traditionally involved digging a round or square pit down to bedrock. The gravel was initially piled on canvas or a tarp next to the pit. Each layer was then transported to a water source and run through either a rocker or a sluice box to determine a gold yield from the pit and to determine the layer in which the pay streak was located, if one existed. The down side to this technique was that it was only useful in locations where the gravels were shallow enough so that a person could throw the dirt out of the pit. However, in the Northern Rocky Mountains where placer deposits were relatively shallow, this technique seemed to be a favorite among placer miners given that there are tens of thousands of test pits dotting the landscape—although many remaining test pits may be associated with hard rock mining as placer test pits were often destroyed.
by subsequent mining. While there is no quantifiable account to prove this, my own experience of hiking through many of the major gold fields in the Northern Rockies suggests that this is the case. This technique required relatively little capital and labor investment, and people could dig numerous test pits in a day. The basic equipment needed to accomplish this task consisted of a pick, shovel, a piece of canvas or a tarp, some way to haul the gravel, and either a rocker or a sluice box. Gardner and Johnson note that one individual could effectively excavate eight cubic yards of semi-loose gravel in eight hours (1934a: 28).

A more labor and capital intensive version of test-pitting was to test a deposit by shaft-sinking. By the 1930s this method seems to have become the “usual method of testing placer ground” (Gardner and Johnson 1934a: 29). Gardner and Johnson do not give a justification for why they consider this the “usual” testing method, but it is possible that it was due to the fact that most of the shallow deposits had already been mined out by the 1930s. To test by this method a shaft of course was dug into the deposit. These shafts generally ranged in size from three feet by four feet to four feet by six feet and were supported by cribbing timbers that ranged from four to six inches in diameter, similar to typical hard rock mining operations (Gardner and Johnson 1934a: 29). Miners removed gravel from the shaft using a hand windlass, or in later years, a power windlass connected to a bucket via a cable or rope. In some cases, the gravels were so compacted that miners needed explosive charges. Once miners removed gravel from the shaft, they worked it in either a rocker or a sluice box. However, in the 1930s, in some instances miners would have probably transferred gravel to a wash plant. If done in favorable conditions, two men could make 10 vertical feet of progress in a day.
Gardner and Johnson give several examples of shaft-sinking including one from the Garnet Range, near the subject area of this thesis:

On Bear Gulch, north of Bearmouth, Granite County, Mont., a 4- by 6-foot shaft was sunk to a depth of 32 feet in 1932 at a cost of $3 per foot. The shaft was largely in fine, mucky, loose, angular gravel. It was cribbed solid with 6-inch round timber. A crew of three men averaged 6 feet per day. Wages were $3.50. Little or no water was encountered, and no blasting was required as the ground could be loosened by pick (1934a: 30).

It is unknown what sort of mining technique took place after this testing was completed.

Drifting was another frequently used method of testing a location for placer gold in ancient stream beds. This method consists of miners digging a drift, which is a horizontally dug tunnel often at the bottom of a shaft, into the deposit where the excavated gravel was then removed from the drift and run through a sluice box. Drifting required substantially more investment of capital and labor than either panning or test-pitting. In California this was probably a common method of testing, as the western slope of the Sierra Nevada Mountains contain numerous ancient river systems that, at the time of the California Gold Rush, contained massive and deep placer deposits. In the Northern Rocky Mountains, however, this probably was not widely used as a testing method as placer deposits in that region tend to be fairly shallow.

Generally the results of panning and test-pitting were not scientific but required the miner to act on their own intuition and experience to interpret the results. Shaft-drilling and drifting were generally done by more highly capitalized enterprises and thus
the results were more likely to be interpreted by a professionally trained mining engineer or geologist. Either way the next step in the mining process was to develop a mine in the most promising spot based on the testing results.

Initial Development

During the gold rush phase of mining in the Western U.S., placer mines generally started with low levels of technological sophistication, environmental resource usage, labor, and capitalization. Once miners found a promising pay streak, these four things increased in size and complexity, increasing with each level of higher yield until the mined played out. Gardner and Johnson lay out an excellent “classification” (as they call it) of the levels of intensification that occurs and these are outlined below.

**Hand Shoveling**

The most basic form of placer mining is hand shoveling. Gardner and Johnson describe hand shoveling as “picking and shoveling surface-placer gravels and washing the material excavated to recover the valuable minerals” (1934a: 46). While the basics of how the gravel is excavated is simple, during the hand shoveling process the act of washing the gravel varies widely. In some instances, miners washed the gravel at the diggings while in other situations they moved the gravel to another location via wheelbarrows, pack animals, carts, etc. for washing. Gardner and Johnson classify hand shoveling into sub categories based on the way the gravel is washed. These categories are panning, rocking, use of a long tom, sluicing, and dry washing (1934a: 46). While Gardner and Johnson list Dry Washing as a possible extraction technique, it was only used in the desert southwest where there was not enough water to initiate the other
methods. Given its lack of use in the Northern Rockies, this technique is excluded from discussion herein.

Panning is by far the most simple and most laborious means of mining placer deposits. It is simple enough that most people can get moderately proficient at it in an afternoon. The typical gold pan is constructed of stiff sheet iron and is 16 inches in diameter at the top and two and a half inches deep. The rim is flared out generally at a 50 degree angle from bottom to top. Garner and Johnson give an excellent description of the physical motions of panning:

The pan usually is filled event with the top, or slightly rounded, depending somewhat upon the nature of the material being washed and the personal preference of the panner; it is then submerged in the water. Still water 6 inches to 1 foot deep is best. While under water the contents of the pan are kneaded with both hands until all clay is dissolved, and lumps of dirt are thoroughly broken. The stones and pebbles are picked out. Then the pan is held flat and shaken under water to permit the gold to settle to the bottom. The pan is then tilted and raised quickly so that some of the lighter top material is washed off. This operation is repeated, occasionally shaking the pan under water or with water in it until only the gold and the heavy minerals are left; this material concentrates at the edge of the bottom of the pan. Care must be taken that none of the gold climbs to the edge of the pan or gets on top of the dirt (1934a: 49).
A proficient miner can wash about ten pans of dirt in an hour, which adds up to washing about one half of a cubic yard per day (Gardner and Johnson 1934:48-49). However, that same miner could pick and shovel many times that amount of sediment in that same hour.

**Rocking**

A more efficient way of washing gravel is by using a rocker. Rockers have been traditionally homemade and thus vary substantially in their size and component parts. However, the basic concept of how they function remains the same. When gravel was poured in the rocker, it was rocked back and forth like a baby’s cradle (and in fact they are sometimes called cradles) as water was added, with the idea that this motion would sort the gravel. In order to work a rocker the miner would put a shovel full of gravel into the hopper, usually on top and rear of the device. As the rocker was gently shaken back and forth, a miner would pour a small amount of water into the hopper with some sort of actual or improvised dipper. The gravel would travel out of the hopper and on to an “apron,” a piece of canvas nailed to a board that is tilted at a 45-degree angle. The apron caught most of the gold. The remaining gravels and gold not caught in the apron then would pass over a series of small riffles, which caught the rest of the gold while everything else is discharged out of the end of the rocker. Generally, two people were necessary to use a rocker as one has to rock the device while the other has to shovel gravel and pour water. Gardner and Johnson estimate that one to three cubic yards of material could be excavated and washed per man-shift (which is presumed to be eight hours)(1934a: 49). Rockers have the advantage of being relatively portable as well as needing no infrastructure to deliver water to them, as a bucket full of water will suffice.
Use of Long Tom

A tom is a screened hopper designed to reject the larger gravel and allow the gold and very fine gravel to pass through (Young 1970:117). At the end of the tom would be riffles, a sluice box, canvas, or some other means of catching gold. Young (1970:117-118) believes that long toms fell out of favor very early on in the American West because of the invention of the sluice fork, a tool that resembles a hay fork but with many flattened tines, which enabled a sluice box to be used efficiently without a tom.

Small Scale Sluicing

While sluicing was used in highly capitalized operations the goal here is to only talk about small scale sluicing operations where the picks and shovels were still the primary excavation tools and where little ditch construction was needed to operate the sluice. Gardner and Johnson believe that “the method of shoveling-into-boxes has its chief application in the working of small deposits by men with little capital but a willingness to work hard” (1934a:53). In order to set up this sort of operation a group of miners had to determine a good place to erect their sluice. The boxes for this sort of operation generally varied from eight to twenty-four inches in width and were built to be as long as needed. The ideal slope of the sluice was six to twelve inches drop per twelve linear feet (Gardiner and Johnson 1934a:53-54). Then a minimal ditch was constructed in order to get water to the sluice from a nearby water source. In many instances, this sort of operation was constructed parallel to a nearby stream so that only a short ditch needed to be built. Gardiner and Johnson describe the process of sluicing as follows:

After the boxes are set, shoveling begins at an advantageous point. All material of a size that will run through the sluice is shoveled in, and the oversize is thrown to one side. Boulders from the first cut should be
stacked outside the pit, on barren ground if possible. The width of a cut usually is limited to the distance a man can shovel in one operation...Work may begin at one edge of the deposit and proceed across it by regular cuts. The sluice may be maintained on the surface of the unworked ground or on bents on the opposite side of the cut. After the first cut the boulders are thrown onto the cleaned-up bedrock. Where cuts are run on both sides of the sluice the boxes are supported on bents as the ground underneath them is dug out. At other places the boxes may be set on bedrock and all dirt shoveled into the head of the sluice from short transverse cuts at the upper end of the pit. Work usually begins at the lower end of a deposit so that bedrock may be kept drained. The length and order of making the cuts will depend upon local conditions (1934a:54).

After the area had been mined down to bedrock, the miners then “cleaned” the bedrock. Because gold is extremely heavy, gravity pulls it to the lowest possible point, such as into the many cracks and crevices in the bedrock. During this process miners would scrape and sweep out all nooks and crannies that might have gold in them. They would then wash these scraps in pans, a rocker, or their sluice. Cracks and crevices often contained nuggets and those would be picked up as soon as they were seen.

Typically, a hand shoveling sluicing operation as described above would take three to four people to operate. One miner Gardner and Johnson estimate could shovel fifteen cubic yards of gravel into the sluice per shift (1934a:54-55).
Ground Sluicing

Ground sluicing is a more industrial and larger scale operation than the smaller scale sluicing mentioned above. While ground sluicing tended to use the same equipment as the small scale sluicing operations, it required much higher volumes of water and infrastructure to deliver that water. Thus ground sluicing was, and is, considered a more industrial undertaking. Quite often small scale sluicing operations eventually turn into ground sluicing operations when miners determined that there is enough gold in a deposit to justify the amount of capital and labor to construct relatively small scale water delivery systems such as dams and ditches. However, most ground sluicing occurred in the bottoms of stream beds where there was already a water supply; the ditch and dam systems were only used to regulate water when it was sent through the ground sluice. There was little hydraulic head involved in ground sluicing, as miners generally use the natural grade. Ground sluicing could only be applied to deposits where the gravels are not cemented together. Gardner and Johnson studied twelve ground sluicing operations in 1932 from around the Western U.S. and found that they all were mining in gravels that were between five and twenty-two feet thick (1934a:59).

The basic idea of ground sluicing involved water being poured over the face of the mine into a channel containing a sluice box. Sluice box(es) would capture the gold while the tailings washed out at the lower end of the operation. Rocks too large to be forced through the sluice because of the lack of hydraulic head were moved by a rock derrick into adjacent stacked tailings piles. Ground sluicing operations can be divided into two categories, distinguished by water delivery method to cut away the gravels at the face. These two categories include 1) mines that sluice with the natural flow of the stream (or mostly natural flow) and 2) mines that use booming to wash the gravels.
Operations that use just the natural stream flow need to build a small temporary dam (actually more like a water deflection structure) to force the stream channel to wash across the stream bank and then into the sluice boxes below. Once one bank was washed, out the dam would be rebuilt to deflect the water into the other bank. Between two and three quarters and nine cubic yards of gravel could be washed by this means in a work day (Gardner and Johnson 1934a: 64).

The second category, booming, required damming the creek to form a reservoir above the mining operation. Generally, these dams were lined with boards on the upstream side so that water rushing out of them would not erode the dam. The water would be released using a gate that filled a channel cut into the dam. When the water was released in a big burst it significantly increased the erosive power of the stream and thus improved the amount of gravel that could be washed. A 1932 study of five ground sluicing operations that used booming reported that the average number of booms per day ranged between two to twenty four and the duration of the booms ranged from one and one half to thirty minutes. The study also reported that these mines washed between four and thirty-two cubic yards of gravel per man-shift Gardner and Johnson 1934a:65).

While these numbers give a good estimation of what ground sluicing could accomplish, they did not take into account the seasonal variability of water flow. In general, in the Northern Rockies there is a higher water flow in May during spring runoff events than in September after snowmelt water is gone. Also, Gardner and Johnson themselves admit that ground sluicing operations in their 1932 study were much smaller in scale than the ones that had been operating during the height of earlier gold rushes (1934a:73). Once all
of the gravels had been washed from an area the bedrock would then be cleaned just as in
the small scale sluicing described above.

**Hydraulicking**

Hydraulic mining was—and still is—a capital and labor intensive form of mining placer gravels where water under high pressure is sprayed through large nozzles called “giants” or “monitors” onto the deposit, thus cutting it away. The gold is then recovered as the gravels wash through sluices at the tail end of the mine. Since water pressure is the main means of excavating the gravels, the water supply is almost as important as the deposit itself.

Under any given conditions the daily yardage is roughly proportional to the quantity of water used. The quantity excavated likewise is proportional to the head used on the giants, but the higher pressure is of less value in driving and washing and of none at all in sluicing the gravel through the boxes to the dump (Gardner and Johnson 1934b:4).

Two sources of water are needed for this method—water for the giants and water for sluicing. Water for the giants is generally brought in from a considerably higher elevation and likely in linear distance. This is to ensure sufficient hydraulic head. Water for sluicing generally comes from the closest source to the mine.

Unlike previously mentioned forms of placer mining, the majority of labor in a hydraulicking operation takes place in preparation of the mining system. Most of this labor involves getting the vast amounts of water needed to the mining operation. The first step in setting up a hydraulic mining operation requires evaluation of the local, and sometimes even regional, water supplies in relation to the mine location. It is important
to note that the minimum hydraulic pressure for a small operation was 50 feet of hydraulic head, while a more optimal hydraulic head would be 300 or 400 feet (Gardner and Johnson 1934b:4). To get these sorts of hydraulic heads, water often has to be transported from many miles away. Crews constructed a dam or reservoir system at the water source, with diversion dams used to force water into the delivery systems for the mining operations. These dams had many forms including earth filled timber cribs, rock filled cribs faced with boards, and if the stream was small enough a log is placed across the stream with the upstream side faced with boards. Reservoirs were used at mines with insufficient water supply to continuously operate the mine. Most often these reservoirs would have been placed above the diversion dam. If that was not practical then the reservoir was built at the lower end of the water delivery system just above the intake pipes that lead to the giants. Quite often there would be a gate at the bottom of the dams and reservoirs to allow the sediment that gets trapped behind them to be flushed out (Gardner and Johnson 1934b:14).

After the diversion dam was constructed, structures such as ditches and flumes were built to get the water close to the mine. Crews excavated ditches into the side of a slope with the grade of the ditch being of paramount concern. Ditches in early California Gold Rushes were built too steep and many washed out due to the erosion caused by the hydraulic head. The optimal grade for ditches is between four and eight feet of drop per mile (three quarters to one and a half feet of drop per 1,000 feet) (Gardner and Johnson 1934b:5). Gardner and Johnson (1934b:5-11) provide an extensive discussion of ditch construction theory including calculating mean velocities through various soils, roughness coefficients of various materials, water flow calculations, ditch discharge
tables as a coefficient of velocity, and other topics). In places where it was not practical to build ditches, flumes were often added to ditch lines. Flumes were used where the ditch line passed around cliffs, over ravines, to pass over porous ground, to bypass places where ditches might cause slides, and in places too rocky for ditches. In some instances flumes would be constructed on high trestles to cross valleys and through narrow ridges by means of tunnels to prevent the construction of many miles of ditch line to go short linear distances. Flumes were generally constructed of wood but could be lined with other materials such as pipes of many types, (wrought iron pipe to stove pipe depending on the financial resources of the mining party), sheet metal, or simply wood planks (Gardner and Johnson 1934b:7).

Once the water delivery system was in place, the actual extraction operation needed to be established. At that point the water from the ditch/flume systems was forced under hydraulic pressure into metal pipes. These pipes were generally made of sheet metal and laid from the bottom (where the mine face will be) to the top. At the upper end of the pipe where it met the ditch, a pressure box gave the water its initial velocity while holding screens to catch debris that may have entered the water in the ditch system. The water then flowed through the pipes to the giant.

A giant was “a device with a nozzle for directing and controlling a stream of water under a hydraulic head” and “can swing horizontally through a full circle and from 11° below to 55° above the horizontal (Gardner and Johnson 1934b: 24). The giants were mounted to a base that could withstand the recoil of the water jet. There were two ways to steer a giant. The first was to mount a counter balance (e.g., a box of rocks attached to a board) to the giant which made it easy to steer because the weight of the
rocks against gravity was equal to the force of the water pressure thus making the giant appear “weightless” to the individual trying to steer it. The second was to use a deflector, a device that fit onto the nozzle, to steer the giant using the water pressure the same way a ship’s rudder is mounted just behind the propeller, thus directionalizing the thrust of the propeller to steer the boat. Smaller nozzles on giants undercut the placer deposits while larger nozzles were used for sweeping the gravels into the sluice boxes. Other equipment needed at the face to start mining included rock derricks, Ruble elevators, and hydraulic elevators. Once the mining began, the water was turned on and forced through the giant pointed at the face of the mine. The water eroded the face of the mine, and the sediment laden water flowed to the bottom of the pit. In smaller operations the water was allowed to flow straight into the sluices. Gardner and Johnson give a good description of the operation of this sort of hydraulic mine:

When a pit is started a cut is taken across the channel, after which a diagonal or square face is advanced upstream. In wide channels or bars two or more parallel cuts may be taken. One pit may be worked while boulders are handled or bedrock is cleaned in the other. At the Ruby Creek mine at Atlin, British Columbia, the channel was 250 feet wide; two 125-foot cuts were made and worked alternately. Wing dams of timber, logs, or boulders generally built to guide the water and gravel into the head of the sluice (Gardner and Johnson 1934b:43).

At medium and large mines sometimes the same giant and sometimes another giant forced the sediment into a Ruble elevator which sorted the material by size, next the larger size material was forced into the tailings pile and the smaller material into the
sluices. Rock derricks were used in hydraulic mining to move small boulders just as in ground sluicing above. In some places it was not practical to put the sluice boxes in the pit of the mine—especially when the deposit was particularly deep. In these cases hydraulic elevators were used to lift the material up to the sluices. Hydraulic elevators consisted of a pipe with a narrow nozzle on the end that forces high pressure water through a sump containing the material that has just been excavated. The material was forced through a grizzly and up an inclined pipe to an upper level of the mine where the main sluice boxes are located.

**Dredging**

Dredging can be divided into two rather distinct categories. The first type of operation is a float dredge, while the second type is a dragline dredge. When most people think of dredging, they imagine a floating dredge. Float dredging was invented in New Zealand in the 1880s. Floating dredges were essentially barges with a gold processing plant housed on top of them. The first successful float dredging operation did not occur in the U.S. until 1895 when the dredge named the *Fielding L. Graves* began mining on Grasshopper Creek near Bannack, Montana (Meyerriecks 2003: 13). This type of mining was by far the most capital intensive type of placer operation; however the labor inputs into such an operation was quite small after the actual dredge is assembled. The capital investment was large enough that for the most part, only corporations could bank roll floating dredge operations. Clark C. Spence gives an excellent account of the development of such a placer mining company, as well as a look at the industrial history of placer mining, in his book *The Conrey Placer Mining Company: A Pioneering Gold Dredge Enterprise in Montana, 1897-1922*. While Gardner and Johnson (1935) give an
extremely in-depth description of float dredging, Meyerrieck sums up the process best by describing floating dredges as being “a clever combination of a sand dredge and gold saving equipment—a marriage of a boat and a sluice” (Meyerrieck 2003: 12). Floating dredge mining was done on large relatively flat lying placer deposits especially in the bottom of stream and river valleys. Often, floating dredges reworked areas that had been previously mined by other means as those discussed above. In order to set up an operation, the company would build a small dam to form a lake in a stream valley. The dredge would then be transported to the site in many pieces and actually assembled on the reservoir. A boom at the front end of the dredge possessed a digging ladder also called a bucket line. This boom could be raised or lowered to start eating away at the deposit in the water below. The material was transported up the bucket line and into the processing portion of the dredge where it was dropped into a hopper. From there the material was sorted by size with the finer material being run through a sluice. The tailings were then taken out the back of the dredge onto a boom where they were deposited into very distinctive looking tailings piles.

The other type of dredging, dragline dredging, requires virtually no water at all. In fact, the less water at a dragline dredging operation the better. This type of mining operation varied in its capital and labor requirements, from small “mom and pop” operations to large corporations. Dragline dredging involved using a dragline to scrape away the placer deposit. Each bucket full was then poured into a trommel where the material is sorted by size. The small material fell through the bottom of the trommel where it was run through a sluice which was the only part of the operation that required
water. Dragline dredging was not as efficient as float dredging, but could be used in environments with less water availability.

Almost all placer mining landscapes follow a similar pattern of development. First miners travel through the landscape testing for potential gold deposits. Once gold is found mining activity intensifies based on the geological and environmental conditions encountered and the knowledge that the miners have in exploiting those factors. Now that the basic concepts of the discovery, development, and continued intensification of placer mining have been introduced, it is time to take a look at what features are left behind in the archaeological record long after mining has ceased.
Chapter 5 Placer Mining in Archaeological Contexts

Working a summer seasonal job for the USFS I visited a nineteenth century placer mining site with a long time USFS archaeologist. We observed row after row of very neatly stacked rock channels over an area of many acres. To me it was obvious that ground sluicing had occurred on the site. However, the other archaeologist turned to me in disbelief and said “wow, I think this is the largest Chinese site I have ever seen!” An argument then proceeded between the two of us about whether the site was created by Chinese miners or whether it was just standard ground sluicing. What this story illustrates is that there is a severe lack of knowledge of placer mining among the cultural resources community. In this chapter an attempt is made at constructing a general guide to interpreting placer mining features found on the landscape in the Northern Rockies by explaining the different landscape features that are often found with different forms of mining. Table 5.1 connects these features with the various types of mining and associated artifacts. Each section throughout the rest of this chapter provides additional information about each placer mining feature.

Table 5.1. Features of Placer Mining

<table>
<thead>
<tr>
<th>Type of Mining</th>
<th>Landscape Features</th>
<th>Artifacts Associated with Industrial Uses</th>
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<tbody>
<tr>
<td>Testing/Exploration</td>
<td>Pits</td>
<td>Hand Tools</td>
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<td></td>
<td>Trenches</td>
<td>Gold Pans</td>
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<td></td>
<td>Coyote Shafts</td>
<td>Rocker Boxes</td>
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<td>Small Scale Sluicing</td>
<td>Mounded Tailings Piles</td>
<td>Hand Tools</td>
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<td>Some Stacked Rock</td>
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<tr>
<td>Ground Sluicing</td>
<td>Extensive Water Delivery Systems</td>
<td>Sluice Components</td>
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<td>Dams</td>
<td>Lard/Oil Cans</td>
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<td>Ditches</td>
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<td>Flumes</td>
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<td>Headgates</td>
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<td></td>
<td>Stacked Rock Sluice Channels</td>
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<td>Rock Derrick Platforms</td>
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<th>Hydraulic Mining</th>
<th>Extensive Water Delivery Systems</th>
<th>Sluice Components</th>
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<td>Dams</td>
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<td>Ditches</td>
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<td>Flumes</td>
<td>Pipes and Fittings</td>
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<td>Pressure Boxes</td>
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<td>High Pressure Piping Systems</td>
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<td>Stacked Rock Sluice Channels</td>
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<td>Rock Derrick Platforms</td>
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<td></td>
<td>Giant Components</td>
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<td></td>
<td>Large Cut Faces</td>
<td>Drag Line Dredge</td>
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<td>Large Tailing Piles (often round in shape)</td>
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<td>Trommels</td>
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<td>Dragline Buckets</td>
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<td>Large Rounded Tailings Piles (often in linear patterns)</td>
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<td>Dredge Components (bucket lines, dredge floats, etc.)</td>
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<td>Dams</td>
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**Testing and Exploration**

Features associated with the testing and exploration of placer deposits—while definitely not glamorous to study—are the most common archaeological signatures of placer mining in the North American West with tens if not hundreds of thousands of them dotting the landscape. These are test pits (Figure 5.1) and can be found in many varieties.
Figure 5.1. Example of a typical mining test pit. This pit is located on the Sawtooth National Forest.

The ones that will be talked about here are test pits, test trenches, and coyote shafts and associated drift mining. These archaeological features represent the initial prospecting phase of placer mining. Test pits (Figure 5.1) are found in all sorts of shapes, diameters, and depth. In the nineteenth century they would have been dug by hand with a shovel and a pick and thus were usually quite small. By the twentieth century bull dozers and other mechanical equipment may have been used. Deposits would have been worked with either a gold pan or a rocker box (Figure 5.2). A major problem in interpreting the function of test pits is that they were also used to test locations for potential hard rock mineral deposits. There is no infallible way of differentiating placer test from hard rock
test pits. An analysis of the locational context of a particular test pit can give clues to the type of testing occurring.

Sometimes miners would excavate coyote shafts to access deeper deposits. A coyote shaft (and often associated drift mining) (Figure 5.3) is among the most dangerous types of placer mining and involves the excavation of a vertical shaft to access deep deposits. If gold is found at a certain level in the shaft the miners would start a drift, a horizontal tunnel, to continue to exploit that deposit. The term coyote mining comes from the early phases of the California gold rush where miners frequently used this technique to test ancient river beds for placer gold. The California miners described the areas where this type of mining had occurred as looking like the diggings left by denning coyotes in that there were holes dug into the earth with mounds of dirt next to them scattered across the landscape (Greenland 2001:25). Often there are not good representations in the archaeological record of coyote shafts because they have collapsed.
or miners found enough gold to deploy other methods such as ground sluicing or hydraulic mining to access the deposits. In parts of the west with very deep placer deposits, such as California, coyote shafts were used beyond testing as a main form of placer gold extraction in the form of drift mining (Figure 5.3).

![Diagram of drift mining](image)

Figure 5.3. An illustrator’s depiction of a cross section of a coyote shaft with drift mining occurring at the bottom of the shaft. The hoist pictured would have given miners access to the mine as well have been used to transport gravels to the surface (Young 1970:111).

However, in the Northern Rockies the use of coyote shafts seems to have been primarily a testing method but was occasionally used as a primary form of extraction. One diagnostic feature of drift mining in the archaeological record is that there will be collapsed shafts (in the form of depressions) every 50 to 100 feet. The depressions vary from test pits because the tailings piles will appear much larger than what could have come out of a depression of that size. This is because the tailings piles represent the
material that came out of the drifts between these shafts.

The last method of testing was small scale sluicing (Figures 5.5, 5.6) where the
gravels were being excavated by shoveling (i.e. water was only used for sluicing and not
excavating gravels). This occurred where miners further testing their deposits to see if
the deposit warranted expanding operations to other more intensive forms of mining.

Figure 5.4. Archaeological representation of coyote shafts and drift mining (McCullough 2003:97).
Figure 5.5. An illustrator’s depiction of a small scale sluicing operation (Young 1970).

Figure 5.6. Plan and cross section views of a small scale sluicing operation (aka hand shoveling operation) in Blewit, WA. (Gardner and Johnson 1934:54.5) In this diagram mining would have occurred from left to right. Gravels would have been shoveled out of the creek bottom and banks and into the sluice box where gold would have been caught in the riffles.
Archaeologically these sites often have features such as wing dams, tailings piles, and a sluice. Wing dams are diversion dams that are hastily built for temporary use in flowing sources of water such as creeks to divert water into sluice boxes. Most of these wing dams have been destroyed by erosion and archaeological examples are rare as these dams are located in creeks and rivers and get washed away by seasonal flooding. Artifacts associated with testing and exploration include hand tools, gold pans, rocker boxes, long toms, and small sluice boxes. Tailings piles associated with testing and exploration are often small if they are even visible. Often they have eroded away, settled, or have been obscured by vegetation due to the fact that they are usually in drainage bottoms and susceptible to the erosional forces of water. Overburden would have been piled up along the edge of the pit or trench while any gravels washed would likely be dumped in a stream.

**Water Management**

Rather than continuing on to small scale sluicing, ground sluicing, hydraulic mining, etc. as presented in Table 5.1, I consider it a better strategy for the sake of discussion to organize the rest of this chapter into two sections—water management and gold extraction/tailings piles. The reason for this is that neither water management features nor tailings piles features are directly related to the complexity of mining at a particular site. The complexity of both are heavily dependent upon the geologic, climatic, and social conditions the miners found at the given location.

In the case of water management features, a very small scale placering site may have a tremendous amount of water management structures while an extensive placer mining site might only have a few. Water management features are the result of a
complex equation related to the relationship of water supply needed (perception of climate) for the intended type of mining (perception of geology) related to the water supply available (perception of climate) related to the access to the needed water supply (social factors such as claim boundaries, water rights, etc.). Additionally this is all related to the past experiences of the miners in the form of landscape learning. In other words one can’t judge a mining site on the size of its ditches and dams.

Water management structures can be classified into one of two major categories: 1) features that were meant to collect water such as dams and retention ponds; and 2) features that were designed to transport water such as ditches, flumes, and pipes. Dams

Figure 5.7. Example of a typical earthen dam associated with a placer mining main storage reservoir. This particular one was recorded as part of the Bonanza Hydraulic Placer Mining Site HAER documentation (Historic American Engineering Record 1992a).
and retention ponds can be characterized as one of three types—long term storage collection points, short term storage or booming points, and dams for dredging. Long term storage captures spring runoff for use during the mining season and they can vary drastically in size depending on the type of mining being conducted, the amount of material to be washed, and the water available. These types of dams can be of earthen construction (Figures 5.7 and 5.8), timber construction, or some combination of the two (Figure 5.9) where there is an earthen dam with a timber or lumber discharge gate. Archaeologically the earthen components of dams are much more prevalent as timbers and lumber have long since decayed.

Figure 5.8. This is a view of the interior of the main storage reservoir at the Bonanza Hydraulic Placer Mining Site as recorded by HAER (Historic American Engineering Record 1992b). This is the same dam as pictured above in Figure 5.6.
The term “ditch” itself implies a trough made of dirt. However, the task of making a ditch often required a lot more engineering than just constructing a trough to carry water. First miners had to have a good idea of where their water collection reservoirs are located. Next a route would have been plotted taking into account the desired fall and then construction would occur including navigating over, around, and/or through natural obstacles or socially created boundaries. Archaeologically features associated with water distribution systems include earthen ditches (Figure 5.10), hillcuts for navigating around steep slopes (Figure 5.11), flumes often on trestles for traversing very steep or
exceptionally rocky slopes (Figure 5.12), flumes on trestle bridges for crossing drainages, tunnels with flumes going through obstacles, and built up rock shelves to hold flumes.

Figure 5.10. Typical example of a ditch that connects a primary storage reservoir to a mine in an archaeological context. This ditch, called the China Ditch, is located at Thompson Pass, MT.
Figure 5.11. Historic photo of a ditch connecting a primary storage reservoir to a hydraulic mining site. This ditch is the 17 Mile Ditch located in Quesnel Forks, B.C. where it was constructed by the Cariboo Hydraulic Mining Company (British Columbia Archives 1895).

Figure 5.12. Bracket Flume on a trestle. From McCullogh 2003:4.
Figure 5.13. Layouts of four ground sluice mines including both plan and cross sections. A represents Ravano mine in Laurin, MT, B is Rundle Mine in Blackhawk, CO, C is Camp Bird Mine in Laurin, MT, and D is Harvey Mine in Lincoln, MT. In the plan view of A, the mining is occurring from bottom to top. In the plan view of B mining is occurring from left to right. In the plan view of C mining is occurring from right to left. In section view of D the mining is occurring right to left.
Once the water reached the vicinity of the mining operation often times there was a more localized storage area. In the case of ground sluicing (Figure 5.13) operations this would usually consist of a dam/reservoir and a penstock, which is a gated intake structure that controls water flow. These water retention areas were for booming where bursts of water would be sent on to the face, creating more erosional power (Figures 5.11 and 5.12).

Water would be allowed in to fill the storage area and once the storage area was full it would be released very quickly to create a pulse of erosion force on the face of the mining operation. In the case of hydraulic mining, the water would be released from the local water retention system via a valve usually into a pipe that would connect to a monitor to deliver a directed stream of water to the face of the mine. Archaeological
features and artifacts associated with the localized water retention and delivery systems include ditches and flumes (as well as their associated features mentioned above), dams, retention ponds, metal pipe (usually greater than six inches in diameter), and hoses.

Figure 5.15. Automated booming gate (Gardner and Johnson 1934a:64.5).
Figure 5.16. Examples of joints for placer pipe (Gardner and Johnson 1934b:18.5). Often pieces of joints are present in an archaeological context.
Gold Extraction and Tailings Piles from Ground Sluicing and Hydraulic Mining Operations

Now that the features related to the water collection and transport components of mining have been discussed, it is important to move on to the features related to the “meat” of the operations—gold extraction and the features associated with that in the archaeological record. Here I will focus on the archaeological features associated with the gold extraction areas of ground sluicing and hydraulic mining. As discussed in Chapter 4 ground sluicing is a form of placer mining where deposits are eroded away by water using only force of gravity, while hydraulic mining also erodes the away placer deposits using water but channeled through giant nozzles that give the water more erosive

Figure 5.17. Ground sluice operation in archaeological context at McGinnis Creek, MT. Mining would have occurred in a direction toward photographer. The channel is the remnant of the sluice with tailings on either side.
energy and that can be aimed reasonably well to target a very specific area. In both forms of mining, the freed deposits are then channeled into a sluicing area where the gold is extracted.

Components of ground sluicing operations that are often found in the archaeological record include sluicing channels and their associated stacked rock tailings piles, breaks in ditches, and rock derrick platforms. The defining feature represented in the archaeological record of ground sluicing operations are the linear sluice channels that cut through often systematic looking stacked rock tailing piles (Figure 5.17). Often there is a main sluice channel with side channels branching off of it. As the miners moved up stream they would have continually cut into the face by releasing water that would erode out the deposit, releasing all of the gold and overburden. The ground sluice would be built at the tail end of the mine. As the miners moved upward (often upstream but sometimes up slope), the ground sluice would also be extended toward the face. All of the smaller size sediments would be run through the sluice to extract the gold. Large size sediment such as boulders would be moved either by hand, rock derrick, or Rubble elevator (Figure 5.18) and stacked along the edge of the sluice boxes.

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5 Rubble is the name of the person who invented the Rubble elevator which ironically carries mining “rubble.”
Figure 5.18 Simplified drawing of a Rubble elevator.

This created the linear channels present today at former ground sluicing operations. The tailings rock were stacked close to the sluices for two reasons. One
being that it was the easiest place to put the rock from an energy expense perspective and
the other being that placer miners were required by law to store all of their tailings on
their own claims. The second feature often found at ground sluicing operations are large
breaks in ditch lines. When a mine was first developed the ditch system would be
constructed to the lowest elevation point that would be mined. This final delivery ditch
would parallel the mining operation. As the mining commenced and the operation moved
upstream or uphill the miners would dig out breaks in the ditch line further and further
uphill allowing the water to erode the deposits being mined. These intentionally created
cuts in the ditch line are often visible today. They appear simply as a large break in the
ditch. While many of them have been destroyed by natural erosion or subsidence that
occurred subsequent to mining, some of them remain in areas that are protected from
these natural processes.

The third feature often found at ground sluice sites are rock derrick platforms. As
the smaller sized sediment was washed through the sluices, often large boulders had to be
moved out of the way in order to continue moving the ground sluice up through the
deposit following the face of the mine. Moving these boulders by hand would have been
an impossible task so miners devised a device called a rock derrick (Figures 5.19, 5.20) to
move them. In order to make a rock derrick, miners first had to find a reasonably large
diameter tree and bring it to the mine. Then a platform had to be created by placing the
tree trunk upright and filling in around it with tailings to hold the trunk vertical. A
second log would be lashed to the tree at an angle creating a boom. Then this creation
was rigged with rope and pulleys. The boom could then be swung around and have a
boulder connected to its rigging. The boulder would be hoisted and then pivoted around
and then dropped in the tailings piles or stacked along the edge of the sluices creating the channels mentioned above. Often the only non-industrial artifacts that I have observed on placer mining sites are lard cans—and high concentrations of such cans. Lard was likely used to lubricate the moving metal parts of rock derricks.

Figure 5.19. Rock derrick in action at what appears to be a ground sluicing operation at Alder Gulch, MT (Jackson:1871).
Components of hydraulic mining that are found in the archaeological record include massive exposed faces, metal pipelines, hydraulic giants, and sluice channels (Figures 5.16, 5.21, 5.22, 5.24, 5.25). Often the most notable features of hydraulic mining sites are large faces that look like escarpments (Figure 5.19). These are the areas where the placer deposits were being mined from colluvial deposits or sometimes ancient gulch placer deposits. Hydraulic mining also occurred in gulches. These hydraulic mines often don’t have dominant exposed faces remaining.

Figure 5.20. Diagram of a winch powered rock derrick at the Harvey Placer Mine in Lincoln, MT (Gardner and Johnson 1934a).
Figure 5.41 Historic photo of a typical hydraulic placer operation. One giant can be seen actively cutting up into the face of the mine. In the center of the photo is the sluice box. Near the entrance to the sluice box there appears to be a rock derrick.
Figure 5.22. Historic photo of hydraulic placer operation where giants can be seen cutting downward into the face of the mine. The sluice box entrance is clearly visible in the center of the photo. Photo is from the British Columbia Archives.
Figure 5.23 Photo of a hydraulic placer mining face in an archaeological context. This photo shows the results of intensive hydraulic mining at Malakoff Diggings in California.
In order to create these faces, miners would deliver water with significant head pressure through metal pipes to hydraulic giants, also called hydraulic monitors, that would be directed at the face of the mine to erode the deposit (Figures 5.24, 5.25).

Figure 5.24. Hydraulic giant with close-up view of nozzle (Gardner and Johnson 1934b:24.5).

Figure 5.24. Hydraulic giant with close-up view of nozzle (Gardner and Johnson 1934b:24.5).
The tail end of hydraulic mines often resembles a ground sluicing operation. There is usually a sluicing channel with stacked rock. However, there is usually only one sluicing channel rather than a network of sluicing channels as in a ground sluice operation. Stacked rock sluicing channels are not always present as often times there was no need to stack tailings piles because the giants could put so much more energy onto the deposit that only very large boulders would remain and they could be worked around. In tighter valleys where storing tailings was much more of an issue, rock derricks may have been
used so rock derrick platforms may be present.

Figure 5.26. Plan and section views of four hydraulic mines (Gardner and Johnson 1934b:48.5). A is the India Creek Mine in Douglas City, California, B is the Blue Channel Mine in Wolf Creek, Oregon, C is the Superior Mine in Superior, Montana, and D is the Golden Rule Mine in Warren, Idaho.

**Dredging**

Two types of dredging occurred in the Northern Rockies—dragline and floating. Archaeologically the only two traces that dredging leaves are tailings piles and components of the dredges themselves. Dragline dredges (sometimes just called draglines) are a piece of mining equipment that is still in use today (Figure 5.27). The dragline would scoop up the deposit and dump the overburden in one area and the pay dirt in another. The pay dirt would then be scooped up by other machinery and placed in a trammel that would separate out the gold. Archaeological components of draglines and trommels can be found in the vicinity of dragline dredge sites. However the most
distinctive feature of these sites is the erratically arranged tailings piles.

Figure 5.27. Dragline dredge in archaeological context on the Salmon-Challis National Forest.

Floating dredges operated by damming up a drainage or river so that the area to be mined was covered in relatively shallow water. The dredge was then brought to the area to be mined and was often assembled on site. The dredge would systematically mine the deposit by running a bucket line on a boom that would scoop up the deposit and carry it down the bucket line into the dredge itself. Inside the dredge was a processing facility
that would separate the gold from the other material.

Figure 5.28 Yankee Fork Gold Dredge, Bonanza, ID. The Yankee Fork Gold Dredge is a floating gold dredge. The bucket line is visible in the center of the photo and would have scooped the gravels in to the dredge. The gold would have been separated from the gravels inside the dredge on a series of sorting tables. The gravels would have then been taken out of the back of the dredge (background side of photo) on a boom with a conveyer visible in the photo.

A conveyer would take the tailings out of the back of the dredge where it was dumped. Archaeologically features associated with floating dredges are pieces of the dredge itself (including entire dredges that have been abandoned) and tailings piles. The tailing piles associated with dragline dredges are much more orderly and linear than with dragline dredges.
Chapter 6 Archaeology, Placer Mining, and Landscape Learning in McGinnis Creek, Elk Creek District, and the Broader Garnet Range

Introduction

In this chapter, documentary evidence is integrated with an analysis and interpretation of the mining features observed in McGinnis Creek to explore whether and how landscaping learning process(es) (Rockman 2010) played out in the Elk Creek Mining District. Documentary evidence includes an oral history of George Morse, mining records relating to placer mining in the Elk Creek Mining District and related County records, as well as a newspaper writer’s observations of the area as the region transitioned to long term rather than boom-style mining operations. The oral history of George Morse tells of the typical experience of someone who did not come from a mining background but eventually made their way “out West” to eke out a living in the gold fields, learning and gaining experience as they traveled through the landscape. Morse mined in Elk Creek from the time of the original strike nearly all the way up until his death around 1920.

Mining records contain useful information relating to how miners understood the landscapes they were encountering. In particular, the records of the Lower Elk Creek Mining District, located at the Montana Historical Society, provide a tremendous amount of information. These sources contain a record of the meetings where the miners established rules for staking claims during the original 1865 rush, as well as records of the first five years of claims that describe who was mining where and [sometimes] how they were mining and where they were getting their water. Additional records were located at the Deer Lodge County Courthouse including water rights and placer claim
records. However these records are sparse and do not include any information on the original rush as they are all from the 1880s and 1890s. After the original rush Ben R. Dittes, under the pen name Benardee, took a trip for through the placer mining districts of the Garnet Range and reported on that trip through a series of dispatches printed in Deer Lodge’s *New North-West* newspaper. These dispatches give a snapshot of what mining looked like in 1872 including information on where mining was occurring, where it had occurred, what techniques were being used, and as the dispatches point out—the most important issue—where miners were getting and how they were using their water supply. The second half of this chapter focuses on the mining features in McGinnis Creek.

![Historic ground sluice operating in the Deep Creek drainage of the Garnet Mountains (Scmidt 1890s). This is the only historic photo of a ground sluice that was located during the research for this project that is actually in the Garnet Range.](image-url)

Figure 6.1
Col. George Morse’s Oral History of the Placer Mining in Elk Creek

In 1858 news of a gold discovery in Pikes Peak, Colorado spread across the North American Continent. At that time a twenty-year-old George W. Morse was in New Orleans and upon hearing the news headed to St. Anthony, Minnesota (part of present day Minneapolis) where he worked for several years building dams on the Mississippi River. He presumably gathered what he needed and left as part of a party of four for Colorado in May of 1859. Morse, who didn’t likely have any previous mining experience, made his living doing ancillary work to the mining itself. His first job upon arrival in Colorado was to drive logs down the South Platte River to a mining boomtown that would eventually be known as Denver to be used as construction materials. After that Morse went to Gregory, Colorado to haul quartz in the gold fields for nearly a year and later hauled hay for cattle. According to Morse’s own account, he never seem to establish himself as a miner in the Colorado gold fields. Maybe he got there too late? Maybe he didn’t know where to start given his lack of experience? In 1862, after not striking it rich in the Colorado gold rush, Morse joined a party of men bound for Florence, Idaho.

It is unclear how the party heard of the gold strikes in Idaho. However, it is apparent that the party knew little about where they were headed:

We knew that Florence was some place in a land called Idaho and in the northern part of it. We thot [sic] by going to the Salmon river we could go to the mines without any trouble. When we arriver [sic] at old Fort Lemhi we saw how impossible it would be to reach the mines in that way So we went to the Deer Lodge valley in what was to become Montana (Morse 1915:2).

The decision to not head down the Salmon River and to go to Montana Territory was a fateful one for the party. According to Morse the party consisted of Col. McLean, Wash
Stapleton, Lou P. Smith, John White, and Morse himself. Upon arrival in the Deer Lodge Valley Wash, White, and McLean split off and prospected around southwest Montana where White would become one of the two men credited with the discovery of gold on Grasshopper Creek, which is where Bannack was established and then where McLean was elected the first delegate to Congress from Montana Territory. Morse himself left for his original destination of the Idaho gold fields where he spent several years actively mining.

In 1865 word spread through the Idaho gold fields of a new strike in the Garnet Mountains of Montana Territory. Morse states that he “remained in Idaho til 65 and then came to Montana to Bear Gulch. Elk Creek was struck before Bear by Walker’s party, from the Kootenea [sic]” (Morse 1915:2). This directly contradicts most of the literature about the establishment of placer mining in the Garnet Mountains as most of that literature gives credit for the discovery of gold in Elk Creek to Morse himself. More research needs to be done to determine who Morse means when he refers to Walker’s party.

Morse himself did not stay in Bear Creek long. He describes his time there by saying:

we arrived there some time in October. There was a hole down that was not to bedrock. This was near the canyon. We did not stop in Bear but went to Blackfoot City. After Blackfoot City Morse traveled to the Missouri River prospecting as he went. I did not find any thing on the Mussleshell so came back to Indian creek where the other boys staid [sic] and I then went back to Elk (Morse 1915:2).
Morse goes on to tell about his experiences in Elk Creek:

I struck Weasel and Bilk Gulches. The way the gulch got its name was this. There was no water and the boys thot [sic] it could not be worked so they said it was bilk. I knew better than that as we could see the gold in the gravel. I told them we had better organize and call the place Bilk and it went. We had to melt snow to get water with which to do our rocking. The fellow whom we had elected as recorder did not want a claim as he said he had rather have the recorders fees. I told him to take it and I would go in with him. This was a rich little gulch (Morse 1915:3).

Weasel and Bilk Gulches are located near Top O’Deep along the crest of the Garnet Range. While it is not known for sure whom Morse was referring to when he mentions the recorder, it is possible that he was referring to John W. Keanan who was the first elected recorder in the Lower part of the Elk Creek Mining District (Lower Elk Creek Mining District 1866-1870).

Morse also gives a description of what it was like to acquire supplies in during the initial bonanza in the Elk Creek area.

While we made some money it was very expensive living in those days. I recall that four of us, Moore, Simmons, McClennan and myself, hearing that W.A. Clark had gotten into Reynolds City with seven pack horses loaded with goods, came to the conclusion we would go and get a few things we needed. It was four miles to the camp so we got on our snow shoes [sic] and pulled out. It was on Sunday. We bought our goods for which we paid Clark between six and seven hundred dollars and we
packed all on our backs back to camp. We paid the following prices: Four Pr. Gum boots at $38 a Pr. Four shovels at $12 each. Our axes ar [sic] $4 each and four picks at [$]18 each. That gives some idea. We did not buy much grub but what we did buy was bought in the same proportion (Morse 1915:3).

Morse [may have been person collecting the oral history] snidely remarks about Clark that “no wonder that Clark became rich and could start a bank as those seven pack loads would go some way according to those prices” (Morse 1917:3-4). Clark would eventually become one of the Copper Kings and one of the most powerful men in Montana.

Morse comments that there was “$2,500,000 of gold taken out of Bear, Elk and Top O’Deep”, further noting that the “claims were only two hundred feet long and every man had to take care of his tailings. It was abot [sic] all pick and shovel work which made it very expensive. It took lots of money that one recovered from the claim to keep from injuring the fellow below you” (Morse 1915:4). By making reference to the expensive nature of not “injuring the fellow below you,” it is likely that Morse was referring to the amount of time and labor it took to stack tailings and manage wastewater in a way that they did not flood a neighboring claim with water or waste rock. It is unclear how accurate the value of the gold taken out of those districts is. The oral history of Morse occurred in 1915 and at that time Morse was still mining in the area and had plans for the future.

I have been associated with the mining in Bear and Elk from that time till this as I am mining there yet. I have a bed rock flume but have non [sic]
dump. It would be a splendid dredge propersition [sic] –the fellows who own the ranches below as too much for them so that one can’t buy and secure a dump. The Elk is about eight miles long and every gulch that empties into it from the South had good pay. Some of them had big pay.

It is my opinion that Elk produced more than Bear but not as much as Bear and Deep both. I do not know who struck Deep tho [sic] I was there before it was found. I think I was in Blackfoot City when it was found.

No, I am not making much out of the ground now as I am trying to run a bedrock flume. (Morse 1915:4)

The term bed rock flume is a term that, as mentioned above in Chapter 1 and 3, seems to be a regionalism to describe ground sluicing. I have been unable to find linguistic use of that term across the broader American West; however I did not extensively explore this.

Unfortunately throughout the interview Alva Josiah “A.J.” Noyes, the collector of the oral history, seems to continually steer Morse away from talking about the methods of mining and towards more social and historical questions about public hangings, saloons, who was the first person born in Elk Creek, who was the first woman in Elk Creek, etc. While the answers to those questions are interesting and very useful for understanding the social conditions of the Garnet Range in the 1860s, they are not useful for understanding the industrial history of the area. Morse’s comments at the close of the interview are telling about nineteenth-century Montana: “I made my money in the cattle business and put it into quartz from which I never have made one dollar but have always made some thing out of placer” (1915:7). Certainly nineteenth-century hard rock mining was virtually never a profitable endeavor for any miner unless one owned a large corporation
with lots of capital. Placer mining and cattle certainly provided opportunities for people
to make a living and even sometimes strike it rich.

**Mining Records: The Formation of the Lower Elk Creek Mining District**

On Monday October 16, 1865, not long after the first discovery of gold on Elk
Creek, a meeting was held in the Elk Creek Valley to establish the Elk Creek Mining
District. In forming a district, miners established laws in which the district would be
governed by including how claims were to be marked, recorded, the size of claims, the
types of claims, etc. Below are the mining laws of the Elk Creek District:

Laws of Elk Creek District

Laws of Elk Creek District _aped before the District was devided [sic]

Deer Lodge County Montana T.Y. Oct 16th 1865

A meeting was held on Elk Creek Deer Lodged Count on Monday Oct 16th
1866[5] on motion H R Day was elected President. W W Johntrou
Secretarty of the Meeting The following then was adopted as the mining
Laws of Said District (Elk Creek District[])]

Sec 1 The name of this District shall be Elk Creek District and Shall
extend the length of Elk Creek and all its tributaries

Sec 2 The folloing [sic] Shall be the dimentions [sic] claims in this
District
Creek Claims 2 Barr claims 3 Hill claims 4 Gulch claims

Sec 3 A Creek claim Shall be 200ft up or down Said Creek and Shall extend to the rise of the rim Rock on each side each claimant Shall have the right to drain? Through any other claim or claims but each claimant Shall confine his Dump to his own ground.

Sec 4 A Barr claim Shall be 200ft. and Shall extend from the first to the second rim Rock

Sec 5 A Hill claim Shall be 200ft from T and Shall extend to the Summit of the Hill

Sec 6 A Gulch claim Shall extend 200ft up or down and Shall extend three hundred feet on each side of the Gulch

Recorders Laws

Sec 7 All Creek Barr and Gulch claims shall be hlanly [sic] Staked Marked and Recorded in the Recorders office All Hill claims Shall be Staked and have note’s posted theron [sic] copies of which notices Shall be recorded
Sec 8  Each person in this District to hold a Creek claim a Barr claim a Hill claim and a Gulch claim by Premtion [sic] [possibly preemption?]

Sec 9 All Discoverers shall be entitled to hold one sett [sic] of claims by premtion [sic] [preemption] and one sett [sic] of claims each by discovery all others one sett [sic] of claims each as set forth in Section (8)

Sec 10  All claims Recorded in or before the 15th of November 1865 in this district Shall not be forfeited or not be represented by labo[r] pror [sic] to June the 1st 1866 after which time all claims Shall be represented by actual labor at least on day in each week

Sec 11  Companies or Individuals holding adjoining claims may represent all such claims by performing labor on any one of Said claims

Sec 12  The Recorder Shall be entitled to receive the Sum of two Dollars and fifty cents for recording each claim in this District

Sec 13 All papers filed for record in the Recorders Office Shall be considered [sic] in accordance as actually recorded the recorder Shall record all such papers within three days from the filing thereaff [sic] and upon Said papers the date of Said filing and also the page of the Book in which the same is Recorded all papers shall be Recorded in the order in
which they are received for Record the Recorders Shall allwas [sic]
[always] be open to public inspection.

John W Keanan was the duly elected Recorder
And on motion the meeting adjourned
H B Day Pres
W W Johntson Sect
October 16th 1865 (Lower Elk Creek Mining District 1865-1870:1-2)

As mentioned above in Chapter 1 (and see Hardesty 2007 discussion of legal frameworks being one of the signs and symbols that miners leave on the landscape) one of the determining factors in the formation of placer mining landscapes is the legal structure in which those landscapes are formed. The Elk Creek District was almost operating in a legal vacuum as legal structures governing the area were practically non-existent. At the time the district was established there was no state government (only a weak territorial government); Deer Lodge County had only been established in 1865 and was not yet equipped to comprehensively track laws or keep records. Also at this time, the Federal Government had not yet passed comprehensive mining legislation. There was no national placer law until 1870 and the General Mining Law, which is still today the law by which claims are governed, was not passed until 1872. Additionally no GLO surveys had been conducted so even if the Placer Mining law of 1870 and the General Mining Law of 1872 had been laws there would have been no way to file or patent a claim using those laws. The only law governing the area was the “miners’ law” establishing the district.
While it is not known for sure if there was a standard for establishing miner’s laws, there certainly had to be miners coming from other gold strikes that would have had a rough idea how to establish them. To investigate this, the laws pertinent to the Elk Creek Mining District are examined section by section. Section one is self explanatory as it simply establishes the name and boundaries of the district. Section two establishes the types of claims that would be recognized within the district. This is where we can begin to glean landscape learning information from the legal framework that the miners establish. The miners have spent a very limited time in this particular location but are using knowledge they have acquired at other locations throughout the American West.

Sections 3-6 describe the types of claims that represent the way that the miners see the environmental landscapes. Section 3 establishes the guidelines for creek claims and shows that the miners establishing the laws have working social knowledge of how placer deposits are arranged in creek bottoms (what McCullogh 2003 would call gulch placers) and an understanding that to exploit them water may need to be transported across others’ claims. It also acknowledges that the miners are experienced enough to know that waste rock will be an issue. The establishment of barr claims shows an understanding of changing stream courses over time. It acknowledges that miners understood that old stream deposits lying above current stream beds may contain placer gold. The way that it is written indicates though that the miners seemed to only think this was possible along larger streams. This may indicate some miners may have come from areas with large river deposits.

The differentiation of creek claims from gulch claims indicates that the miners recognized a distinct difference in the depositional environments between streams that
consistently flow consistently like Elk Creek and streams that may have very low or no flow in dry periods like McGinnis Gulch. The establishment of hill claims shows that the miners did have knowledge that placer deposits could be found on hill sides. There is not enough evidence to show whether the miners recognized and differentiated these deposits as being ancient stream beds or colluvial placer deposits. Sections 7-13 identify the procedures for staking and recording one’s claim. Given the lack of standardization of land ownership in Montana Territory at that point in time this would have surely been one of the most important parts for the miners. According to the Lower Elk Creek Mining District Records book, it is apparent that the recorders position is one of the most important positions within the district as there are numerous entries of miners’ meetings being called to elect new recorders. On June 12th 1865 a meeting was called to discuss dividing the Elk Creek District into two districts:

June 12th 1866

At a meeting called by the miners of Elk Creek District held at the discovery ground at one oclock P.M on (Elk Creek) the following business was transacted. J.M McKay was duly elected President and R.F. Jones Secretary of Said meeting The President called the meeting to order and after stating the object of the meeting S Bradly offered the following motion, That Elk Creek Mining District be divided into two district from the dividing line between No 25 and 26 Below discovery throwing no 25 in the upper district and 26 in the lower district Motion carried McKenan then laid in his resignation as Recorder of the whole District which was accepted and on Motion R.F. Johnstown was duly elected Recorder of the
upper District and Lewis Oren was duly elected Recorder of the lower District which was carried on motion.

JM McKay Pres

RF James Secretary (Lower Elk Creek Mining District 1865-1870:4)

It is unclear why the miners decided to split the Elk Creek District into upper and lower sub districts.

It also seems apparent that the record book somewhat functioned as a way for miners to communicate to one another through making motions about meetings to meet the needs of the district. For example on November 29th 1866 there is an entry that states “We The under signed request the Recorder to call a meeting of Lower Elk Creek District for the purpose of transacting business to be held in Yreka on Thursday Nov 29th 1866 one oclock PM” Record Book of Lower Elk Creek Mining District 1865-1870:4).

At a miners meeting called by the miners of lower Elk Creek district the following business was transacted, James Dugan was elected President of the meeting and P Osborn Secretary. P. Osborn laid in his resignation as Deputy Recorder which was excepted [sic], and then P. Osborn was nominated as Recorder for Lower Elk Creek district and was duly elected motion ______ [agreed?] and then

The following motion was offered by P Osborn Pres [?] of ____ that we the miners of Lower Elk Creek District declair [sic] all the creek claims laid ___ until May 1st 1867 also no (1) (2) and (3) on prosperity Barr

Motion carried

James Dugan President
This is to certify that I hereby appoint JM Johnston Deputy Recorder of Lower Elk Creek District

Yreka City

Lewis Osin (Lower Elk Creek Mining District 1865-1870:4)

The Lower Elk Creek Mining District Records also documents the location and descriptions of all claims present in Lower Elk Creek from 1865-1870. This is a great resource of information about where mining was occurring in the lower portion of Elk Creek during the initial rush years. These records state that mining was occurring in Elk Creek, Skimmerhorn Gulch, Prosperity Barr, Jackah Gulch, Prosperity Flat, Shanghai Gulch, and Herricks Gulch. Unfortunately, most of these locations are no longer known by these names and only the locations of Elk Creek and Skimmerhorn Gulch are actually known.
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<th>Modern Name</th>
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<td>Weasel Gulch</td>
</tr>
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</table>

Table 6.1. Historic Place Names Mentioned in George Morse’s Oral History and Record Book of Lower Elk Creek Mining District 1865-1870

**Deer Lodge County Courthouse Records**

There three types of records related to placer mining at the Deer Lodge County Courthouse including placer location records, water rights records, and real estate records. The placer mining location records are poorly organized prior to the late 1880s—if they are even present at the courthouse⁶. An attempt was made to comb through the

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⁶ The Lower Elk Creek Mining District records 1865-1870 were donated to the Montana Historical Society by Deer Lodge County in 1920 according to the inside cover of the document. This is really
early records but they are so poorly organized that they are unusable or they are no longer there. Beginning around 1890 placer mining records seem to become better organized and indexed. At some point in time, the Elk Creek Mining District must have gone from an organized district as established in the Lower Elk Creek Mining District 1865-1870 records to an unorganized district. It is unclear when this transition occurred. The first records that appear from Elk Creek in the Deer Lodge County Index of Placer Locations mark the district as “Elk Creek (unorganized).” There is a gap between 1870 and approximately 1890 where no placer mining claim records for the Elk Creek area could be located. A search Elk Creek Mining District records was also made at the Missoula County Courthouse. All of the records at the Missoula County Courthouse seemed to be mere copies of the records located at the Deer Lodge County Courthouse. Additional records related to Elk Creek may be found at the Granite County Courthouse (Maria Craig, Missoula BLM Field Office, personal communication 2019). However, at the time of this research I was unaware of the existence of these records and did not include them in this thesis.

My original research design intended to research any claims of any miner who had any connection to McGinnis Creek—whether it be a water right, placer claim, real estate transaction, etc. and any miner that may have been a major participant long term in the Elk Creek District (i.e. George W. Morse)—in order to track down a complete landscape history of McGinnis Creek and at least a basic historical timeline of mining development in broader Elk Creek District. With approximately twenty years of records missing, it became apparent that the original intent for that sort of landscape history strange considering that one of the roles of county clerks’ offices is to manage records relating to property transactions.
through placer claim records represented a futile effort. Therefore, I used the above discussion of the early Elk Creek District records to illustrate patterns that can be discerned from mining records as a substitute. The only claim in the entirety of the Placer Locations Index that is located in McGinnis Creek. That claim was filed by McGinniss, John et al (the “et. al.” was James J Martin and H.W. Nixon). The McGinnis Gulch Placer Claim states:

Notice is hereby given that the undersigned citizen of the United States having complied with the requirements of chapter six of title thirty two of the revised statute and local customs laws and regulations have located 40 acres of placer mining ground situated lying and being in Elk Creek (unorganized) mining district in the county of Deer Lodge and state of Montana particularly described as follows to wit. Beginning at N.E. Cor post no 1 thence 880 yards westerly to NW Cor post no2: Thence southerly 220 yards to SW Cor post No 3: Thence 880 yards to SE Cor post no4: thence 220 yards to NE Cor post no1 the place of beginning = to be known as the McGinniss Gulch placer Claim. Situated in McGinnis Gulch adjoining Elk Creek on the West—

Discovered on the 6th day of November AD 1893
Located on the 6th day of November AD 1893

James J Martin
H.W. Nixon
John McGinniss
Locator and Claimant
State of Montana

County of Deer Lodge

James J Martin being duly sworn says that he is of Lawful age and one of the Locators and Claimants of the foregoing described placer mining claim: that said location is made in good faith and that the matters set forth in the foregoing notice by him subscribed are true that a copy of the foregoing notice was posted upon said claim on the 6th day of November AD 1893

Jas J Martin

Subscribed and sworn to before me this 17 day of November AD 1893

JG Moony

District Clerk

[Hand drawn seal of Dist Court] (Deer Lodge County Placer Locations Book 2 Page 94)

The note at the bottom of the claim indicates that McGinnis himself was not present when the claim was filed at the courthouse.

Water rights records at the Deer Lodge County Courthouse, like the placer claim records, were very sparse during the early years of mining. Using the U.S Geological Survey maps of the central part of the Elk Creek Mining District, where McGinnis Creek is located, I made a list of all of the named Creeks and Gulches. I then examined the water rights index book and documented all of the water rights index entries for that area with the hope of building a landscape history of water use (see Table 6.3). Once again, as
with the placer index records, the early records were missing as the first entry in the water rights records was from May 15, 1885. Therefore, the data is just not there to construct a complete landscape scale history of water use using documentary records. There was only one record located within McGinnis Gulch. That water right was issued to Pat McDermott of Potomac for 100 inches of water in Maginis [sic] Gulch for “placer mining purposes and the place of its intended use is tributary of Maginis [sic] Gulch” (Deer Lodge County Water Rights Book 3 page 578). The water right record also mentions that the water has been diverted from a “Gulch by means of a ditch whish said ditch is 12 inches by 24 inches in size, and carries or conducts 100 inches of water from said Gulch: said ditch taps and diverts the water from said stream at a point upon its left bank” (Deer Lodge County Water Rights Book 3 page 578). The water right was appropriated on July 6, 1894 and officially filed at the court house on May 2, 1895.
Table 6.2. Water rights located in Elk Creek.

<table>
<thead>
<tr>
<th>Name of Water Right Holder</th>
<th>Drainage</th>
<th>Reference Book</th>
<th>Page Number in Book</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burnham, G.W. et al.</td>
<td>Skimmerhorn</td>
<td>3</td>
<td>456</td>
</tr>
<tr>
<td>Barnes, W.P et al.</td>
<td>Skimmerhorn</td>
<td>3</td>
<td>456</td>
</tr>
<tr>
<td>Chamberlain, J.S.</td>
<td>Elk Creek</td>
<td>3</td>
<td>309</td>
</tr>
<tr>
<td>Cranson, C.S.</td>
<td>Skimmerhorn</td>
<td>3</td>
<td>580</td>
</tr>
<tr>
<td>Carver, C.F et al.</td>
<td>Elk Creek</td>
<td>4</td>
<td>26</td>
</tr>
<tr>
<td>Dwyer, M.S. et al.</td>
<td>Elk Creek</td>
<td>1</td>
<td>123</td>
</tr>
<tr>
<td>Dean, Wm. A.</td>
<td>Elk Creek</td>
<td>1</td>
<td>370</td>
</tr>
<tr>
<td>Daniels, Benjamin et al.</td>
<td>Elk Creek</td>
<td>5</td>
<td>298</td>
</tr>
<tr>
<td>Fleming, W.P et al.</td>
<td>Elk Creek</td>
<td>4</td>
<td>26</td>
</tr>
<tr>
<td>Hood, F.B. et al.</td>
<td>Skimmerhorn</td>
<td>3</td>
<td>456</td>
</tr>
<tr>
<td>Kroger, Charles</td>
<td>McMannus Gulch</td>
<td>1</td>
<td>241</td>
</tr>
<tr>
<td>Kennedy, J.J. et al.</td>
<td>N. Fork Elk Creek</td>
<td>3</td>
<td>338</td>
</tr>
<tr>
<td>Kennedy, J.J. et al.</td>
<td>Keenau Creek W. Fork</td>
<td>4</td>
<td>165</td>
</tr>
<tr>
<td>Keenau, John</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lehson, John C. et al.</td>
<td>McMannus Gulch</td>
<td>1</td>
<td>241</td>
</tr>
<tr>
<td>Togue [sic], Wm. A. et al.</td>
<td>Elk Creek</td>
<td>2</td>
<td>236</td>
</tr>
<tr>
<td>Togue [sic], Jedidiah A.</td>
<td>Elk Creek</td>
<td>2</td>
<td>236</td>
</tr>
<tr>
<td>Morse, G.W. et al.</td>
<td>Elk Creek</td>
<td>2</td>
<td>238</td>
</tr>
<tr>
<td>Morse, George W.</td>
<td>N. Fork Elk Creek</td>
<td>3</td>
<td>338</td>
</tr>
<tr>
<td>Martin, Jas. A. et al.</td>
<td>Skimmerhorn</td>
<td>3</td>
<td>456</td>
</tr>
<tr>
<td>Moss, John W. et al.</td>
<td>Melhorn Creek</td>
<td>3</td>
<td>477</td>
</tr>
<tr>
<td>Myers, George et al.</td>
<td>Skimmerhorn</td>
<td>3</td>
<td>426</td>
</tr>
<tr>
<td>McCallister, E.C. et al.</td>
<td>Elk Creek</td>
<td>1</td>
<td>123</td>
</tr>
<tr>
<td>McAdams, George et al.</td>
<td>Melhorn Creek</td>
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<td>477</td>
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<tr>
<td>McDermott, Patrick</td>
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<td>McDermott, Patrick</td>
<td>Maginnis Gulch</td>
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<td>Nelson, Orca M. et al.</td>
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<td>5</td>
<td>293</td>
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<tr>
<td>Propper, G.R. et al.</td>
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<td>2</td>
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<tr>
<td>Powers, P. et al.</td>
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<tr>
<td>Sproule, Robt. B. et al.</td>
<td>Melhorn Creek</td>
<td>3</td>
<td>477</td>
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<tr>
<td>StanRidge, W.H et al.</td>
<td>Elk Creek</td>
<td>3</td>
<td>615</td>
</tr>
<tr>
<td>Wemyss, Rowland J. et al.</td>
<td>Elk Creek</td>
<td>2</td>
<td>236</td>
</tr>
<tr>
<td>Wemyss, Donnie R. et al.</td>
<td>Elk Creek</td>
<td>3</td>
<td>315</td>
</tr>
<tr>
<td>Woodford, F.S. et al</td>
<td>Skimmerhorn</td>
<td>?</td>
<td>426</td>
</tr>
</tbody>
</table>
The General Real Estate Index records start in 1865, which is significantly earlier than the placer mining and water rights records at the Deer Lodge County Courthouse, and potentially captures a lot of information about the early gold rushes in Elk Creek. However, they record every single real estate transaction in Deer Lodge County from 1865 to 1886, which translates into a massive amount of material to go through (seven volumes) considering that at that time Deer Lodge County was one of only nine counties in Montana Territory and comprised a massive geographical area. I did not research these records myself. Although on one of my visits to the Deer Lodge County Court House Chris Merritt, who was working on a project documenting the Chinese experience in Montana (Merritt 2017), accompanied me and happened to find a reference to McGinnis Gulch. The record documented a real estate transaction on July 24, 1875 where the Grantor was Ah Kong (by Sherriff) and the Grantee was Wesley W. Jones. The transaction is over “Clm [claim] 51 bel on dis [not sure what this means] in Elk Cr. Elk Cr. Dist. And extending down to mouth McGinnis gulch and Bed Rock Flume W.R [presumably water right] ditches, reservoirs and belonging thereto” (Deer Lodge County General Index to Real Estate A-L 1865-1886:page number not labeled). This transaction demonstrates two things—that there was ground sluicing occurring prior to 1875 in the vicinity of McGinnis Gulch and that Chinese miners were operating in the Elk Creek District by 1875. If one could arrange to spend a solid week in the Deer Lodge County Courthouse, the real estate records are certain to reveal information about the early rushes in the Elk Creek District. This is but one area to expand on the research presented here.

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7 This transaction is also reported as a Sheriff’s Sale in a Deer Lodge newspaper (New North-West 1875:4).
Newspaper Dispatches: Evidence of 1872 Placer Operations in the Garnet Range

In 1872 a writer known as Bernadee⁸ wrote a series of dispatches⁹ in Deer Lodge’s *New North-West* publication, sharing details of a multiday trip through the placer mining operations of the Garnet Range, including a trip led by Beartown resident J.E. Van Gundy. Van Gundy took Bernadee on a tour of all of the major areas being worked at that time—June of 1872—in Bear Creek, Deep Creek, and Elk Creek, including their major tributaries. It was intentional that Bernadee chose to visit these areas in June during peak run off as he mentions that this is when mining is at its best stage. It is not clear as to whether he was actually a reporter for the *New North-West*, but several of his remarks insinuate this possibility. There are three points that make Bernadee’s observations useful from a landscape learning perspective. First is the timing of his observations. They occur more than half a decade after the initial wave of stampedes in the Garnet Range. This is important because most of the initial miners had already left at that point leaving the miners that were committed to staying in that place and really applying the knowledge that they were learning from the landscape. Secondly, Bernadee seems to have interviewed nearly every mining party he encountered about their water usage and their mining techniques including in many places the amount of labor that it was taking to

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⁸ A search of chroniclingamerica.loc.gov, the Library of Congress’s historical newspaper database reveals that “Bernadee” was Ben R. Dittes. Dittes was a resident of Lewis and Clark County and seems to frequently appear in Montana newspapers in association with Republican Party Politics in Montana Territory. I just by chance stumbled on a newspaper entry that reported Dittes appointment to the Republican Territorial Convention as a member of the Committee on Credentials. Also appointed to that committee at that same convention was G.W. Morse of Deer Lodge (*Helena Weekly Herald* 1876:2). Maybe the two men met for the first time in Yreka?

⁹ It appears Dittes frequently wrote to newspapers about mining camps. For example in New North-West 1870:3 he writes a similar dispatch about a trip to the mining camps in Cedar Creek west of Missoula.
implement those techniques. The third point that makes Bernadee’s observations relevant to this thesis is that he actually went to McGinnis Creek!

Bernadee’s route took him to Bear Gulch, First Chance Gulch, Herrick’s Gulch, Prosperity Flat, Granite Gulch, Short Gulch, Melhorn Gulch, Bellamie Gulch, McGinnis Gulch, Yreka, the main stem of Elk Creek, Bilk Gulch, Head of Deep, Top O’ Deep, and Deep Creek. Throughout Bernadee’s description of his trek two broad patterns emerge: 1) virtually all of the mining operations are “reservoiring” their water supplies and 2) widespread intensification of mining efforts are reoccurring across many parts of the landscape. Bernadee’s term reservoiring means the same thing as booming, a process that has been described above in Chapter 3, where water is stored for a period of time to let the volume build up and then released at a predetermined rate that maximizes the erosive potential of the water.

At almost every mining camp he visits. Bernadee reported the number of hours per day that miners are able to use their system. In Skimerhorn Gulch C. Anderson & Co. had six hours of water per day; in Herrick’s Gulch McDonald, Winger & Co. had nine hours of water; and in Granite Gulch C. Lawson had four hours of water for his hydraulic operation. Bernadee describes all of these locations as not having much head so it assumed that the mining was occurring high in the drainages, which are all located west of Elk Creek. In the higher drainages east of Elk Creek, such as Bilk, which are among the highest in the Garnet Range, Bernadee described a situation where there was not enough water or gravel at that elevation to sluice and that “in 66, in the spring of the year, six rockers were run by the discoverers with water made from melted snow, and $100 to each rocker per day was the result as long as the snow lasted” (New North-West 1872:4).
These deposits were apparently exhausted fairly quickly and only some lode testing was occurring in 1872.

Yreka, which had been the hub of supplies and social activities in the Elk Creek District during the initial rush, was on the decline in 1872 and is described as being a shadow of its former self despite the fact that one saloon alone had sold ten gallons of whisky on the Sunday prior to Bernadee’s visit (New North-West 1872:4). However, Bernadee reports along the bottom of Elk Creek itself that a massive intensification of mining efforts was occurring. Just below town, miners had constructed a ground sluice that was a half mile long and contained 228 twelve foot long sluice boxes. Bernadee witnessed them wash about two quarts of dirt and get between eight and ten cents of gold out of that small amount of sediment which would have been considered very rich pay dirt. Above town networks of ground sluices stretched up the drainage clear to the former boom town of Reynolds City. Bernadee credits this pay out with miners’ patience and perseverance. This is a classic example of landscape learning where the miners first gained locational knowledge during the early days of the rush. They then kept experimenting with this knowledge and refined their techniques, their ability to acquire and more efficiently use water, and their ability to navigate the legal frame works of the district to acquire and consolidate claims, based on that knowledge to the point that they acquired limitational knowledge as is defined in Rockman 2003 and Rockman 2010.

One of the places Bernadee visited on his trip through the Garnet Range was McGinnis Gulch—the placers that started this whole project. Bernadee describes the head waters of McGinnis Creek as being composed of three gulches including Short Gulch, Melhorn Gulch, and Bellamie Gulch. Melhorn Gulch is still a place that is identifiable on
current U.S.G.S. maps. It is unclear where the places Bernadee calls Short and Bellamie Gulches are geographically located as they do not appear on any maps or records that have been examined for this project. Short Gulch is described as being “as the name indicates, is not long but very steep and rocky, affording the three men here engaged, Mr. Geo. McDonald and party, ample fall for their diggings” (New North-West 1872:4). To get from Short Gulch to Melhorn one needs to cross over a low divide. Melhorn Gulch is described as a place that had been worked prior to June 1872 but that at that time was occupied by Jake Myers’ vegetable garden. The last headwater drainage to McGinnis Creek, Bellamie Gulch, was being worked by Wm. Dean & Co. No description of the mining features or water supply were mentioned. Bernadee then describes the placers in McGinnis Gulch as being:

owned by Meyers, McDonald, H. Hartwell and Dean. So far, all the placers named are worked by groundsluicing, being shallow on a decomposed granite bedrock; but at the Junction of Melhorn Gulch with McGinnis, the nature of the diggings is changed, and drifting is the modus operandi. Here Sexton, Carr, Farnham & Co. own a large extent of the gulch, having their flume set in a drift, obviating the expensive mode of hoisting the pay dirt and permitting work during the winter. Pay in this gulch is regular at about $9 per day to the hand. With Mr. Sexton I found W. Turner, an old typo10, who after seeing the light and shadow side of miner’s life, is again working for a stake. Refreshed on his bountifully

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10 It is unknown what Bernadee means by typo. The Merriam Websters Dictionary only has one definition for a typo and that is the same definition still in use meaning a typographical error. The first known use of the word typo is in 1878. Possibly this was a “typo” typo.
supplied table with a substantial supper, the trail led us down past the
discover claim of this gulch, the riches part of it, but now work out and
abandoned, and below which for one and a half miles no pay dirt ever
could be found, to where its waters mingle with those of Elk Creek (New
North-West 1872:4).

Bernadee describes the active mining in the McGinnis Creek drainage in 1872 as being high in the drainage with the discovery claim occurring in the lower portion of the drainage one and a half miles up McGinnis Creek from Elk Creek. This fits the pattern throughout the nineteenth century American West where miners would first make a discovery in a major drainage, in this case Elk Creek, and then start working their way up secondary drainages, such as McGinnis Creek, in their attempts to find the lodes that the placer gold deposits originated which in this case is the Coloma area. This also corroborates with mining features observed on the ground in McGinnis Creek as will be discussed below.

Connecting Documentary and Archaeological Evidence: Interpretations of McGinnis Creek’s Placer Mining Features

As one enters the mouth of the McGinnis Creek Drainage, a road is encountered. This road may follow the original travel route up McGinnis Creek but it has no doubt been improved with a bull dozer as part of subsequent logging that has occurred in the area. The only identifiable mining-related feature encountered during the first mile and a half up the drainage is a substantial ditch on the northern side of the drainage (Figure 6.4). After observing this feature, I surmised that this ditch might predate the placers in Elk Creek that were worked prior to the commencement of mining in McGinnis Creek.
6.2 Location of major placer mining features in the McGinnis Creek drainage.
Figure 6.3 Index of photo locations for the remainder of this chapter. These photo locations are generalized.
Figure 6.4 Remnants of substantial ditch in lower McGinnis Creek downstream of the first major ground sluicing operation. Photo area A.
Figure 6.5 As one travels up the drainage this first area that appears to have been ground sluiced. This is likely the point of discovery in the McGinnis Creek Drainage. Mining would have occurred in an upstream direction. The sluice channel gets significantly deeper just upstream of this photo. Photo area B.
Figure 6.6 Near the head of the Lower McGinnis Creek placer workings. At this point the miners were removing material across the entire valley floor. Looking up the ground sluice. Photo area D.
Figure 6.7 Side sluiceways off of the central sluiceway. Photo area D.
Figure 6.8 A tremendous amount of material was moved! Notice the scarp on the far side of tailings pile that shows a possible location where the ditch line was cut to provide water in to the ground sluicing operation. Photo area D.
Figure 6.9 An overview of the central sluice showing that the entire width of the creek valley bottom was excavated. Photo area D.

Figure 6.10 Overview of the central sluice looking up drainage towards the direction of mining. Photo area D.
Figure 6.11 Noticeable flat and smooth in the tailings. It is theorized that areas such as this were used as rock derrick platforms. Photo area C.
Figure 6.12 This is a very flat terrace that parallels one of the major secondary sluiceways (right side of photo). It very well could be a place where a rock derrick was continually moved up the diggings as the mining proceeded up the drainage. Photo area C.
Figure 6.13 Secondary Sluiceway. Photo area C.
Figure 6.14 Very deep portion of the main sluiceway. Photo area C.
Figure 6.15 Secondary sluiceway up against the hillside. Photo area C.
Figure 6.16 The main sluiceway is running through the center of the photo. Near the very center of the photo there is a noticeable low spot in the tailings. At that location a secondary sluiceway comes in to the main sluiceway. That secondary sluiceway connects to another network of tertiary sluice ways. Additionally there is another network of secondary sluiceways to the photographer’s right. The first place the mining would have occurred in this photos is straight up the middle of the drainage (from right to left). As they encountered areas with high concentrations of gold they then expanded their operations out towards the walls of the narrow valley creating the secondary sluiceways. Photo area C.
Figure 6.17 Main sluice way with a parallel sluiceway against the base of the bank on the far side of the photo. Photo area C.
Figure 6.18 Main sluice way with a parallel sluiceway against the base of the bank on the far side of the photo. Photo area C.
Figure 6.5 Secondary sluiceway. Photo area C.
Figure 6.20 Person is standing in the bottom of a deep secondary sluiceway. Photo area C.
Figure 6.21 Person standing in the bottom of a very deep sluiceway. A sluiceway this deep indicates that the original ground surface was significantly higher before the commencement of mining operations. Photo area C.
Figure 6.22 Deep portion of main sluiceway. Photo area C.
Figure 6.6 Main sluiceway with massive tailings pile. There is a secondary sluiceway on the other side of the tailings pile. Photo area C.
Figure 6.24 Head of the main sluiceway. Mining seems to have stopped at this point. Photo area D.
Figure 6.25 Several lard cans that were located on the surface of tailings piles at the lower McGinnis Creek placers. Lard was likely used to lubricate equipment such as rock derricks. Photo area C.

Unfortunately, I was unable to locate any documentary evidence supporting this explanation of the feature’s chronology. However, the ditch is blown out along the lower ground sluice workings. If these blow outs were intentionally created by the miners to erode away the deposits, they would have occurred lower in the drainage first and then the created at intervals the miners saw fit as they worked their way up the drainage through the deposits. Since the ditch has these blown out areas and the ditch goes below these workings, I therefore believe that the ditch has to predate the McGinnis Placers.

Continuing up the road around one mile from the mouth of McGinnis Creek, evidence of ground sluicing became apparent in the form of one large sluice channel that currently still holds the main course of McGinnis Creek (Figure 6.5). This is likely the
discovery point of gold in McGinnis Creek. Miners would have probably used gold pans, shovels, and picks to test the creek from its mouth at whatever intervals they saw fit. At this point, they must have hit some pay dirt that intrigued them enough to intensify their operations (photo area B). Given that the ground sluice system at this point has just one sluicing channel means that they were only finding gold near the creek bed. Another thousand feet or up the drainage the ground sluicing operation expanded dramatically and cover the entire bottom of the drainage (photo area C). I interpret this as meaning the miners found a rich deposit and expanded their diggings outward to exploit that deposit.

At this point there is still one primary sluice channel that still has McGinnis Creek running through it. Branching out from this channel is a very large network of other secondary sluicing channels that then connect to further sluicing channels (photo area C). Occasionally, there are areas that seem to have been intentionally leveled on the tops of the tailings piles (Figures 6.6, 6.7, 6.10, 6.11, 6.12, 6.13). These may have been rock derrick platforms—although there is no way to know for sure. This pattern of mining continues upstream and around a bend in the drainage for approximately 1,500 feet (photo areas C and D). This type of pattern represents a situation where the miners kept expanding their excavations further and further away from the main channel as they continued to find gold stopping only when they hit the bedrock at the bottom of the deposit and on the hillsides that contain the drainage. The pattern abruptly comes to an end near where there is a really large well defined single sluice way at a location just below where the gradient of McGinnis Creek increases significantly (Figures 6.6, 6.8, 6.9, 6.10, 6.24). No evidence of mining seems to exist upstream of here for nearly half of a mile.
Did the miner’s stop here because they ran out of gold in their sluices? Or did they stop here because the gradient increased so the likelihood of gold deposition in the creek decreased? If they stopped here because the gold ran out in their sluices, they still hadn’t gained any more than locational knowledge of gold deposits. If they recognized the fact gold deposition is not as likely to occur in areas with steeper gradient because the water has more energy and thus can carry heavier sediments (i.e. gold), they would have shown not just locational knowledge of gold deposits but also limitational knowledge of gold deposits. A modern geology interpretation is that gold was deposited here because the steepness of the drainage decreased not giving water enough energy to carry the gold. The bend in the drainage allowed the waters of McGinnis Creek to lose even more energy, allowing the gold that eroded out of the contact zone at the head McGinnis Creek to be deposited at this location.

A half mile above this location evidence of ground sluicing appears again (photo area E). At that point the drainage is much narrower and there is only one dominant sluice channel (Figures 6.28, 6.29, 6.30). However, miners were going quite deep. It appears in some locations they may have been mining through twenty feet of sediment. This is also possibly the location of where Bernadee, as mentioned above, observed miners drifting in to the placer sediments. Given the loose nature of the placer deposits and the overall crumbly nature of the granite in this drainage, evidence of those drifts would not preserve well in the archaeological record.
Figure 6.26. Explanation of gold deposition zones in relation to areas of intensive ground sluicing.
Figure 6.27 Lard can at upper McGinnis Creek placers. Lard was often the only lubricant available in remote mining areas and was used to lubricate equipment such as rock derricks.
Figure 6.28 Upper McGinnis Creek placers. Here there is one ground sluice.
Figure 6.29 Main ground sluice at the Upper McGinnis placers.
After the initial intensive development of placer deposits in McGinnis Creek during the late 1860s to mid-1870s, it appears that placer mining significantly tapered off. By the 1890s, as is typical of the patterns of mining development, efforts shifted to the significant lode being developed in association with Coloma. Unlike much of the Garnet Range placers, McGinnis Creek does not appear to have been significantly re-mined which allowed all of the evidence of ground sluicing to be preserved; however, there is some evidence of small scale placer development in the drainage during the Great Depression. The lower McGinnis Creek ground sluices appear to have had a road bulldozed across them some time in the 1950s. Additionally, the remains of a [likely]
Depression-era cabin (Figure 6.31) are situated near the lower placers; however, that date range is only speculation as there is not temporally diagnostic artifacts associated with the cabin.

Figure 6.31 Twentieth century cabin.

Concluding Thoughts and Recommendations for Future Research

In this thesis there has been much discussion of landscape learning as a process for use as a tool for understanding placer mining landscapes. However, there is much more that could be done. One thing that would be helpful is to have all of the county records digitized so that they do not become lost, like the placer and water rights records from the 1880s at the Deer Lodge County Courthouse. In addition to the pipe dream of
digitizing those records, it would be beneficial to future researchers in the Garnet Range to look through the nineteenth century real estate record books. They could potential be a treasure trove of information. Given the massive amount of real estate transactions documented in those records, one strategy to efficiently comb through the them could be to make a list of all miners known to be mining in Elk Creek (from sources used in this thesis) and look them up in the general real estate index. In addition to future documentary research of mining records, researchers studying placer mining could benefit from including aerial remote sensing methods, such as drone based photogrammetry, mapping, and remote sensing. That would have been a game changer for this project. One of the obstacles that kept standing in the way of this project was how to map such large landscape scale features that were often not accessible to walking them with a GPS. The lower McGinnis Creek placers alone probably have over 500 sluiceways—many of which were filled with water or lined with precariously placed rocks. Mapping work that would take weeks with a handheld GPS could be done in a couple of hours with a drone. Lastly, from a more regional perspective, it would be beneficial to have a larger, more thorough, and more diverse guide to interpreting placer mining features. Such a guide would also have information on how to evaluate placer mining resources for NRHP eligibility.
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Appendix I Glossary of Placer Mining Terminology

Booming—The process of sending pulses of water through a placer operation to increase the erosive power of the water supply where the water supply may be limited.

Dirt—Miner slang for placer gravels.

Ditch—A structure made of dirt (that is sometimes lined with other materials such as wooden planks) used to transport water from a water source to a mining operation.

Diversion Dam—A dam that has the sole purpose of steering water rather than holding it back into a reservoir. These dams are used at placer operations to steer water into ditches and flumes.

Drag-line—A machine used for excavation at dry dredging operations. The machine looks like a crane where there is a control house that can swivel on base with a boom leading off of it. Like a crane the boom has a cable leading from the control house to the top of the boom and then back to the ground. However on the ground is a large bucket meant for scraping. This bucket can be pulled towards the control house in order to scrape off just the top layer of material which can then be picked up and placed in a trammel or some other washing device.

Dry Washing—The process of washing gravels through a special wash plant that does not use water.

Face—In surface mining it is the area of the mine that is being cut into in order to expand the pit.
Flume—A structure that is usually part of ditch systems, usually made of wood, that allows the water supply to pass around obstacles such as cliff faces, soil to course for ditches, etc.

Giants—A steerable piece of pipe with a nozzle on the end that when it has water forced through it creates a very direct and powerful stream that is used to excavate gravels during hydraulic mining.

Gravel—Miner slang for the material contained within a placer deposit.

Hydraulic Elevator—A contraption that uses water pressure to force placer gravels through a pipe up out of the pit of a mine to a higher elevation where the gravels are then run through sluice boxes.

Hydraulick Head—Water pressure created by gravity when water from a higher point travels to a lower point in a contained space such as a pipe.

Lode—An igneous rock deposit that contains gold. When lodes erode it releases the gold which then washes downstream to form placer deposits.

Miner’s Inch—A unit water measurement common through the Western U.S. However, the miner’s inch is not standardized across this region. In CA and MT the law states that forty miner’s inches equals one cubic foot per second while in CO 38.4 miner’s inches equals one cubic foot per second of water flow. In other words the 40:1 ratio equals 11.22 gallons per minute (Gardner and Johnson 1934a: 59).

Panning—The process of using a gold pan to wash material from a placer deposit. Sometime the pan itself is used to excavate the material and sometimes a shovel or pick is used.

Pay Dirt—Miners slang for placer deposits containing substantial gold.
Pay Streak—Miners slang for the certain depth in a placer deposit that contains the highest amounts of gold.

Pipes—Rolled pieces of sheet metal used either by themselves or within a flume to deliver water to a hydraulic mining operation.

Pit—The part of a surface mine actually being worked.

Placer—

Reservoir—A water storage area created by a dam.

Riffle—The cross bars in the floor of a sluice box. They are named such because they create a riffle which then causes the heavier sediments (i.e. the gold) in the water to settle out.

Rock Derrick—A hoisting device used to lift boulders out of the pit of a mine and to a tailings pile. They consist of a large vertical post beam attached to a boom that can swivel around the beam with a pulley on the end. A cable or rope is run through the pulley and is used to do the actually lifting.

Rocking—Generally associated with the exploratory phases of placer mining it is the process of using a rock box to wash placer gravels.

Ruble Elevator—Named after the Ruble Mine in Josephine County, Oregon. During hydraulic mining this device separates small gravels from larger material and is basically an inclined grizzly sloped at around seventeen degrees that has a narrow chute in its lower section that sends the finer material into sluice boxes while the larger material washes up the grizzly and is put into the tailings piles (Gardner and Johnson 1934b: 26).

Sluice—Any narrow channel that when water and gravels are run through that is designed to capture mineral deposits such as gold.
Sluice Box—A narrow device shaped like a three sided box that contains contraptions such as riffles, carpet, or screens to capture valuable mineral deposits when water and gravels are run through.

Trommel—A tumbling drum that is used to sort placer gravels according to size. Trommels are one of the main means of washing gravels at dragline dredging operations.

Wash Plant—Another name for a trommel.

Washing—Miner slang for processing gravels.