REPELLANT BEAUTY: A RATIONAL INQUIRY INTO 21ST CENTURY PATENTED LODE MINE USE

by

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DEDICATION

This work is dedicated to my parents, girls and wife who I have with me- always.

ACKNOWLEDGEMENTS

In titling this dissertation *Repellant Beauty*, I acknowledge a passage by Dr. Francaviglia (1991) in *Hard Places: Reading the Landscape of America's Historic Mining Districts*, which stayed with me as a recurring theme while writing. The text reads, "The creators of mining landscapes have provided us settings that are difficult to view with neutrality, for these landscapes appeal and repel simultaneously. The fact that we judge landscapes aesthetically and moralistically makes their interpretation all the more interesting."

I would also like to thank a number of friends and colleagues who provided professional expertise, guidance, and encouragement during my journey including my supervisory committee professors from Boise State University Dr. Luke Fowler, Dr. Greg Hill and Dr. Monica Hubbard, cartographer and GIS specialist Jim Liesenfeld, land use attorneys JoAnn Butler and Jim Phillips, statisticians Karen Austin and Ronnie Toplyn, and Mining Engineer Jim Koonce.

ABSTRACT

Rationalistic, incentive-based redevelopment objectives must comply with regulatory entitlement requirements that enmesh broader community goals. These community goals include site reclamation, environmental protection, and smart growth land use development measures. The focus of this dissertation is to better understand both the economic and community factors affecting the use of approximately 3,500,000 acres of patented lode mine (PLM) lands in the West. Study methods use a unique dataset compiled from BLM land patent documents, Idaho property assessment records, USGS mineral resource data, and GIS-derived surface estate measures to analyze effects of a set of jurisdictional, mineral estate, surface estate, and control variables. Findings provide evidence to the role economically-liberal policies have on the use of PLMs. Additionally, factors affecting other prominent PLM uses, such as active mining and neglect, are complicated by policies that create information asymmetries around PLM's mineral estates. As such, conflicts between economic and non-market dimensions of PLM use in Idaho provide significant insights into land use choices and redevelopment across the West.

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LIST OF ABBREVIATIONS

AML	Abandoned Mine Land
BLM	Bureau of Land Management
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CWA	Clean Water Act
FLPMA	Federal Land Policy and Management Act
GAO	General Accounting Office
IDL	Idaho Department of Lands
IDEQ	Idaho Department of Environmental Quality
IGS	Idaho Geological Survey
MSHA	Mine Safety and Health Administration
NEPA	National Environmental Policy Act
NRB42	National Register Bulletin on Historic Mining Properties
OSM	Office of Surface Mining
PLM	Patented Lode Mine
SMCRA	Surface Mining Control and Reclamation Act
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
USFS	United States Forest Service

CHAPTER ONE: INTRODUCTION

The historic mining landscapes of the West are disappearing (Francaviglia, 1991; Noble and Spude, 1997). Vanishing from the landscape are the old aerial tramways, head frames and such telltale mining features as conical-shaped tailings and waste rock dumped below hard rock or lode mines.[1] To some with a critical view toward mining, "good riddance" might be too kind to say for all the destruction and exploitation the mining industry wrought in America's West over more than a century. To others, a loss of the historical record in any form has its consequences.

There is a philosophical competition in environmental policy that is unique to disappearing historic mining landscapes and use of century-old hard rock mining properties into the 21st century. To some, the most relevant perspective is market economics and the privileging of mineral extraction consistent with the principles of economic liberalism granted patentees by the 1872 Mining Act. To others, non-market

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[1] The language and features of mine workings are historically and contextually rich with dimensions that extend to other parts of the world, like Cornwall, England where many early underground mining practices were developed in 18th century tin mines. To capture some of these elements, Appendix A includes select glossary terms and references, such as aerial tramways and head frames as used here, as well as mine names contemporaneously chosen by the late-19th and early-20th century lode miner in Idaho.

and non-economic dimensions matter most. Of utmost importance is the *polis* and the priorities of the community.[2] In this instance, the key criteria for decision-making is not maximizing personal gain or the incentive of profit, but the promotion of public interest, such as cleaning-up derelict or contaminated legacy mine lands where economics competes with environmentalism.

Both economic and community factors affect owner decisions on the use of patented lode mine (PLMs). To address competing values in environmental decision-making on PLMs this dissertation asks the question: *what* factors affect patented lode mine (PLM) use in the West? It does so through the development and subsequent analysis of a wholly unique dataset,[3] which facilitates the testing of three sets of research propositions addressing the effects jurisdictional, surface estate, and mineral estate factors have on the current use of PLMs.

Efforts to understand the effect jurisdictional, mineral and surface estate variables have on the use of historic patented lode mines for residential and other purposes will serve the public interest. As Stegner (1954) wrote in *Beyond the Hundredth Meridian: John Wesley Powell and the Second Opening of the West*, "an on-going and distinctive

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[2] In the *polis* model of society, the unit of analysis is community and decisions are political (Stone, 2012). Consequently, the best form of government and the resolution of major policy issues involve connecting the individual self-interests of community members to the common, community interests of the *polis*.

[3] The dataset used in this study consists of records compiled throughout Idaho from a myriad of disparate but related sources, including BLM accession records for each patented lode mine observed, tax commission aerial parcel maps, United States Geological Survey mineral resource reports, the annually updated assessment records of 28 counties, and a newly developed land use entitlement timeframe model organized around the facilitative, neutral and obstructive policy regime work of Ostrom (1990).

pattern of land legislation in the West is based on inadequate or inaccurate information" (p. 410). Whether friendly, undecided, or against mineral extraction and it's repellant beauty, communities and policy makers in the West benefit by knowing the forces causing historical mining landscapes and the use of patented lode mines to change.

Mining has a repellant beauty. As Francaviglia (1991) wrote, "The creators of mining landscapes have provided us settings that are difficult to view with neutrality, for these landscapes appeal and repel simultaneously. The fact that we judge landscapes aesthetically and moralistically makes their interpretation all the more interesting" (p. 66). We are attracted to the thrill and lore of Disney's Thunder Mountain as its 5-car locomotive "traipses down into an abandoned mine shaft" and "inside a nearly 200-foot mountain to the Big Thunder Mining Company, established in the early days of America's Gold Rush" (Birnbaum Guide, 2003, p. 65). Yet, as Leshy (1987) reasoned, "though nineteenth-century miners are still sometimes revered in the folklore of western settlement, their modern cousins are more often viewed as rapists of the landscape" (p. 262).

To address the significance of historic mining lands, the National Park Service – one of the keepers of our nation's history—issued in 1992 its *National Register Bulletin on Historic Mining Properties* (*NRB42*). As notated in its revised edition in 1997, the *NRB42* provides "a body of information to support federal, state, and local efforts to manage historic mining properties with a sense of stewardship predicated upon recognition of the importance of these properties in our nation's history" (Noble and Spude, 1997, p. ii). Of particular note was the inherent challenge of determining whether, as Glaser (2010) questioned, historic properties such as privately-owned patented lode mines met the integrity measures of "design, materials, workmanship, feeling and association" set forth in the *NRB42* requirements (p. 219).

It can be a challenge for historic mining areas to be seen as complying with the integrity measures of the National Register of Historic Places. As Hardesty (1990) observed, "Mining sites often are considered to lack integrity because of the visible and sometimes dramatic disturbances to earlier archaeological deposits caused by later mining activities" (p. 48). Also impacting the integrity of historic mining areas are forces of neglect, reclamation, and gentrification (Francaviglia, 1991; Noble and Spude, 1997).

History of Patented Lode Mines

The four forces of reclamation, renewed mining, neglect, and gentrification correspond with four prominent patented lode mine (PLM) land uses. There are reclaimed PLMs where the surface estate has been restored to varying degrees to approximate the pre-mining landscape. There are historic PLMs that experience renewed mining, such as the nation's deepest industrial silver mine called the Lucky Friday in the panhandle of northern Idaho. There are many abandoned and neglected PLMs. Finally, there are PLMs that have been gentrified and re-purposed for residential purposes, like those the author's land use planning and engineering corporation encountered while working in the resort community of Sun Valley, Idaho. As such, reclamation, renewed mining, neglect, and gentrification are both forces on the landscape and prominent PLM land uses.

Reclamation, which is a foremost goal of the Surface Mining Control and Reclamation Act of 1977 (SMCRA), is a dynamic land use that affects PLMs. SMCRA's abandoned mine land program, for instance, is credited with helping reclaim thousands of dangerous sites,[4] including many former hard rock or lode mines (NAAMLP, 2013, p. 3). As elaborated upon in the National Park Service's *NRB42*, "although well-intended, these cleanup activities can contribute to the loss of significant historic mining resources" (Noble and Spude, 1997, p. 1). In turn, these cleanup activities can lead to brownfield developments and productive reuse of industrial sites, including PLMs.

Renewed mining, whether mining low-grade ore in an open pit method where the workings are open to the surface or re-mining old tailings from formerly mined sites using new technologies, alters the historic landscape and is a use that exists on some PLMs. As Francaviglia (1991) observed, "We may think of surface mining and underground mining as being found in different areas, but it is usually time, rather than space, that separates them" (p. 129). Not all renewed mining on PLMs requires mass surface grading, as evidenced by the deep underground Lucky Friday Mine, as well as with small, artisanal mines that retain the historic timber practices described in greater detail in Appendix A.

Neglect, as documented in the abandoned mine land initiative of the federal government, is a significant issue with mines (Kimball, 2006, BLM, 2006). Neglected PLMs impact communities throughout the West, as approximately 3,500,000 acres of the public minerals of the United States were privatized throughout the West under the 1872 Mining Act (McClure and Schneider, 2001; Woody, 2010). To understand the causes of PLM neglect today entails looking at a number of surface, mineral, and regulatory

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[4] To address the many hazards associated with mines, additional abandoned mine land (AML) initiatives by a myriad of federal and state programs have been created since SMCRA was adopted in 1977. For example, the Idaho Abandoned Mine Reclamation Act was enacted and funded in the 1990s and includes a program eligibility feature for "abandoned mines on private land" consistent with the provisions of Idaho Code §47-1703.

factors, ranging from how evidence of past mineral discoveries are documented to how mineral deposits are valued and taxed by state legislators. In particular, the mineral disclosure provisions of the 1872 Mining Act, Idaho's valuation of mines for taxation statute (Idaho Code §63-2801), and competing worldviews in PLM development, which are measured by evaluating land use application entitlement timeframes by county throughout the State of Idaho, will be analyzed in this dissertation.

Lastly, gentrification and the process by which a community changes as often wealthier and new people move to a place, as evidenced by the growth in population of the Western Mining States[5] from approximately 1 million people in 1872 to more than 74 million in 2015, impacts the use of PLMs. Tied to the growth in the West's population, an increase in gentrification and residential use of PLMs is occurring. Former mining towns like Aspen, Colorado and Sun Valley, Idaho are now tourist attractions, ski towns, and recreation playgrounds with no active mining and strict development codes. These communities have adopted land use controls, which protect property markets (Alexander, 2001). The result is development proposals move more slowly, take longer, and are characterized by less facilitative entitlement timeframes.

In protected property markets, a dissipation of land values occurs for uses subject to development uncertainty (Rose-Ackerman, 1985). As empirically analyzed in Chapters 6 and 7, this uncertainty favors non-mining uses of PLMs. The logic is, as problems or

[5] The Western Mining States, as referenced here, include: Alaska, Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

issues increase, the number of potential buyers decreases and the value attributed to a property dissipates (Van Velsen, 1967). This logic characterizes the philosophical competition in environmental policy that is unique to brownfields, PLMs, and other potentially contaminated or derelict properties.

Scholars have not studied competing worldviews in the context of PLM land use issues. Yet, environmental decision-making has evolved to where complex regulations affect PLM use in the 21st century. At the local level, the land entitlement processes owners and investors go through when developing property depict an identifiable community characteristic and ethos of a local jurisdiction. On a relative basis, counties with facilitative entitlement timeframes can be viewed as more utilitarian, *laissez faire,* and economically liberal than counties where long, possibly obstructive, entitlement timeframes pervade. Processes that slow development represent more of a conservationist or protectionist set of community values and, as a result, likely result in fewer re-purposed PLMs

Competing Values in Land Use

Competing values in PLM decision-making affect patented lode mine use. These values include the generally accepted premise that government laws in the United States may limit the use of private property. For instance, the use of a century-old PLM in the West for active mining is not strictly a private matter, but a use subject to a host of federal laws and requirements of regulatory federalism. Some PLM land uses may be impacted by local land use controls or impacted by policies that neither require reclamation of an abandoned mine shaft on a PLM nor allow speculative valuations of a PLM for property assessment purposes.

Not only do government rules affect PLM use, likewise other jurisdictional factors such as entitlement timeframes and property values affect the rational decision-making of PLM owners and investors. Including jurisdictional factors, there are at least two other underlying factors that affect the use of PLMs. As identified in the literature and for purposes of this study, the three key factors affecting PLM use are the characteristics of the mineral estate, the characteristics of the surface estate, and the jurisdiction characteristics of the county within which the PLM is located. These unique situational factors are further described below.

The application of jurisdictional rules, including government laws, regulations, and practices, to mining lands in communities throughout the West affect patented lode mines. As Davis and Davis (2007) described in *The Politics of Hard-Rock Mining in the American West*, numerous environmental laws have effectively curtailed the predominantly *laissez faire* mining practices of the past. These laws have been written, disseminated, upheld in the courts, and wielded against the mining industry in citizen lawsuits and by anti-mining groups in jurisdictions throughout the West (Holland and Hart, 2003; Davis and Davis, 2007).

The impact of jurisdictional requirements consists of not one**,** but multiple accumulating laws and regulations that together form an underlying, causal factor that affect how PLMs are used. Stated simplistically: if a mining permit is issued, renewed mining has a chance of occurring; if Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) sanctions are invoked, then reclamation occurs; if the incentive to mine is less than an alternative land use in a given jurisdiction, such as building a residence on mineral patent property, then the likelihood of gentrification increases; and, if buying and holding a mineral patent poses negligible risk or minimal, if any, property taxes compared to the uncertainty, payoff and risk of investing and developing a working mine, then conditions for neglect heighten.

Besides jurisdictional rules, the two other factors that are essential to the study of PLM use are the characteristics of the mineral and surface estate. With the mineral estate, the federal government granted to the owners of mineral patent lands the right to extract subsurface minerals. Consequently, recognition as to the importance of the mineral estate to PLM use follows the basic logical premise that for patented, already privately-owned property, there is little incentive to mine the property if the mineral estate is insignificant or has little if any commercial value. On the other hand, it may make sense to extract minerals from a PLM if, for instance, a significant deposit of a valuable commodity is known to exist in the subsurface of the estate.

The surface estate affects patented lode mine use for a host of tangible reasons readily identified by the physical surroundings of a property. Observable are the characteristics of the property: it’s size, views, vegetation, roadway, location, proximity to services, and improvements. With former mining properties, such features as abandoned mine shafts, water runoff from the mine, and ore dumps might be present. The surface estate also corresponds to the factors an appraiser or the local county assessor would note about a PLM.

Noteworthy with mineral patent lands is that the 1872 Mining Act conveyed the “exclusive right of possession and enjoyment of all the surface … [and] such surface-lines extended downward vertically” on the patent property (Library of Congress, 2016, pp. 91-92). Further, as Costigan (1908) in the *Handbook of American Mining Law* extrapolated, “a patent is the conveyance executed by the United States which passes to the applicant the legal fee-simple title to the land…. [and] passes to the patentee all the interest of the United States, whatever it may be, in everything connected with the soil, in everything forming any portion of its surface, and, in general, in everything which is embraced within the signification of the term ‘land’" (p. 392).

Insights into the underlying factors affecting the current use of mineral patent lands will assist a community that wants, but does not have, renewed mining. The community could discover that the impediment lies with the attractiveness of the surface estate for competing, incentive-based purposes, relative to the risk and uncertainty of regulatory jurisdictional requirements and the characteristics of the mineral estate. Or, legislators may find that adopted tax policies aimed to discourage county assessors’ offices from evaluating mineral patent lands based on speculative mineral values has the unintended consequence of encouraging freeriding by some users and land speculation and neglect of mineral patent land by others.

The goal of this research is to inform policy vis-a-vis factors affecting PLM use. By empirically studying the effect county jurisdictional, mineral estate, and surface estate variables have on the use of mineral patent land, this research aims to complement frameworks like the National Park Service’s *NRB42* evaluation process for assessing the significance of mining sites (Noble and Spude, 1997) and policies, such as the lack of a mineral disclosure provision in the 1872 Mining Act. Neglect, gentrification, reclamation and renewed mining have been identified as indicators of mine disappearance on mineral patent land. Yet, the underlying reasons for why patented, privately owned, fee-simple properties are neglected has not been fully studied, nor what factors result in reclamation, gentrification, or renewed mining. These factors are poorly understood and have not received focused scholarly attention.

Scholarly attention into the causes of neglect, reclamation, gentrification, and renewed mining land uses on mineral patent properties is needed to improve the adequacy and accuracy of information provided to legislators in the West. Attention to factors affecting PLM neglect or renewed mining reveals, for example, that Idaho's mineral taxation statute (Idaho Code §63-2801) includes the distinctive feature, as noted in Idaho Attorney General Opinion No. 93-13, that property tax assessments not be based on the speculative value of an ore body, but on its net output or five dollars an acre ($5/acre) for lode mines when not producing (pp. 2-3). Yet, the outcome of this policy, at least in 2015, was none of the five active gold or silver mines in the state showed a net profit; nearly three-quarters of all the pre-1920 PLMs in Idaho were abandoned or neglected; and, further, one-of-every-four counties with pre-1920 PLMs appeared to use mineral only (category 9) assessment valuation practices in contradiction to Idaho Code §63-2801.[6]

The potential to improve land use legislation, not only at the state level in the matter of mineral taxation statutes such as Idaho's but also at the federal and local level is significant with this research into factors causing particular land uses on PLMs to occur. *Analysis of the key jurisdictional, mineral and surface estate factors causing neglect, reclamation, gentrification, and renewed mining is the purpose of this research.* Understanding these variables will inform policies, ranging from the lack of a mineral

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[6] Additional detail on the specifics of these findings are set forth in Chapter 6.

disclosure provision in the 1872 Mining Act to Idaho's valuation of mining property statute that was originally enacted in 1903 and has changed little since then. Letting decision-makers know what problems exist so that issues can be addressed is important. A policy of doing nothing is, as Leshy (1987) observed, a "nonpolicy of tacit acquiescence" (p. 11).

Nonpolicy acquiescence, tacit or otherwise, affects patterns of land use on patented lode mines. To address this requires policies, which as Sabatier (2007) observed, "combine expert, statistical, and content knowledge with the public's emotions and intuitions" (p. 3). Given results of polls like Colorado College's "2015 Survey of the Attitudes of Voters in Six Western States," it is clear protecting and conserving the environment for future generations is of utmost importance to the public.[7] This is underscored by Noble and Spude (1997), who noted that many significant mining properties had not been evaluated and that protection was "pressing" due to a "marked increase in activities that threaten historic mining resources" (p. 1). To inform policy further, empirical analysis of the content-rich historic mining landscape on PLMs and the

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[7] Key findings of Colorado College's "2015 Survey of the Attitudes of Voters in Six Western States" indicated that 40% of the population finds it "very important" to "make sure resources such as … minerals … are available for development and mining" (p. 11). While not directly on point, since the Colorado College (2015) poll dealt primarily with the use of public lands (not private property), the report does trend a general understanding held by voters in the Western states that "opportunities for outdoor recreation, and clean air and water … are significant reasons [people] choose to live where they do" (p. 21) with 82% of respondents finding it "very important" that natural areas for future generations be protected and conserved" was "very important." In general terms, the Colorado College poll finds that economic factors are eclipsed by environmental priorities.

causes of renewed mining, reclamation, neglect and gentrified land uses on PLMs are needed and pursued in the following chapters.

Overview of Eight Chapters

In this dissertation the following chapters are presented. In Chapter 1, the repellant beauty of mining and underlying factors affecting PLM use, such as competing worldviews in land use issues as noted in the preceding pages, was introduced. In Chapters 2 and 3 the changing perspectives on mining over the last 150 years and environmental decision-making are given attention. Referenced is the enduring zeitgeist of economic liberalism and its principles of free access and a minimal role for government, as well as the advent of a sustainable environmental protection ethos affecting private lands, such as brownfields and PLMs. Confounding PLM redevelopment are inherent public policy challenges, ranging from the lack of a mineral notice provision in the 1872 Mining Act to mineral taxation provisions, such as found in Idaho Code §63-2801, that cap mineral and surface valuations on PLMs.

In Chapter 4, the economic model of rational choice is introduced as the theoretical framework for this dissertation to help understand the factors affecting PLM use. In Chapter 5, the research design, materials, and methods are described. Featured in the research design are pre-1920 PLMs in Idaho in 2015 as the unit of analysis, the operationalization of variables, and use of statistical tools consistent with the levels of measurement, data sources, and research propositions.

Chapters 6 and 7 present and discuss the empirical results of pre-1920 PLMs land use in Idaho. Propositions of rational decision-making in PLM use statistically reveal a competition in values between community interests and self-interested welfare maximization strategies of PLM owners. Opposing rational choice are the community value explanations for land use outcomes affecting PLM use. Insights into local entitlement factors and mineral taxation policies affecting patented lode mines in Idaho and, to a degree, the West and other mineral patents, are provided.

Chapter 8 states this study's conclusions and suggests areas of further inquiry. Deduced from the study results is that an enduring zeitgeist of economic liberalism remains embedded in a number of significant federal, state, and local laws affecting PLM use. At a national level, these embedded beliefs include --approximately 150 years after enactment-- the lack of a mineral disclosure requirement for lands patented pursuant to the 1872 Mining. At a state level, a market approach appears in policies, such as Idaho's mineral taxation statute (Idaho Code §63,2801), which caps PLM valuations at five dollars an acre ($5/acre). At a local level, a *laissez faire* approach to land use decisions manifests in faster, less restrictive entitlement timeframes and processes.

As Idaho and possibly the other Mining States of the West analyze the implications of generous economic liberalism policies, issues of increased PLM neglect and freeriding will require attention. Addressing abandoned mine land reclamation needs voluntarily will continue to yield negligible results. Incentivizing inactive land use with preferential tax treatment is, statutorily, questionable and opposite other approaches taken by conservative legislatures, like Idaho. In the case of Idaho Code §63-2801, it should be revisited with updated data to address issues of neglect, freeriding, and the assessment inequities it causes Idaho counties in the 21st century on PLMs.

CHAPTER TWO: BACKGROUND

The history of gold and silver mining in the West spans three centuries, starting most famously with the discovery of gold on the American River in now the State of California in 1848 to the ongoing 2017 underground #4 Shaft work that will eventually reach a below ground depth of nearly 9,600 feet at the Lucky Friday silver mine in the Idaho panhandle (Hecla, 2017). For reasons of nation building, payment of debt, manifest destiny, and commerce, federal land disposal policies pervaded early congressional acts, including Acts for railroad development, statehood, homesteading, and mining (Smith and Freemuth, 2007). “An Act to Promote the Development of the Mining Resources of the United States” (referenced herein as the 1872 Mining Act), in particular, was approved by Congress and signed into law by President Ulysses S. Grant on May 10, 1872 (30 USC 22). Nearly 150 years later, *the 1872 Mining Act is responsible for the privatization of approximately 3,500,000 acres of public lands and minerals of the United States throughout the West* (McClure and Schneider, 2001; Woody, 2010).

This chapter begins to tell the story of how these approximately 3,500,000 acres are now being used. It unfolds in four parts, starting in the first section with a description of mining’s importance to settling the West and the privatization of lode mines in the post-civil war President Grant era of the nation. It continues in the second section of this chapter by addressing the different historical perspectives, policies, and regulations affecting PLM use. For additional context reasons, this second section also includes a description of economic liberalism and the concepts of first possession and free access, which were both prevalent perspectives that existed when the 1872 Mining Act was adopted and, arguably, persists in policies affecting PLM use to this day. The section continues by describing the three evolving perspectives on the 1872 Mining Act from the late-18th century forward. Addressed in phases through the approximately 150 years the 1872 Mining Act has been law are the restrictions to private initiative that have been legislated into the original statute and changed with the growth of the West and maturing of the United States.

The third section of this chapter picks up where the three previous 50-year phases of federal laws affecting patented lode mines left off, by providing a general overview of the main federal statutes affecting mining in the West today. The fourth and final section of this chapter takes a state level view, from the midst of the Western Mining States, by looking at Idaho laws and regulations. Notably, this section begins with a historical analysis of gold and silver mining in Idaho and ends with an analysis of a very unique Idaho statute (Idaho Code §63-2801) that caps mineral taxation values of PLMs for property tax purposes at five dollars an acre ($5/acre) for the majority of Idaho's 1,908 pre-1920 PLMs.

Historical Importance of Lode Mining

When the 1872 Mining Act was enacted following the Civil War in the United States and former-Union Army General Ulysses S. Grant was president, a host of rational federal policies befitting the era were adopted. For instance, the country was recovering from war and the previous "depressing influences of the insurrection," which President Lincoln a decade earlier described as further "be[ing] specially felt in the operations of the Patent and General Land Offices" (p. 1). In this era, revenues from land disposal, as with the various homesteading and mining disposal laws, were needed to pay the national debt, fund government, and to pay for bounty lands granted to soldiers fighting during the Civil War and in various western outposts (Heidler, 2002).

In the 1870s the focus of the United States included the building and settling of a nation. This is reflected by the adoption of the 1872 Mining Act, a full copy of which is provided in Appendix B. As President Grant declared in his second annual message on December 5, 1870, "The opinion that the public lands should be regarded chiefly as a source of revenue is no longer maintained. The rapid settlement … of [these lands is] now justly considered of more importance…. The pioneer who incurs the dangers and privations of a frontier life, and thus aids in laying the foundation of new commonwealths, renders a signal service to his country, and is entitled to its special favor and protection" (Grant, 1870, p. 2).

In the design of the 1872 Mining Act, Sections 1, 2 and 5 clearly forwarded rights and rules aimed at granting special favor and protection to the miner who endured frontier life and was helping lay the foundation of a new commonwealth. Special favor, for instance, was demonstrated in the graciousness the 1872 Mining Act took toward immigrants, as Section 1 permits "citizens of the United States and those who have declared their intention to become such" eligibility to explore and purchase "all valuable mineral deposits in lands belonging to the United States, both surveyed and unsurveyed" (Library of Congress, 2016, p. 91). Special favor and protection of miner interests was likewise reflected in Sections 2 and 5 of the 1872 Mining Act by the integration of mining district rules, customs and a framework consistent with the practices of existing frontier traditions in the West during the mid-19th century (Costigan, 1908; Leshy, 1987; Lueck, 1998).

Two western mining district traditions integrated into the 1872 Mining Act included, first, a focus on the active versus speculative development of the United States' mineral resources and, second, assuring the role of the individual miner in this effort. As Leshy (1987) reported, "The framers of the Mining Law were as serious as the miners themselves about the idea that mining claims should not be held for speculative purposes" (p. 109) and that rules were needed "to guard the mines from being monopolized, thus reflecting the "common aversion of the frontier democracy to monopoly" (p. 170). These goals, which incorporated the signal service the pioneering miner provided the United States', took form in Sections 2, 4 and 6 of the 1872 Mining Act. These sections of the statue, for example, featured an inducement for the miner to patent up to 20.66 acres.

The distinctive approximately 20.66-acre shape and size of a lode patent survey plat is the result of topography, a miner's estimation as to the direction a vein of ore coursed, and Section 2 of the Mining Act. As Noble and Spude (1997) noted, "Lode claims follow the geologic structure as it was understood at the time the claims were located" (p. 6). This is consistent with Section 2 of the Mining Act, which states: "A mining claim located after the passage of this act, whether located by one or more persons, may equal, but shall not exceed, one thousand and five hundred feet in length along the vein or lode…. No claim shall extend more than three hundred feet on each side of the middle of the vein at the surface …. The end-lines of each claim shall be parallel to each other" (Library of Congress, 2016, p. 91).

In order to forward the nation's goal of rapid settlement and active promotion of mineral development in the West, the 1872 Mining Act featured a series of inducements to the miner. These inducements, as previously noted, included liberal citizenship allowances and the opportunity to attain fee-simple title or mineral patent (Library of Congress, 2016, p. 91). It featured, by its absence, no requirement for the payment of federal royalties or taxes on developed minerals. As Huber and Emel (2009) explained, "While in the 18th century Congress required a third of the profits from hard rock mines on federal lands to go to the Treasury, the 1872 Mining Law requires no royalty be paid to the US Treasury as representative of the public" (p. 376).

In an attempt to encourage mining early in the development of the United States' mining industry, when mining was mostly comprised of independent prospectors, no royalties were required. "Indeed," as Huber and Emel (2009) observed, "in the historical context of 1872 the notion of opening up the archipelago of public lands to `productive activities' was central to the production of the national scale as a progressive `taming' of the wild, western, `frontier' by self-reliant, entrepreneurial, individual producers" (p. 376). As Francaviglia (1991) added, "To the nineteenth-century capitalist and entrepreneur, mining was seen as an indispensable part of the mission of Western civilization" (p. 215).

An additional inducement for rapid mineral development in the West, besides the absence of any royalty payment requirement to the federal government in the 1872 Mining Act, was the limited initial capital outlay required to attain title to the land and minerals below the surface. As Costigan (1908) wrote, "The whole spirit of the statute, and the construction given by the learned tribunals that have considered them, is not that the prospector must find a paying mine before he can locate his claim" (p. 117). Economically successful deposits did not have to be proven by claimants and the result was that many mines were filed on "show veins" with only surface mineralization present (Lueck, 1998).

Excessive investment was not required for a miner to receive a mineral patent and title to land in 1872. As Section 6 of the 1872 Mining Act stipulated, "A patent for any land claimed and located for valuable deposits may be obtained" (Library of Congress, 2016, pp. 92-93). Required investments included the expenditure of $500 worth of labor or improvements ($100 of work for 5 years), as well as a payment at patent of approximately $100 (20 acres at five dollars an acre for lode claims) (Library of Congress, 2016, pp. 92-93). "The object of the requirement of the expenditure of $100 annually before the issuance of patent, and of $500 in the aggregate before patent," as Costigan (1908) emphasized, "was to develop the mines and demonstrate their character" (p. 117).

The inducement approach of the federal government in the 1872 Mining Act benefited the small miner and reflected the Jeffersonian Democracy position from the classic early-19th century debate between Alexander Hamilton and Thomas Jefferson. As Weber and Ley (2007) reported, "the primary dispute involved to whom the land should be sold –small, cash poor, yeoman farmers in the Jeffersonian mold, or, as Alexander Hamilton preferred, capitalists and large land companies who could pay higher prices" (p. 190). According to Leshy (1987), "In 1872 the average nonfarm daily wage was $1.46" (p. 416) and "$100 represented nearly seven weeks' labor for the average American worker … [and] was not a trifling commitment in the 19th century--especially in the many mining camps located at higher elevations, where weather prohibited activity during many months of the year" (p. 109).

The degree to which the inducement of mineral patent at a nominal price, as set forth in the 1872 Mining Act, worked to help settle the West, prevent monopoly, and promote the development of the United States' mineral resources was significant. Over a thousand mineral patents were issued under the 1872 Mining Act in nearly every state between 1880 and 1912 (Leshy, 1987). Idaho's share of this total between 1880 and 1912, as shown in Table 1.1, was approximately 5-6% with 1,661 lode mines patented, including 257 Patented Lode Mines (PLMs) in the 1880s, 549 PLMs in the 1890s, and 690 PLMs in the first decade of the 20th-century (BLM, 2016).

Table 1.1 50-Year Patented Lode Mine History in Idaho, 1870-1919

Patent Year	Number
1870-1879	2
1880-1889	257
1890-1899	549
1900-1909	690
1910-1919	409

The number of patents issued peaked in 1892 with the vast majority of these patents occurring before 1920 when the federal government started its mineral leasing program (McClure and Schneider, 2001). Patent lode mines issuance in Idaho, as depicted in Figure 1, reflected a similar issuance pattern. As shown in Figure 1,

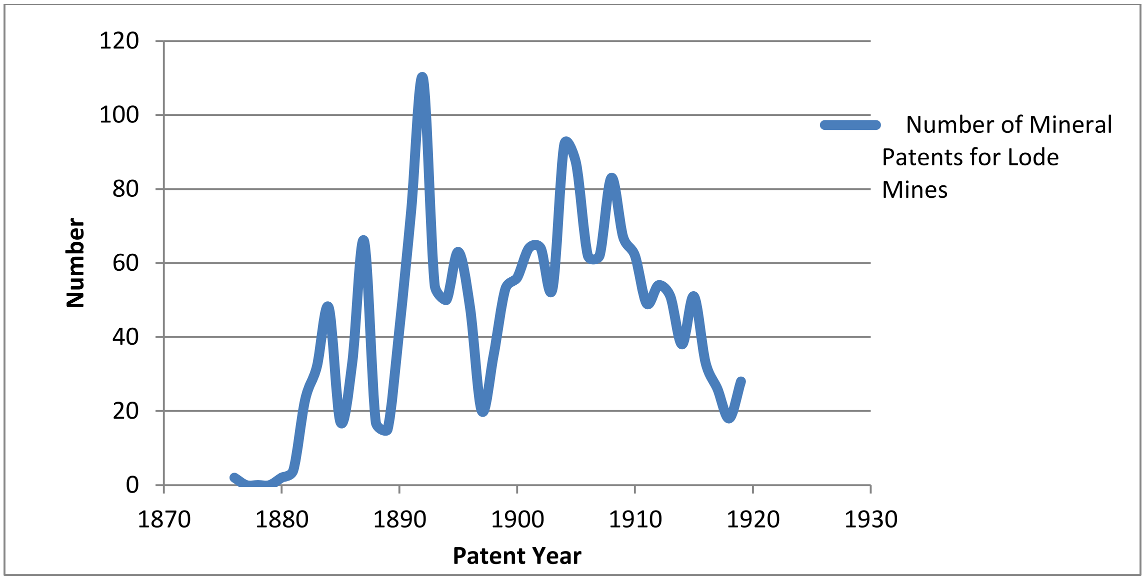

Figure 1. Number of Mineral Patents for Lode Mines Issued by Year in Idaho

the first federal patent for a lode mine was issued in Idaho in 1876 with the number of patent lode mines issued peaking in 1892 at 110 and then declining in the early-20th century leading up to enactment of the Mineral Leasing Act in 1920 (BLM, 2016).

Changing Historical Perspectives and Policies

In the 19th century a liberal economic and regulatory approach to land disposal prevailed in the United States. As George (1871) credited the then Commissioner of the General Land Office as stating, "It has ever been the anxious desire of the Government to transmute its title to the soil into private ownership by the speediest processes that could be devised" (p. 11). This economically liberal approach featured rights of first possession and a freedom to access federal lands (Klyza, 1996).

First Possession

The speedy process used and devised for transmuting title to the public domain in the West followed the legal precept of first possession. First possession is expedient and was the dominant method in the United States to dispose of federal resources and establish property rights (Van Velsen, 1967; Rose, 1985). It shows up in western water doctrine and first in time, first in right legal precedents. As Lueck (1998) wrote, “first possession is … tightly woven into the fabric of Anglo-American society, where it is better known as ‘finders keepers’ or ‘first come, first served,’ in cases ranging from street parking and cafe seating to setting up fishing huts on frozen lakes” (p. 1).

First possession, as a rule, grants ownership to the party that gains control first. It is a powerful norm (Ellickson 1991) and rewards useful labor (Rose, 1985) and is embedded in the mining district customs that were subsequently integrated into the adopted 1872 Mining Act (Leshy, 1987; Francaviglia, 1991; Kalen, 2000). As set forth by statute, the acts of location normally follow discovery and, in sequence thereafter, the posting of a discovery notice, the sinking of a discovery shaft, boundary marking, location notice posting, and the recording of legal papers.

The rules of first possession are important not only for purposes of location and awarding ownership to the party that gains control first, but in establishing on-going legal rights of the use that occurred first on the lands. The rational is not dissimilar from right to farm legislation, which subordinates nuisance claims to prior activities and uses (Lueck, 1998). The result is mineral patent properties have precedent or grandfather rights not dissimilar to the pre-existing condition notion set forth in right to farm statutes. The premise is that prior to patent issuance a “valuable mineral” was worked for no less than five years. In the words of Kalen (2000), "A mining claim … is not valid unless and until all requirements of the mining laws have been satisfied. One of these requirements is the actual physical finding of a valuable mineral deposit within the limits of the claim"

(p. 351). The result, in general terms, is that pre-existing *grandfathered uses retain constitutional protections* (Givens Pursley, 2009).

An additional important requirement in satisfying the requirement of patent and affirming the pre-existing, first possession, status of the mineral operation was the examination and approval of a survey plat by the United States survey-general of the General Land Office. As established, the General Land Office (GLO) was assigned the role of administering and passing on patent (title) to mineral applications. This role began in 1849 when the United States Department of Interior (USDI) was assigned by Congress the responsibility for surveying public lands, supervising land entries, issuing patents, and overseeing business relating to public lands including mines (Costigan, 1908; Leshy, 1987). In 1946 the functions of both the GLO and Grazing Service merged with the Bureau of Land Management (BLM) assuming responsibility for GLO records and duties (Noble and Spude, 1997).

Mineral survey plats were filed for each mineral patent issued and recorded with the General Land Office, which is now managed by the BLM. Figure 2, below, depicts an example of a typical mineral survey plat, which in this case is an 1883 survey of the Eureka Lode in the Sawtooth Mining District in Alturas County, Idaho. As shown, the Eureka Lode is 18.94 acres in size and in September of 1883 was surveyed by the

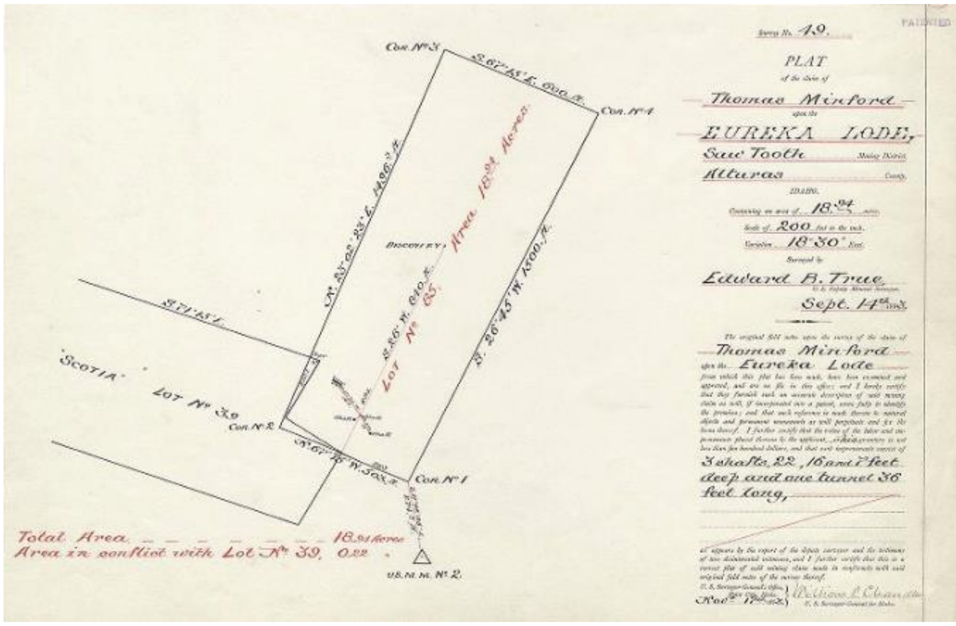

Figure 2. Eureka Lode Survey Plat

Deputy Mineral Surveyor two months prior to the United States' Surveyor-General for Idaho applying his signature to the plat. As attested, labor and improvements were made to the Eureka Lode that amounted to not less than five hundred dollars, and included mine development consisting of three shafts, 22, 16 and seven feet deep and one tunnel 36 feet long.

First possession, as in the case of the federal government passing title to mineral lands by survey plat, was a dominant method in the United States to dispose of federal resources and establish property rights (Lueck, 1998). As both a concept and practice, first possession has normative strength. Whether an actual birthright in the spirit of John Locke dating to the 17th century, or the product of more contemporary law that invokes right to farm rights or similar traditions, the normative appeal of first possession is emblematic to economic liberalism and on-going private property right claims to the public domain (Klyza, 1996).

<u>Free Access</u>

Possibly the foremost federal policy that upholds the tradition of economic liberalism and the validity of private property rights on the public domain to this day is the 1872 Mining Act (Lueck, 1998; Kalen, 2000). The 1872 Mining Act is, as Leshy (1987) proclaimed, "the last bastion of traditional, unfettered free enterprise…. [with] nearly all defenders of the Mining Law … really defending only one part of it, the free-access, self-initiation policy" (p. 347). Free access, as set forth in the 1872 Mining Act, applies to "all valuable mineral deposits in lands belonging to the United States, both surveyed and un surveyed, [which] are hereby declared to be free and open to exploration and purchase" (30 USC 22 §21 to §54).

The provision that all valuable mineral deposit in lands belonging to the United States are "free and open to exploration and purchase" gives rise to the larger political debate about the compatibility of the Mining Act with other priorities for federal land. In fact, many vested mining interests and members of congress in the Western Mining States contend this free access is critical to mineral development in their states and international competition (Kalen, 2000).

<u>Evolving Perspectives on the 1872 Mining Act</u>

The debate about the compatibility of the 1872 Mining Act with other priorities for federal land takes different forms depending on the era in which it is discussed. As Francaviglia (1991) noted, in the 19th century Victorian era, mining was not held in disdain, rather the industriousness symbolized by the mining landscape "may even have epitomized civilization's inevitable victory in the quest for knowledge and superiority over nature" (p. 215). Isenberg (2017) reiterates this point, noting "A history of mining in

North America that reckons with the environmental context and consequences of the industry must confront these romantic understandings of mining" (p. 402).

Today's 21st century social, economic, technological, and political forces differ greatly from the early-19th century, and periods in between. Fifty years ago the nation turned its attention to the enactment of environmental regulations to redress the ills of industry and also shifted use of the public domain toward multiple-use and, in many instances, away from previously prioritized historic land uses on public lands (Davis and Davis, 2007). In the early-20th century and before the modern environmental movement, the nation switched its policies from the earlier eras focus on land disposal toward land conservation (Alexander, 2007).

Conservation Under President Theodore Roosevelt

By the early-20th century, as evidenced by numerous proclamations of President Theodore Roosevelt, and the "approaching exhaustion" of the nation's resources, the United States began to move away from a policy of unrestricted land disposal. In a succession of annual messages, including his second annual message on December 2, 1902, Roosevelt expressed concern with "the approaching exhaustion of the public ranges …[and] the best manner of using these public lands in the West" (Roosevelt, 1902, p. 1). In his third annual message in 1903, Roosevelt expressed serious concerns with land disposal fraud and established a commission to investigate. "By various frauds and by forgeries and perjuries, thousands of acres of the public domain, embracing lands of different character and extending through various sections of the country, have been dishonestly acquired…. I have appointed a commission … to report … on the use, condition, disposal, and settlement of the public lands" (Roosevelt, 1903, pp. 2-3). In his seventh annual message President Roosevelt observed, “Three years ago a public lands commission was appointed…. Their examination specifically showed the existence of great fraud upon the public domain, and…. the passage of great areas of public land into the hands of a few men” (Roosevelt, 1907, pp. 1-2).

The abuses attributed to the 1872 Mining Act during the era leading up to Roosevelt’s various proclamations and the decade thereafter are ascribed by Leshy in *The Mining Law: A Study in Perpetual Motion*, among other scholars (Alexander, 2007). In particular, Leshy (1987) described blatant abuse of the Act by Senator Cameron of Arizona on claims leading to one of the several southern rim descents into the Grand Canyon. As Leshy (1987) summarized, “Cameron was, in short, ‘mining only gold from tourists’ pockets’” (p. 58).

The frontier of the West was deemed closed by the time the Mining Act of 1872 reached its 50th anniversary (Alexander, 2007). By that time multiple railroad lines crossed the nation. The various Native American tribes throughout the West were subdued and the nation had started on a path of public land conservation, largely due to the leadership of President Theodore Roosevelt (Donald, 2009). As Donald (2009) wrote in *The Lion in the Whitehouse: A Life of Theodore Roosevelt*, Roosevelt had a unique relationship with the West where many of the approximately 40 million acres he worked to preserve are located.

Besides helping preserve millions of acres of the public domain in the West, President Roosevelt also helped institutionalize policies of land conservation including trained federal natural resource managers under the control of the nation’s first forester, Gifford Pinchot (Donald, 2009). The significance of a regimented, top down management approach, as pertains to mining in the West, was underscored by Wilson (1989) in *Bureaucracy: What Government Agencies Do and Why they Do It*. Wilson (1989) wrote, “A decentralized organization with operators working alone in isolated outposts might well have decided that its task was to please whatever dominant and politically influential group existed in local communities. The situational imperative in Boise might have led foresters to defer wholly to mining interests…. Something different happened” (Wilson, 1989, pp. 96-97). The creation of the national parks and forest system in a manner that increasingly favored policies of land conservation marked an important crossroads, as the nation moved away from being simple caretakers of the land pending disposal to active land managers (Donald, 2009).

National Park Service lands are actively managed and feature elements of the United States’ history that have been controversial. This is visible in the NPS’s *Guidelines for Evaluating and Documenting Rural Historic Landscapes*, which do not define a rural historic landscape in terms of positive or negative, but as "a geographical area that historically has been used by people, or shaped or modified by human activity … and that possesses a significant concentration, linkage, or continuity of areas of land use, vegetation, buildings and structures, roads and waterways” (Noble and Spude, 1997, p. 13). With mining landscapes the visual legacy have varying meanings and measures of integrity.[8] As Francaviglia (1991) reasoned, “Mining landscapes may vary widely, but they … have left either a powerful visual legacy of waste and degradation or the honest

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[8] The National Park Service includes a measure of integrity as part of its National Register of Historic Places listing process. As Glaser (2010) noted, integrity measures include design, materials workmanship, feeling and association (p. 219).

manifestation of industry, depending on how one views (and defends) the system. The changing attitudes of our culture toward nature now define the landscapes of mining districts and will continue to redefine them in the future" (p. 208).

Advent of Modern Environmental Regulations in 1964

While the disposal of federal lands at below market values for mineral lands -- five dollars an acre ($5/acre) for lode mines and half this amount for placer mines-- remained an option under the 1872 Mining Act, in the late-20th century Congress increasingly restricted its public land and resource policies (Alexander, 2007). In fact, beginning in 1964 and lasting until 1980 --in what Kylza and Sousa (2010) referred to as the "golden era of environmental lawmaking, in which 22 major federal laws were passed" (p. 443) -- a series of laws were enacted that seriously changed how mining in the West, including already patented mineral land, was regulated. These laws continue to this day and have an impact on mining activities that is explored in depth in the next section. Of note, here, is by 1984, according to a national poll, mining ranked right behind steel in the un-coveted position of dying industries in the United States (Leshy, 1987).

Current Regulations Affecting Mining in the West

Whether the cause of the mining industry's demise is directly linked to increasing regulatory requirements for the industry and dis-incentives is a contested topic. Some experts have cited regulatory compliance as increasing business costs (IDAWA, 2016) and as a source of uncertainty that undermines investment (Kalen, 2000). Others, such as Rivera *et. al.* (2009), found that businesses in the United States initially resist protective regulatory schemes from initiation to selection, but cooperate with regulatory agencies thereafter. Expected is that agency cooperation is a more cost-effective business alternative once regulations are adopted (Rivera *et. al.*, 2009) than an adversarial, litigious relationship given the many regulatory programs and agencies overseeing mining properties.

Many factors impact the viability of mining, from commodity prices to costs associated with regulatory compliance, including permit entitlement, bonding, on-going operational compliance, and post-mining reclamation. Mining is multi-national, cyclical, and multi-dimensional. Notable factors impacting the United States' mining industry range from the cyclical nature of the industry (Noble and Spude, 1997; Breckenridge, 2014), to the downward pressure that foreign competition places on commodity prices (Morse and Glover, 2000). Other development costs impacting the profitability of mining activities include processing, transport, and labor (Whitmore, 2006). Of all these factors, commodity prices are paramount (Morse and Glover, 2000).

Below is an analysis and overview of current regulations affecting hardrock mining on PLMs in the West.

The 1872 Mining Act Today

The 1872 Mining Act is --nearly 150 years later—the prominent mining law in the United States today. Yet, the law of 150 years ago is not the law of today. Today, patent issuance has virtually ceased through a process of annual Congressional moratoriums (Earthworks, 2015). The 1872 Mining Act has been amended multiple times with fuels and other nonmetallic materials no longer being eligible for patent, pursuant to the Mineral Leasing Act of 1920 (30 USC Chapter 3A). Further, "common variety" materials are no longer deemed nonlocatable and thus became ineligible for patent, pursuant to the Multiple Surface Use Act of 1955 (30 USC 611-615).

“The word 'mineral,” Costigan (1908) observed, “is used in so many senses, dependent upon the context, that the ordinary definitions of the dictionary throw but little light upon its signification in a given case” (p. 102). In a broad contextual sense relative to mining statutes passed in 1866, 1872 and 1920 in the United States, there is evidence Congress also was perplexed by the proper definition to give minerals. In 1866 the United States adopted a definition of mineral that included gold, silver, cinnabar, and copper and later tin and other deposits (Costigan, 1908; Leshy, 1987).

Beginning in 1920, the definition of “mineral,” at least to the extent that it allowed miners to explore and patent “mineral” land, pursuant to the 1872 Mining Act, narrowed. “The Mineral Leasing Act of 1920 is the major watershed here, being the most prominent example of substitution of a governmental decision for a private one” (Leshy, 1987, p. 28). Until 1920 all mining resources on federal land was open for sale and not subject to federal royalties (Leshy, 1987; Huber and Emel, 2009). In 1920 this changed for fuels and changed again in 1955 for “common variety” minerals (Harrison, 1989). As Kalen (2000) aptly summarized, “That non-mineral land cannot be disposed of under the mining laws is a cardinal rule in the administration of the public land laws" (p. 249).

In 1920 Congress removed oil, natural gas and other fuel from the 1872 Mining Act (McClure and Schneider, 2001) and required coal and oil/gas producers to pay federal royalties of 8% and 12.5%, respectively (Huber and Emel, 2009). For these fuels the federal government began leasing the rights and collecting royalties (30 USC 181), yet retained its policy that no royalties be paid to the federal government for locatable minerals, such as gold and silver (metallic minerals) and limestone and bentonite (nonmetallic minerals). (Dobra and Dobra, 2013).

The Multiple Surface Use Act of 1955 followed a similar pattern of curtailment as the Mineral Leasing Act of 1920 (30 USC Chapter 3A). The Multiple Surface Use Act of 1955 established that "common variety" minerals, including sand and gravel pieces less than two inches across were non-locatable (30 USC 611); and, thus, excluded from the “other valuable minerals” provision of the 1872 Mining Act. This exclusion meant federal lands could not be entered for the purpose of mining common variety minerals. Additional curtailment to the private, self-initiation rights of miners to claim public lands for mineral purposes followed during the golden era of environmental lawmaking.

Complex Framework of Laws atop the 1872 Mining Act

A review of the various statutes that apply to mining, including United States Code Titles 30, 35, and 43, reveal that a complex framework of environmental regulation lies atop the 1872 Mining Act (USEPA, 2004; Bain, 2011; Harrison, 1989). In *Reforming Federal Land Management,* Fitzsimmons (2012) noted that federal decision-making is a quagmire, featuring not performance on the ground, but an over reliance on process that takes years to complete. Complicating mining regulatory processes are the judicial and administrative dimensions where much of what is practiced is unwritten, fashioned more by custom and official acquiescence than by positive decision (Leshy, 1987).

A significant written decision affecting mining is the multiple use mandate stipulated in the Federal Land Policy and Management Act of 1976 (43 USC Chapter 35). In 1976 Congress granted broad authority and discretion to the Secretary of the Interior, pursuant to the Federal Land Policy and Management Act (FLPMA), to manage the public lands for multiple use. The multiple use mandate of FLPMA §302(b) is noteworthy. As stipulated, no longer are mining uses foremost. Rather FLPMA §302(b) requires the Secretary, in managing the public lands, to take any action "necessary to prevent unnecessary or undue degradation of the lands" (43 USC 1732(b)), which includes minerals. The net result of United States Code Titles 30, 35, and 43 is a trajectory of environmental protections in the West that appears to be moving ever upward (Babbitt, 2005; Klyza and Sousa, 2010).

State and Local Influence

When issuing permits and drafting FLPMA based land-use plans a degree of federal deference by the Interior Secretary to state and local jurisdictions exist. As Holland and Hart (2003) wrote, the BLM's land use-use plans are required to be consistent with environmental laws, but also pursue for consistency with state and local plans. This consistency provision in combination with regulatory federalism principles, empower state and local governments in the context of mining activities (Leshy, 1987).

The degree to which state and local governments can promote or hinder the development of mineral activity is an excellent empirical question. Leshy's (1987) position, while grounded in law, is possibly somewhat muted by Klyza and Sousa's (2010) more recently expressed viewpoint that modern environmental policymaking privileges environmental interests in important respects. These respects do not include state and local regulations superseding federal regulations on federal unpatented lands in states, but incorporate a degree a deference to state and local cooperation and regulatory federalism on private patented lode mine lands in the jurisdictional state and counties.

Regulatory Federalism

Under the regulatory federalism model, subordinate jurisdictions like Mining States in the West may assume responsibility for a regulatory program, provided minimum standards established by Congress and applicable agency rules are met. Most of the major regulatory laws in the environmental field employ an incentive scheme (Squillance, 1984) and states receive federal funding incentives in exchange for accepting responsibility for the statutory compliance of the regulatory program (Fischman, 2005). In these instances, states assume compliance responsibilities for the Clean Air Act (CAA), the Clean Water Act (CWA) the Resource Conservation and Recovery Act (RCRA), SMCRA, and other federal statutes that pertain to mining. For example, under the CAA ambient air quality standards may be achieved through state implementation plans; states may develop hazardous waste management plans to handle RCRA requirements; and, point source discharges authorized by the CWA may be regulated through a state program.[9] As Squillance (1984) observed, "the broad delegation of control to the states, mandated by SMCRA … [is] unparalleled" (p. 687).

Both inside and outside of federal-level regulatory controls, state and local governments exercise important, possibly unparalleled, regulatory functions when it comes to mining (Squillance, 1984; Leshy, 1987).

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[9] Achievement of these programs at a state level is not mandatory. For instance, in New Mexico and Idaho the federal government has retained primacy of the NPDES program, as authorized under the CWA §402.

Mineral Patent Land

Patenting under the Mining Law does not insulate the patented land from federal, state or local regulatory control. For instance, if mining is occurring, then federal worker safety requirements apply. Explicitly, compliance with Mine Safety and Health Administration (MSHA) regulations, as codified in the Federal Mine Safety and Health Act of 1977, is required. These regulations take the form of inspections and investigations at mine sites, personnel training, and issuance as well as the power to revoke mine operator plans. MSHA is an agency within the Department of Labor and whose mission reads: “MSHA works to prevent death, illness, and injury from mining and promote safe and healthful workplaces for U.S. miners” (MSHA, 2017). With such a commitment and goals of avoiding mining disasters, such as the Sunshine Mine fire disasters in northern Idaho, active mine operations must follow MSHA requirements.

Other federal programs that can affect PLM mine-related activities include the Clean Water Act’s National Pollution Discharge Elimination System (NPDES). Similar, PLM use proposals that affect threatened or endangered species can readily encounter land use development problems with the Fish and Wildlife Service under the Endangered Species Act. The use of explosives in mines is subject to Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) rules and requirements. A state permit for air emissions or water discharges must comply with federal CAA and CWA regulations that likely will be administered by a state environmental quality department operating in compliance with USEPA rules.

<u>State Pre-emption</u>

In the case of state control, as Holland and Hart (2003) noted, pre-emption is the norm in every mining state, even Colorado with home-rule. What this means is the state has retained final approval subject to conformance with federal rules. Most Western Mining States, for instance, handle performance and post-mining activity bonding requirements with various provisions for small-scale reclamation bond exemptions (Holland and Hart, 2003). In Idaho the exemption applies to mining operations with not greater than five acres of surface disturbance, or more than 10,000 tons of ore excavation each year (Idaho Code 47-1503(7)). In Colorado this exemption extends to mines that "impact less than two [surface] acres and extract less than 70,000 tons per year" and in Nevada it extends to operations disturbing not greater than five surface acres each year (Holland and Hart, 2003, p. 173-8).

State pre-emption does not, however, rule out local permit requirements. Local permit approval and attention is required. As Holland and Hart (2003) emphasized, there is a "daunting array of environmental permits required by federal, state, and local governments for natural resource developments and operations" (p. 116-2). As the Idaho State Section of the American Water Resources Association (2016) noted, getting permits for the development of new mines is measured in years.

Whether operating a small or a large underground mine, the plan submittal requirements are extensive and can take years to permit. A summary of engineering services provided by Leavitt Engineering (2015) for an underground gold mine impacting less than five surface acres on an existing 49-acre tract, including a century-old patented mine in Idaho, required no less than twelve permits and approvals for the project (pp. 1-

2). Included permits were three sets of approvals at the county level (Development Services, Engineer, Highway District), one at the regional level (Health Department), seven at the state level (one with the State Fire Marshal, one for operating the mining facility in the state, five with the Idaho Department of Environmental Quality), and two permits from the United States Environmental Protection Agency (USEPA). In addition, MSHA and ATF approvals are required and entail regular inspections while a mine is operational. As noted in the bond reclamation footnote, no bonding requirement for reclamation was required, however, in today's permitting environment this is atypical except for small operations given the focus of SMCRA.

Reclamation

Today reclamation plans are a central feature of SMCRA mining programs, but this has not always been the case. Nearly 50 years ago, the Assistant Director of BLM's Division of Lands and Minerals, Irving Senzel (1967) decried in the *Natural Resources Journal* that the "lack of a relatively uncomplicated means of termination of abandoned or inactive claims [was] a significant weakness" of the 1872 Mining Act (p. 234). Nearly 50 years later, Idaho Geologic Survey researcher Breckenridge (2014) concurred, "most of these … abandonments … occurred before responsible site reclamation" (p. 1).

In 1967 Senzel estimated that there were "approximately 6 million claims in existence" with "all but a minor fraction" of these having been abandoned, and that in aggregate these abandoned claims were "a cloud on the landscape" (p. 234). In 2004 the USEPA provided a significantly lower figure than Senzel, estimating that there were 900,000 abandoned mines in the United States (p. 13). As researchers with the General Accounting Office (2011) noted, "The Mining Act of 1872 helped foster the development of the West by giving individuals exclusive rights to mine gold, silver, copper, and other hard rock minerals on federal lands. However, miners often abandoned mines, leaving behind structures, safety hazards, and contaminated land and water" (p. 2).

Today new mines file reclamation plans as a core feature of SMCRA mining programs. In practice, this entails the permitting agency attaining an acceptable financial guarantee from the mine operator and owner that assures the mine is (1) operated as conditioned by permit and (2) restored properly after closing of the mine (BLM, 2016). Specific performance standards that are financially guaranteed range from erosion control, grading details and water quality, to "extent practicable" phased completion of reclamation work, to the eventual "designated post-mining land use" (Holland and Hart, 2003, p. 173-13). Future land uses of reclaimed mining projects, including land subdivisions and the construction of backwood cabins, for instance, are subject to local government requirements.

Other Policies Affecting PLMs

As a nation the United States uses seven sets of environmental tools to deal with land issues that affect patented lode mines. The seven government tools, as Fairfax and Russell (2014) summarized, include the acquisition of private property, public investment, taxes, regulations, subsidies, services, and outsourcing. As applied to patented lode mines each of these tools are employed. For instance, it is not uncommon for government to acquire --possibly by tax default, purchase, or trade-- mineral patents, which is decipherable by analyzing county tax rolls.[10] Also not uncommon is public investments related to mining, such as creating a guidebook for the protection of mining landscapes (Noble and Spude, 1997). In particular, the *National Register Bulletin 42* has led to the designation of national parks and the preservation of mining features significant to the nation, including the establishment of the Klondike Gold Rush National Historic Park to commemorate the last major gold rush in American history (Glaser, 2010).

Other mining-related investments made by the United States includes its commitment to geological research with the USGS for the stated purpose “to expedite the production of geologic-map data base for the Nation … which can be applied to land-use management assessment, and utilization, conservation of natural resources, groundwater management, and environmental protection and management (43 USC 2 §31(b)). The United States’ government provides payment in-lieu of taxes (PILT) to counties with federal land within their boundaries. Counties, in turn, use PILT funds to provide government services such as road maintenance that benefit PLMs.

A number of unique factors frame the realm of possible public policies impacting how PLMs are used in the 21st century. A formidable number of these are environmental protection measures that can extend to local, county-level regulatory requirements that, *ceteris paribus*, may be a factor in either encouraging or discouraging active mining. The second non-environmental factor affecting PLM use, involves the 1872 Mining Act and its allowance of *non-disclosure of the valuable mineral discovered*. Noteworthy, is how

[10] As described in greater detail in a later chapter, PLMs acquired by government or nonprofit entities–at least in Idaho— are assigned a special category code (category 81) for tracking purposes.

this non-disclosure provision has led to numerous questions as to the legitimacy of original patents for mining use, to appraisal challenges for county assessors, to the extent which the mineral industry is holding claims for future reserves.

The third public policy tool effecting patented lode mine use in the 21st century, and to which attention is now turned, is the matter of property assessment. In particular, to what extent do adopted tax policies aimed to discourage county offices from assessing mineral patent lands based on speculative mineral values, instead lead to the unintended consequence of PLM neglect and, in contrast to what the framers of the Mining Law envisioned, has led to the holding of mining claims for speculative purposes.

A Contextual Analysis of Idaho's Mineral Taxation Statute

Idaho's mineral taxation statute (Idaho Code §63-2801) affects how PLMs are used. In fact, this policy is relevant to greater than 60,000 acres and 1,908 pre-1920 PLMs throughout the State of Idaho. To give context, this section begins by describing the key factors that contribute to a mine's viability and, in theory, makes a PLM deserving of favorable, non-speculative tax treatment. Next, a historical overview (including maps) of Idaho's many gold and silver rushes and discovery of "world class" deposits is provided. Thereafter, this section describes key elements of Idaho's mineral taxation statute, including its legislative history. This analysis is done in the context of other non-speculative tax treatment programs throughout Idaho, raising the possibility that the adopted mineral taxation framework may actually be contributing to the neglect and abandonment of PLMs.

Policy Context: Viable Mineral Resource

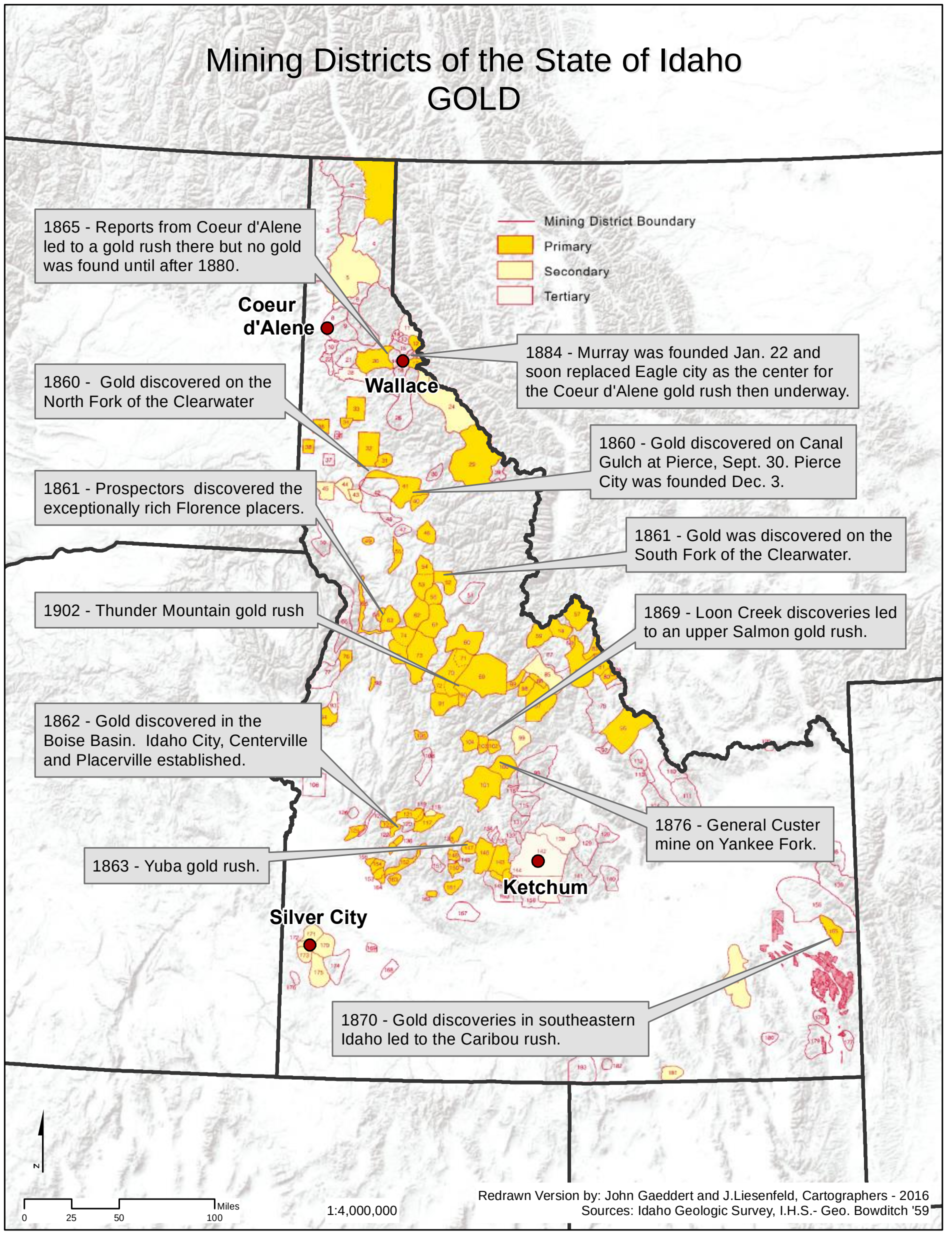
To provide context for property assessment rules dealing with mineral lands, it is important to note the obvious, mining will not occur if a valuable mineral is *not* present. This is true regardless of the ease with which land entitlement and permitting can occur, whether mineral disclosure rules exist or not, or whether particularly onerous or generous property tax rules apply.

The lack of a valuable mineral has dimension. One dimension is simply whether there is a mineral present on a PLM that can be physically mined. Another dimension is whether the mineral on-site is economically viable to extract. A number of factors determine economic viability. As James (2016) observed, “The business cycle and inventories are only two factors in metal price determination. Some other factors that affect prices include changes in metal production, speculation, stockpiling, foreign exchange rates, and production costs” (p. 2). However, the commodity price is paramount (Morse and Glover, 2000).

Historic and Current Gold and Silver Mining in Idaho

Based on past discoveries and reported production results, the potential for new gold and silver discoveries in Idaho exist (IMA, 2015). In Idaho numerous gold rushes dating to the 19th century have occurred. As Map 1 depicts, a number of major gold discoveries were made in Idaho between 1860 and 1902. In fact, in Idaho the USGS mineral resource data system indicated that the three active mines in Shoshone County each feature “world class” deposits (USGS, 2016). Other PLMs in Idaho designated as having world class gold or silver deposits are the former Triumph Mine in Blaine County, the South Chariot Mine in Owyhee County, the Atlanta Lode in Elmore County, and the Bunkerhill Group in Shoshone County (USGS, 2016).

The Idaho Mining Association (2015) reported, “from 1860 to 1866 Idaho produced 19% of all gold in the United States, or 2.5 million ounces” (p. 7). By 1879 Access Genealogy (2016) reported that every Idaho county but four was gold producing, including: Alturas $945,000; Boise $310,000; Cassia $25,000; Custer $1,250,000; Idaho $240,000; Lemhi $210,000; Nez Perce $5,000; Oneida $35,000; Owyhee $430,000; Shoshone $50,000 (p. 1). In the 19th century there were over 60 areas of recorded gold and silver production in Idaho with the Idaho Mining Association referencing 19 mining districts as most significant (IMA, 2015).



Map 1. Gold Discoveries in Idaho, 1860-1902[11]

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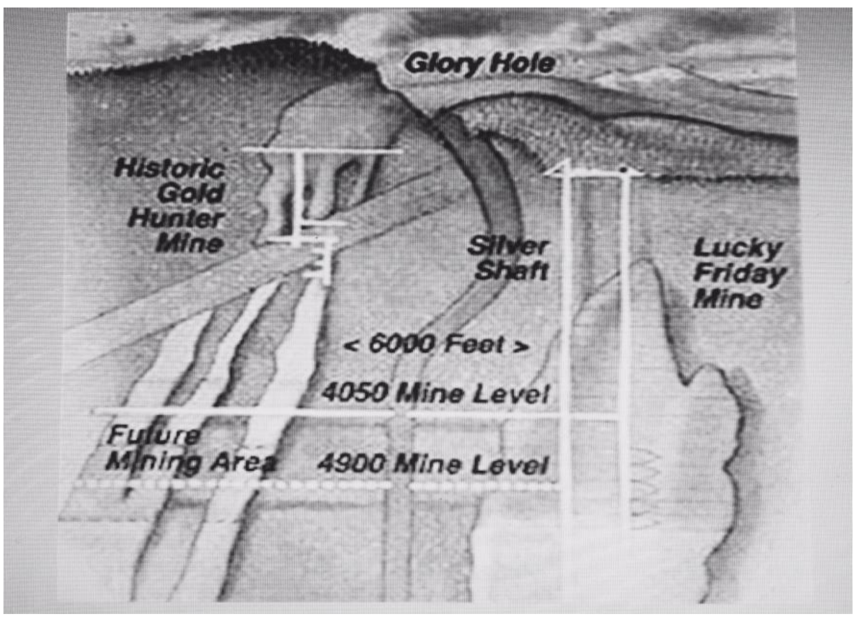
[11] This map combines elements of the *Gold Occurrences in Idaho* map by Gaston and Bonnichsen (1978) of the Idaho Department of Lands, Bureau of Mines and Geology, with *Mining Districts of the State of Idaho* map by Gustafson (1987) of the Idaho Geological Survey, University of Idaho, and with *Idaho's Mining History* map by

Significant silver discoveries in Idaho dating to the 19th century have occurred.

Map 2, as shown on the following page, depicts prominent 19th century silver discoveries in Idaho and corresponding mining districts where silver was the primary mineral produced. Of note, in 2015, is how the silver industry in the northern Coeur d'Alene and Wallace areas of Idaho continue to produce with some of its most significant discoveries made in areas first discovered over a century ago. For instance, Hecla Mining is actively working the Lucky Friday Mine in the Silver Valley, as indicated in Picture 1, alongside and under a patented lode mine first discovered in 1895 called the Gold Hunter (Gillerman and Bennett, 2011).



Picture 1. Cross-section View of the Gold Hunter and Lucky Friday

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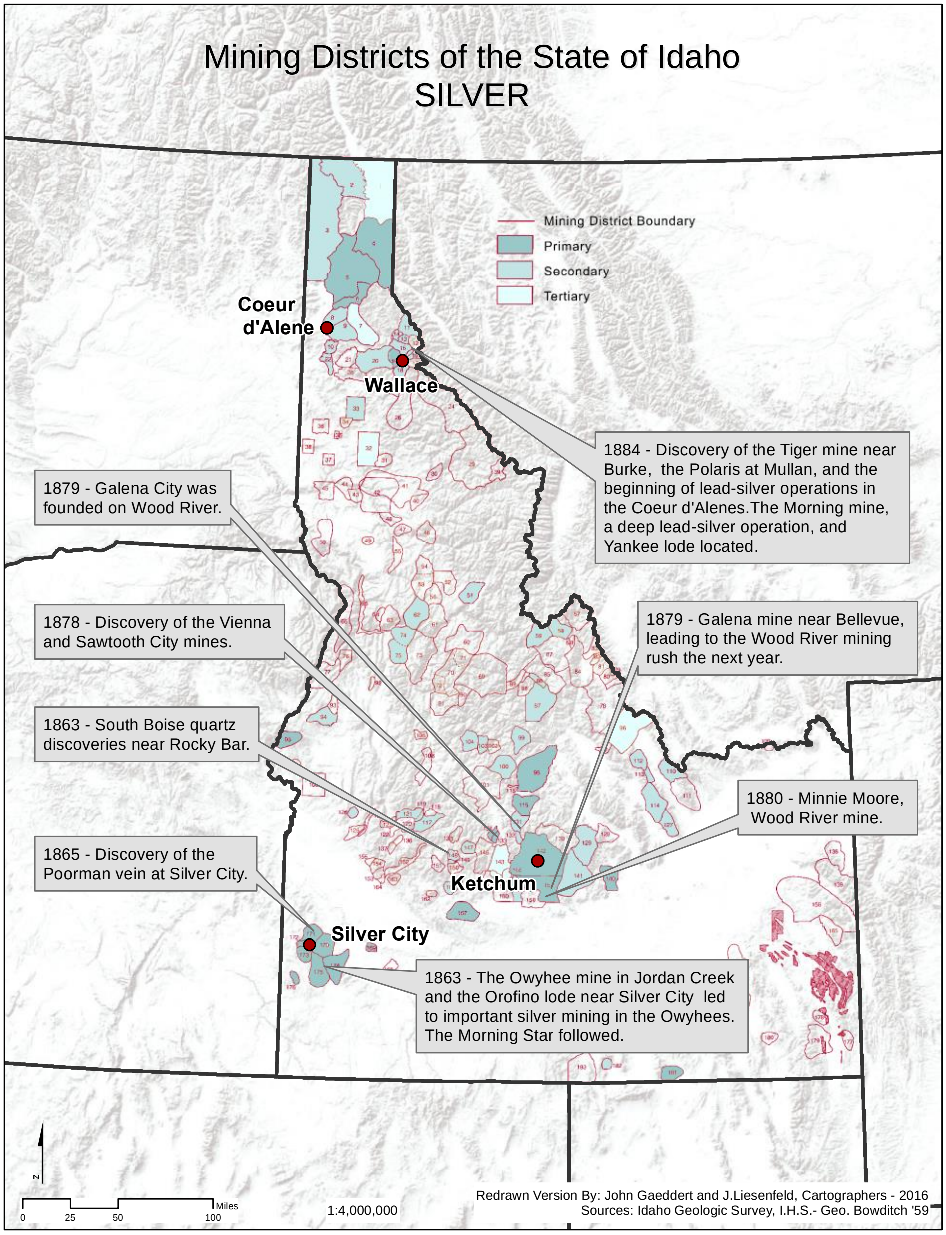
George Bowditch (1959). The coding used for primary, secondary and tertiary minerals follows the listing sequence provided by Gustafson (1987).



Map 2. 19th Century Silver Discoveries in Idaho[12]

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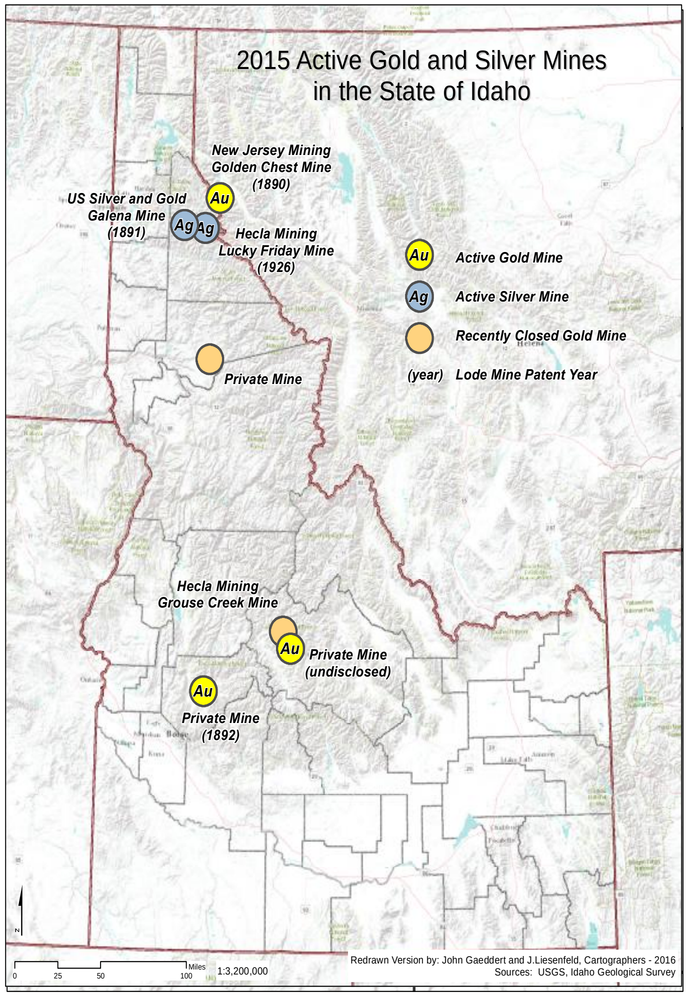
[12] This map combines elements of the *Mining Districts of the State of Idaho* map by Gustafson (1987) of the Idaho Geological Survey, University of Idaho with *Idaho's Mining History* map by George Bowditch (1959). Again, the coding used for primary, secondary and tertiary minerals follows the listing sequence provided by Gustafson (1987).

The Idaho Geological Survey (2015) reported, “In northern Idaho, Hecla Mining is sinking a new internal shaft at their Lucky Friday [silver] mine” (p. 16) and, according to the BLM (2006), “the Coeur d’Alene Basin … [is] considered a ‘world class’ mining district. Mining in the Silver Valley has produced over a billion ounces of silver” (p. 46).

The Idaho Geological Survey (IGS) in its 2016 Annual Report showed a total of five active silver and gold mines in the State of Idaho. These are depicted on Map 3, as shown on the following page, and include two silver mines and one gold mine clustered in the Coeur d’Alene Basin and Silver Valley areas of Shoshone County with the remaining two gold mines at undisclosed locations in Ada and Custer Counties (IGS, 2015, p. 2). Despite the significance of the two silver mines, Lucky Friday and Galena, in 2015 only a limited amount of active gold and silver mining occurred in Idaho. In fact, a review of the annual Idaho Geological Survey reports over the last decade indicated only a limited number of active gold or silver mining occurring in Idaho throughout this period.



Map 3. Active Gold and Silver Mines in Idaho in 2015[13]

In Idaho, as evidenced by past discoveries and reports (IMA, 2015), the potential for new hard rock mineral discoveries exist. For instance, the Idaho Mining Association (2015) reported that with the exception of oil, gas and coal almost every significant mineral exists within the state, including gold and silver, and the state is fortunate “to

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[13] Mine location sites for gold and silver were excerpted from Gillerman and Bennett (2015) with patent year reference dates from the BLM (2016). Note: the Lucky Friday Mine was patented in 1926 adjacent the Gold Hunter Mine patented in 1895.

have enough minerals to meet [its] needs for hundreds of years to come" (p. 1). "As a state rich in natural resources and suffering from high unemployment in rural counties," the Idaho State Section of the American Water Resources Association (2016) noted, "Idaho is always working to maintain a balance between good stewardship and economic benefit" (p. 1).

Idaho's Valuation of Mines for Taxation: Idaho Code §63-2801

In Idaho property taxes are a principal source of operating revenue for each of its 44 counties, 201 incorporated cities, and numerous government subdivisions, such as fire districts (Idaho Association of Counties, 2015, p. 2). Not surprising, then, counties operate under a specific set of statutes and rules when setting fiscal year government budgets, mil levy rates, and property tax valuations. These rules, as set forth in the Idaho Administrative Procedures Act (Idaho Code §35.01.03), range from Rule 126 that establishes tax appraiser certification standards, to Rules 130 and 510 that respectively describe the primary (e.g., vacant residential land and improved residential property) and secondary (e.g., agricultural and patent mineral land) land use categories assessed, to Rule 127 which sets forth each county assessors' duty to assess the full market value of the entire fee simple interest of property for taxation, including subtracting statutory exemptions (e.g., homeowner exemptions, exemptions for farming, urban renewal, mineral lands, etc.). As the Idaho Association of Counties (IAC) noted in 2015, "counties … vary widely in terms of available resources and personnel … experience" (p. 4), but each jurisdiction aims to provide fair and consistent real estate, land, improvement, and business valuations (p. 28).

Each year all taxable property in Idaho must be assessed at 100% of current market value less statutory exemptions[14] (IAC, 2015, p. 29). This assessment task at the county level involves numerous notice and procedural requirements. With regards to agricultural, grazing, forested, and mineral lands, which are referenced as category codes one through nine, the assessment process can be broken down into the following two general steps. The first step is for the assessor to establish a market value for the private property on the county tax rolls. The second step is for the county assessor to subtract any applicable statutory exemption or "speculative value" as well as any qualifying business investments, pollution control, and urban renewal expenses from a property's market value to arrive at its net taxable value. The equations stated more simply is: market value minus speculative value minus qualifying business expenses equals net taxable value.[15]

As set forth in Table 1.2, in 2015 Idaho's largest statutory exemption was for irrigated agricultural land (category code 1), where the removal of the speculative value reduced the market taxable value statewide by over $11 billion, from $14,443,351,487 (market value) to $ $2,695,665,711 (net taxable value). This reduced a total of $11,744,691,012 of speculative value from property tax rolls in the state in 2015. The next largest statutory adjustment in market value in 2015 was for productive forests land with $6,879,868,397 of speculative value subtracted from the

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[14] Consistent with Idaho Code §63-208 and §35.01.03, Rule 217(a), "The assessor shall value the full market value of the entire fee simple interest of property for taxation. Statutory exemptions shall be subtracted."

[15] By statute, there are additional qualifying exemptions, e.g., the homeowners' exemption for certain residences that also apply to the residential secondary category codes; however, for simplicity these are not illustrated here.

property tax rolls. Further down the list with a relatively small speculative value adjustment of $572,028 is patented mineral land.

Table 1.2 2015 Net Taxable Values in Idaho by Category

Property Category	Market Value	Speculative Value	Business, Urban Renewal and Pollution Control Investments	Net Taxable Value
Cat. 1 – Irrigated Ag. Land	$14,443,351,487	$11,744,691,012	$23,106,894	$2,695,665,711
Cat. 2 – Irrigated Grazing	$944,433,312	$806,953,949	$77,180	$137,412,183
Cat. 3 – Non-Irrigated Agricultural	$3,294,429,744	$2,386,332,579	$393,586	$907,703,579
Cat. 4 – Meadow	$678,328,898	$560,429,474	$7,947	$117,891,477
Cat. 5 – Dry Grazing Land	$3,421,606,427	$3,156,689,720	$30,301	$264,886,406
Cat. 6 – Productive Forest Land	$7,533,523,366	$6,879,868,397	$44,715	$653,610,254
Cat. 7 – Bare Forest Land	$1,360,387,477	$1,296,051,849	$1	$64,355,627
Cat. 9 – Patented Mineral Land [16]	$3,215,499	$527,028		$2,643,471

By statute, patented mineral lands in Idaho are not assessed based on speculative values of either the surface or mineral estates. In fact, Idaho Attorney General Opinion

[16] Appendix C provides additional detail on patented mineral land acreage and net market value by county in 2015.

No. 93-13 (1993) clearly states, “The case law interpreting this statute [Chapter 28, Title 63, Idaho Code] recognized the legislature’s intent and the effect of this statute: ‘Instead of directly assessing the ore bodies, which usually constitute the chief actual value of the property, the statute contemplates the assessment only of the *net output*, and this is its most distinctive feature” (p. 2). A full copy of the valuation of mines for taxation provisions of Idaho Code, as set in §63-2801, is provided in Appendix D. Specifically, Idaho Code, § 63-2801 states, “All mines and mining claims, both placer and rock in place, containing or bearing gold, silver, copper, lead, coal or other valuable mineral or metal deposits, after purchase thereof from the United States, shall be taxed at the price paid the United States therefor….” (2016, p. 1).

In the case of patented lode or “rock in place” mines, a valuation of five dollars an acre ($5/acre) for “mineral” property applies, “unless the surface ground, or some part thereof, of said mine or mining claim is used for other than mining purposes” (2016, p. 1). This policy might readily be characterized as pro-property, pro-development, or possibly just common sense as knowing the value of a precious mineral below the ground surface remains a challenge today even with advancements in core drilling and geological assessments, let alone in 1903 when Idaho’s mining tax policy statute was first enacted.

The statutory history of Idaho’s mine taxation provisions (Idaho Code §63-2801) are straightforward and begin in 1903. First enacted in 1903, §63-2801 was amended in 1937, 1941, and most recently in 1988. The 1937 amendment, as set forth in Idaho Session Laws Chapter 70 (1937) added the following provision, “provided that all mineral rights reserved to any grantor, except the United States or the State of Idaho, by the terms of any conveyance of lands other than land acquired under the mining laws of the United States shall be assessed for taxation purposes at the rate of not less than one and not more than five dollars per acre of the land so conveyed" (p. 94). The 1941 amendment, as set forth in Idaho Session Laws Chapter 159 (1941) modified the tax rate to "not less than five dollars per acre of the mineral rights so reserved, to be assessed against the recorded owner thereof" (pp. 317-318).

The final 1988 amendment to the statutory history of Idaho's mine taxation provisions (§63-2801), as set forth in Idaho Session Laws Chapter 212 (1988), is perhaps the most interesting. It includes the following addition, which remains in the statute today, "When in the opinion of the county assessor, the value of reserved mineral rights does not warrant the expenditure to appraise and assess such value, such *de minimis* values need not be appraised or assessed, but the failure to assess such values does not constitute a failure to pay such taxes on the part of the owner, and does not constitute a delinquency on the part of the owner" (p. 402).

By explanation, the statement of purpose provided by the Revenue and Taxation Committee (1987) in the proposed amendment to §63-2801 noted, "some mineral rights have been divided to the point that it does not cover county expenses to assess and tax many small tracts" and, furthermore, the "fiscal impact [is] none" (p. 554). The Revenue and Taxation Minutes from February of 1988 added further detail with "Representative Geddes testifying "that the cost of assessing exceeds the amount received in taxes" and "he would not recommend repeal of §63-2801 at this time but this bill will remove the burden of county assessors to assess mineral rights when it is not economically feasible" (p. 1).

By statute and as the legislative history reveal, mineral properties in Idaho are not valued based on the speculative value of the mines and mining claims. In fact, each county assessor, as clearly noted by statute, has the option to “remove the burden” to assess mineral rights when not economically feasible. Other alternatives include assessing “rock in place” on patented lode mines at five dollars an acre ($5/acre) or assigning higher taxable values when “other than mining purposes” are present on “the surface ground, or some part thereof.” When mining purposes are absent, as in a neglected estate, the statute is silent.

An issue of competing legislative intent arguably exists within Idaho Code §63-2801 and its lack of a distinction between active and inactive or neglected mining properties. Idaho’s mineral taxation statute aims to encourage mining consistent with the 1872 Mining Act. As Leshy (1987) noted, “The framers of the Mining Law were as serious as the miners themselves about the idea that mining claims should not be held for speculative purposes, and that once a mineral deposit was discovered and the claim located, it should be developed promptly or abandoned” (p. 109). Yet, a century later many Idaho PLMs have been abandoned for purposes of mining but retain a favorable five dollars an acre ($5/acre) taxable value. As Gaffney (1969) observed in *Extractive Resources and Taxation,* government policies, such as only taxing minerals once they are extracted, encourage mining industry buy and hold behaviors.

CHAPTER THREE: LITERATURE REVIEW

The importance of mining to the development of the West is reflected in the great number of works devoted to it. As the literature reveals, policy matters related to federalism (Fischman, 2005), policy regimes (Klyza, 1996), federal regulations and jurisdiction (Holland and Hart, 2003), hard rock mining politics (Davis and Davis, 2007), mine permit challenges (Baird, 2002; Bain, 2011), and outdated elements of the 1872 Mining Act (Leshy, 1987; McNeil and Vrtis, 2017) have been heavily researched. Moreover, government publications, authored by a number of federal and state agencies, including the BLM, GAO, USEPA, and USGS provide a rich body of literature related to mining policies and, to a degree, patented lode mines (GAO, 2011, USEPA, 2004; USGS, 2015).

There is a philosophical competition in environmental policy that is unique to PLM land use in the 21st century. As the previous chapter noted, environmental decision-making has evolved in the United States, the West, and particularly on PLMs where a complexity of regulations affects PLM use. This chapter explores this change in environmental decision-making and the role of competing values regarding PLM redevelopment. Worldviews differ from the economic-minded PLM owner seeking profit to community interests that may run counter to the PLM owners desired use of the mineral and/or surface estate of a PLM.

To help understand environmental decision-making in the context of PLM use, this chapter unfolds in four parts. The first section describes competing values in environmental policy. These competing values range from the "cherished value" of traditional resource development that many westerners advocating the "'wise use' of much of the nation's bounty" embrace (Smith and Freemuth, 2007) to environmental policies, like conservation and sustainable development, which question the preeminence of utility and economic prerogatives in land management decisions. Consequently, this first section addresses why economics competes with environmentalism, how economic factors affect choices, and why this is of interest to scholars. Also introduced is the topic of private land use decision-making into the general framework of competing values in environmental policy.

In the second section land use, in general, and PLM use, in particular, is introduced as both an interesting and unique aspect of the competition between environmental policies. Land use is different from other environmental issues, which becomes clearer in this section as the four primary PLM land uses are described and individually analyzed. Starting with reclamation and renewed mining and ending with gentrification and neglect, this section describes the affect federal laws, regulatory federalism, and local land use controls have on rational investors in PLMs.

In the third part of this chapter, the decision-making processes affecting PLM uses are researched. This section explores what scholars have said about competing values in land use issues and, in particular, draws on literature involving derelict or contaminated industrial sites ("brownfields").

Part four concludes with a summation of what scholars have *not* said regarding competing values in land use issues. It is these gaps in the literature this dissertation begins to address.

Competing Values in Environmental Policy

Research analysts are taught to ask: *who, what, where, when, why, and how*. This approach can help find big ideas, such as discovering the underlying values that compete for attention in environmental decision-making. In matters of resource management in the West, the question to ask is not *who* and *when*. It is known that Gifford Pinchot, President Theodore Roosevelt, and the four federal land management agencies have played crucial roles in the past and the voices of new congresses, presidents, managers, and the public will add to the national dialogue into the future. Big environmental policy ideas in the West, for instance, are not *what, where*, or *how*, because as Stegner (1986) capably observed, “Westerners live outdoors more than people elsewhere…. They don't have to own the outdoors, or get permission, or cut fences, in order to use it. It is public land.” The big idea in resource management and environmental policy decision-making is *why*.

The big ideas behind competing values in environmental policy address *why*. Why is there an Endangered Species Act (ESA)? Why do regulators and the public care about clean water or air? Does it matter to an urbanite that there are still naturally wild places; and, if so, why? Why do federal regulations affect so much of what happens on private property and PLMs? Why does anyone do anything greater than or beyond individual self-interest?

Tensions in environmental policy reflect different answers to probing *why* questions and the underlying value systems that correspond with the answers. As Alm

(2007) noted, “Environmental politics entails conflicts between value systems: conservation versus preservation, natural resources development versus environmental protection, [and] individual property rights versus the government’s right of eminent domain” (p. 2). For instance, when Klyza and Sousa (2010) asserted that modern environmental policymaking privileged environmental protections and government rights, the argument and concept forwarded was that individual property rights and development freedoms were increasingly curtailed. Arguable evidence of this restraint on previously higher economic liberalism policies are the annual Congressional moratoriums on any new mine patents (Earthworks, 2015). Another example highlighted by Fitzsimmons (2012) in *Reforming Federal Land Management* is the overwhelming complexity of rules and process that exists within the bureaucratic state and adopted rules and regulations. The result is a regulatory framework that overly relies on process and not enough on common sense and reason in decision-making (Fitzsimmons, 2012).

The value system conflict between conservation and preservation affects environmental politics and decision-making. If decisions are made and politics decided following the conservation worldview, it holds different implications than if a preservation land use ethic pervades. With conservation the environment is used, but in a theoretically non-wasteful, wise, and sustainable manner. The management of natural resources (air, water, wildlife, and the earth’s deposits) is for future generations, but also for current needs. As Pinchot (1910) wrote, “Conservation holds that it is about as important to see that the people in general get the benefit of our natural resources as to see that there shall be natural resources left” (p. 81). And, most famously, Pinchot (1910) wrote, “Conservation means the greatest good to the greatest number for the longest time" (p. 48). Thus, with conservation natural resources are to be used wisely and not necessarily left alone and untouched.

Preservation, in contrast to conservation, reflects a wilderness mentality. It entails preserving as pristine areas that are presently untouched by humans. With preservation, nature is for inspiration and its value is intrinsic, not utilitarian. In this worldview, the wild spaces of the Arctic, wilderness, and the Amazon are not areas for development, sustainably or otherwise, but preservation. "In short, a land ethic changes the role of *homo sapiens* from conqueror of the land-community to plain member and citizen of it" (Leopold, 1970, p. 13).

Many early tests of competing environmental value systems occurred in the West on public lands (Smith and Freemuth, 2007). One of the earliest and most famous examples occurred when Theodore Roosevelt was president and as a result of the San Francisco earthquake in 1906 that destroyed the city. In *The battle over Hetch Hetchy: America's most controversial dam and the birth of modern environmentalism*, Righter (2005) discusses the start of modern environmentalism.

In the midst of the phenomenal energy that President Roosevelt put toward conserving millions of acres in the West, a telltale story about the emergence of modern environmentalism and tensions that can exist between various values about public land use emerged. In 1906 an earthquake in California led to fires that burned virtually the entire city of San Francisco. Unable to put out the fires, the mayor of the city in the aftermath of the earthquake sought a reliable water supply and proposed that Hetch Hetchy in nearby Yosemite Park be made into a dam and reservoir to benefit the city. Posed against Pinchot and his utilitarian perspective (e.g., the greatest good for the greatest number of people) was the founder of the Sierra Club, John Muir. The poet Muir believed that God is in wilderness and that Yosemite should remain wild and untamed. In the end, the utilitarian perspective won out at Yosemite, the Raker Act (1915) was passed and the dam at Hetch Hetchy was built (Righter, 2005).

The legacy of Muir from the Hetch Hetchy decision was that in the following year the National Park Service Organic Act (1916) was enacted. This Act has prevented further incursions, either by mining, development, hunting, or timber cutting into the nations' parks. The National Park Service (NPS) now features more than beautiful scenery. It is the keeper of history and battlefields from Gettysburg to the Little Big Horn. It also features the Minidoka Internment Camps and the Manhattan Project, reflecting a value of preserving history, warts and all.

The history of Hetch Hetchy and the subsequent enactment a century ago of the NPS's Organic Act illustrates, at a national scale, the competition between economic and environmental values. As Smith and Freemuth (2007) observed, "The beginnings and early battlegrounds of the environmental movement lay deep within the context of public lands" (p. x). Economics, such as the City of San Francisco needing a water supply to assure the disaster of 1906 did not recur, yielded a utilitarian decision within Yosemite. Similar battles can be cited, such as Reisner's (1993) *Cadillac Ranch*, where economically driven water use policies in the southwest United States are characterized as causing long-term environmental degradation. Newer battles persist, such as Atlanta Gold's proposal to "open pit cyanide heap leach mine" in an environmentally sensitive location in the Sawtooth Mountains (Idaho Public Television, 2017).

Economic factors affect choices. In the case of Atlanta Gold, the PLM developer proposed a less costly open pit mine versus a more expensive but environmentally responsible underground option (Idaho Public Television, 2017). A battle of choices ensued with Boise City and environmental groups, including the Idaho Conservation League, resisting the initial Atlanta Gold proposal and recommending instead that the “highest standards allowable by law” be required of the development. To date the rationalistic, incentive-based redevelopment objectives of Atlanta Gold have remained intransigent with broader community goals and the proposal is at a standstill.

Changing Values in PLM Use

Land use issues are different from most other environmental policy matters, especially when the focus turns from publicly owned land to private lands. For instance, the habitat of an endangered species might include both public and private land. In the case of habitat protection on federal public land, United States’ Fish and Wildlife (USFW) analysis will be received and following FLPMA §302(b), the manager of the public land in question would be directed by the Secretary of the Interior to take any action "necessary to prevent unnecessary or undue degradation of the lands" (43 USC 1732(b)). In the case of habitat protection on private land, such directive would not equally be forthcoming for two reasons. One, jurisdiction would need to be fully established, which in the case of the endangered species act could be forthcoming, but would not be as automatic as in the scenario of federal public lands. Two, the Fifth Amendment of the United States Constitution requires the government to compensate individuals for the taking of property.

Citizens of the United States generally accept that government action may limit the use of private property. As set forth in *Armstrong v. United States* (364 US 40, 49 (1960), “The Fifth Amendment’s guarantee … was designed to bar Government from forcing some people alone to bear public burdens which, in all fairness and justice, should be borne by the public as a whole” (Givens Pursley, 2009, p. 180). Private property may be taken for public use, however, such action requires compensation by the government to the private land owner, which underscores the point that private land use issues are different from many other environmental policy matters occurring in the West. As Alm (2007) wrote, “Environmental policy is fragmented in every sense of the word” (p. 10).

The fragmentation of environmental policy has taken many forms, yet the trajectory of environmental protections in the West on private lands has increasingly converged on a set of guiding principles. In particular, sustainable land development protection measures have systematically been added to zoning codes since the early-20th century. As Givens Pursley (2009) observed, “Before the *Village of Euclid* v. *Amber Realty* (272 USC 365) decision in 1926, the proposition that the government had the right to regulate the development of real property through zoning was debatable” (p. 13). Nearly 50 years later in 1975, the regulation of private lands through zoning in states, like Idaho, was non-debatable.

In the case of Idaho, it’s planning and zoning authority is traced to the Local Land Use Planning Act (LLUPA) of 1975 (Idaho Code §67-6501 *et seq.*). Enumerated powers in Idaho’s LLUPA statute extend, in part, to the adoption of local planning duties, enactment of zoning codes, and the ability of local governments to determine whether certain uses on private lands in specified areas are allowed, conditionally permissible or prohibited. Importantly, "LLUPA has been construed as a delegation of broad planning and zoning powers to local governments" (Givens Pursley, 2009, p. 16).

In his book, entitled *The economics of zoning laws: A property rights approach to American land use controls*, Fischel (1987) describes how local land use controls are the result of rational exchanges by economic agents. The author forwards rational choice as a superior and insightful framework to analyze why distinct zoning districts for residences, businesses, industry, schools, and other uses makes economic sense and affect owner decision-making (Fishel, 1987). Fischel's (1987) pervading argument is that the most relevant perspective to understanding land use decision-making is market economics.

In the 21st century land use policies and controls are increasingly typified by non-market, non-economic dimensions. New community-oriented and sustainability-oriented dimensions that were not as prevalent when state planning statutes and local zoning codes were enacted in the latter part of the 20th century, let alone a century prior to this when the 1872 Mining Act was enacted, have arisen. In fact, sustainable development is now viewed as a "guiding principle" in policy and management strategies for governments, companies and nonprofits worldwide (Sardinha *et al*., 2013). In the United States, Saha and Paterson (2008) made a similar finding, noting that sustainable development practices were "widely accepted as a useful framework to guide planning" (p. 21); and, Berke (2002) observed that sustainable development is more and more guiding 21st century planning agendas with features that extend well beyond economics into environmental protection and equity initiatives.

Increasingly, environmental protection, economic development, and equity initiatives, sometimes referred to as the *3 E's*, have been adopted by local jurisdictions to guide and improve land use decision-making. "In recent years, much attention has focused on improving the quality of development plans. … The term 'Smart Growth' has been employed in an effort to describe these emerging principles of development" (Givens Pursley, 2009, pp. 232-233). Saha and Paterson (2008) found in the 21st century that the following sustainability principles, increasingly guide local land use development:

- *environmental protection* with measures addressing energy efficiency, pollution prevention and reduction, open space and natural resource protection (e.g., zoning controls, open space zoning, environmentally sensitive area protection, open space acquisition, stream protections, recreational trails, and farmland preservation), and transportation;
- *economic development* with measures addressing smart growth (e.g., planned unit developments and brownfield redevelopment) and local employment; and,
- *equity* with measures addressing social justice and governance.

Underlying various smart growth and land use development initiatives are ethical principles directed more toward sustainable development than the previously predominant *laissez faire*, economic liberalism principles that most readily identified with the West's settlement in the late-19th century. Saha and Paterson (2008) analyzed the "extent to which local governments in the United States are committed to the principles of sustainable development" (p. 21). The authors found that many communities have taken "a narrower vision of sustainable development simply by focusing on goals of environmental protection" (Saha and Paterson, 2008, p. 30). Goals that are often targeted include: water quality protection, open space preservation, environmentally sensitive area protection, transportation demand, and environmental design regulations (Saha and Peterson, 2008, p. 32). While widely accepted in North American planning, Saha and Paterson (2008) noted that staff limitations and political apathy among elected officials were impediments to the implementation of sustainability practices.

The implementation of sustainability practices has many dimensions, from environmental to economic and from social to cultural. As Sardinha *et al*. (2013) aptly observed, "The goals of sustainable development have to be defined in terms of sustainability [and] a choice arises when taking an economic approach, namely, whether natural capital (i.e., the range of functions the environment and natural resources provide for humans) should be fully protected" (p. 2). In the context of land use ethics, full protection of natural and environmental resources equates with conservation (Foster *et al*., 2003), while privileging the ingenuity of human capital moves toward what Sardinha *et al*. (2013) refers to as weak sustainability and a more utilitarian and economic ethos. "Choice between strong sustainability (natural capital ultimately cannot be substituted by other types of capital) and weak sustainability (natural capital can be substituted by other types of capital) and the conceptual differences regarding sustainability ultimately reflect different aspirations as to what a sustainable world might be" (Sardinha *et al*., 2013, p. 3).

In a study by Foster *et* al. (2013), the authors looked at what a sustainable world might be by studying historic land use patterns worldwide involving legacy land uses related to forestry, agriculture, fire, and animal management. When viewed through the lens of a conservation land use ethic, the notion of continuing the land use patterns practiced by legacy land uses was rejected as not sustainable (Foster *et* al., 2003). Specifically, extractive industry and legacy land uses "influence ecosystem structure and function for decades or centuries—or even longer—after those activities have ceased" (Foster *et al*., 2003, p. 77). *In the conservation land use ethic, legacy land use practices are not sustainable*. Again, as Foster *et al*. (2003) asserted, "Conservation is often driven by a desire to restore natural areas to a previous condition characterized as fitting within the 'natural range of variability' or 'indigenous nature of the system'" (p. 81).

The conservation worldview, which in cases has evolved from reviewing the results of past activities and legacy land uses, is often quite negative toward extractive industries (Foster *et al*., 2003), including mining (Leshy, 1987). A conservation land use ethic supports removing the legacies of prior human activity and restoring natural areas to previous conditions. In this context, it is little wonder that land use is often a focal point in research.

Changes in land use are at the center of many planning, policy, and scientific analyses (Nijkamp *et al*., 2002). Hardin (1968), for instance, analyzed common grazing lands and Ostrom (1990) empirically studied other common pool resources, like fisheries and forests. McCarthy (2002) studied the dual land use challenge of brownfields (2002). De Sousa (2000) studied properties that lack site constraints ("greenfields") imposed by prior work or industrial contaminants (as with brownfields).

Reasons for resource and land use studies vary, from environmental threats to externalities caused by past activities, such as with brownfields or former mining activities on PLMs. As Nijkamp *et al.* (2002) highlighted, "land use has a specific economic function in that it … is needed for human activity (production, consumption, investment, recreation)" (p. 1). Yet, when analysis of one of these human activities is studied, a challenge results. As Muir (1944) observed, "'When we try to pick out anything by itself, we find it hitched to everything else in the universe" (p. 1). With land, the very process of using it, whether on a PLM for renewed mining, reclamation, or other uses, can result in policy conflicts as public processes and local land use controls effect private investment. For these reasons, "land use is at the heart of the sustainability debate" (Nijkamp *et* al., 2002, p. 1).

Renewed Mining and Reclamation

Two uses of patented lode mines are renewed mining and land reclamation. One of the consequences of the privileging of environmental interests over the last half-century, particularly in contrast to the first half century of the 1872 Mining Act, has been a re-weighting of these two uses on PLMs. With the advent of the golden era of environmental and worker protection regulations, as noted by Klyza and Sousa (2010), increased oversight of mining activities has occurred. This increased oversight and disposition toward improved environmental stewardship encourages reclamation and, arguably, discourages renewed mining at least as historically practiced.

In certain respects, an encouragement of mine land reclamation and recasting how renewed mining occurred was expected. As Francaviglia (1991) reasoned, "it appears inevitable that mining landscapes would come to symbolize the turmoil between what our culture elects to view as two opposing forces: culture and nature. Active mining landscapes are now seen as being in disequilibrium. Therefore, it is not surprising that we have relegated them to our distant vision. It is in these hard places that the dirtiest work occurs to sustain our ever-demanding technology and culture" (p. 215).

The privilege environmental interests possess over renewed mining activities on existing mineral patent land depend on the unique characteristics of the situation. As Leshy (1987) insightfully noted, “Each situation, each tract of land, each showing of mineralization, each market, and each time frame is unique” (p. 159). Accordingly, a proposed project on a PLM with the potential to impact an endangered or threatened species under the Endangered Species Act (EIS) will have a serious threshold issue to attain a license to operate (Holland and Hart, 2003). Similarly, a project that triggers procedural requirements under National Environmental Policy Act (NEPA) will be required to comply with additional review criteria. Such challenges can readily occur as both the USFS and BLM manage the vast majority of the United States’ public lands (Fitzsimmons, 2012) and must follow NEPA when making regulatory decisions consistent with the 1872 Mining Act (Holland and Hart, 2003).

With adoption of NEPA, the nation determined that an environmental analysis of “all major actions with the potential to impact the quality of the human environment” was required (42 USC 4321). Compliance with NEPA typically would not be a requirement of mining on privately owned PLMs, but given PLM location factors may be an issue if access to the patent property crosses federal land. In such an instance, a right of way access permit is required consistent with policies of the issuing agency, including compliance with the designated land-use area classification set forth in FLPMA. Permit issuance then becomes a balancing of interests, between providing meaningful access and preventing unnecessary degradation of public resources.

Neglect and Gentrification

A future use of a reclaimed mining project on a patented lode mine can include gentrification and improvements associated with residential purposes. A second, somewhat opposing, use of a PLM is neglect. Factors that thwart renewed mining on a PLM can indirectly cause gentrification or neglect on a PLM. Neglect and gentrification are also forces at play in the disappearance of historic mining-related features in the West (Francaviglia, 1991; Noble and Spude, 1997). Factors causing gentrification or neglect of private property include the characteristics of the mineral and surface estate, as well as distinctive state and local jurisdictional elements. In particular, jurisdictional land use controls and property values, surface estate (e.g., roads, amenities and services available to a property), and mineral estate factors affect PLM use.

The use of all mineral patent lands, whether post-reclamation after a mining project or under different circumstances, must comply with adopted local land use regulations. Local land use regulations, in turn, are required to be consistent with state enacted local land use planning act (LLUPA) statutes. As Alexander (2001) recognized, "What all statutory public planning has in common is that one or several levels of general-purpose government and various government agencies have a legal mandate to prepare and approve land use and other related plans" (p. 59). Idaho, for instance, has mandatory planning duties for each county and city to follow. These LLUPA duties require "the planning and zoning commission … to prepare [and] implement … a comprehensive plan…. [that] include[s] all land within the jurisdiction of the governing board. The plan shall consider previous and existing conditions, trends, compatibility of land uses, … [and] desirable future situations" and, among other plan sections, adopt a Land Use Plan (Idaho Code §67-6508).

Land use plans in Idaho, as required by statute, must analyze "natural land types, existing land covers and uses, and the intrinsic suitability of lands for uses such as … mineral exploration and extraction, preservation, … [and] housing" (Idaho Code §67-6508(e)). Thereafter, Idaho Code §67-6508(e)) continues, stating, "A map shall be prepared indicating suitable projected land uses for the jurisdiction." The land use map and analysis conducted by the planning commission and board of county commissioners is then used in the subsequent adoption of ordinances and zoning maps. By precedent of law, adopted ordinances and the zoning map are to be in general conformance with the adopted comprehensive plan.

Local government requirements affect the use of private property, including mineral patent lands. These requirements take the form of land use plans, adopted zoning regulations, and development rules. Each of these requirements are significant to

property markets (Alexander, 2001) and the use of land, including PLMs. Statutory requirements vary by state, however, it is common for zoning codes to specify permitted, prohibited and conditionally allowed uses for geographically defined land use areas or zones (Lai, 1994). For instance, in Blaine County, Idaho a rural remote land use district applies to the majority of lands in the county and identifies, in part, "timber production, mining, grazing, and other agricultural purposes" as well as "single family residential" as permitted uses (§9-6A-4 of the Blaine County Code). Nevertheless, "mining activity on private property within the mountain overlay district" is a conditional use (§9-6A-6 of the Blaine County Code) and “all uses not permitted under the terms of this title are prohibited” (§9-1-5 of the Blaine County Code).

Whether a use is permitted, prohibited or conditional, land development and even the simple permitting of a home on a lot of record is fraught with uncertainty (Alexander, 2001). In the case of mineral patent land, despite the issuance of clear fee-simple title by the federal government, development is even more difficult due to perceived uncertainties or risks –whether real, perceived, or imagined. Land development on mineral patent land, akin to all the applicable legal dimensions attributable to the 1872 Mining Act itself, as described by Leshy (1987), is indeed a special reserve for hardy souls. When problems or issues increase –whether real or imagined-- the number of buyer’s decrease and the value attributed a property dissipates (Van Velsen, 1967).

Dissipation occurs whenever there are incomplete property rights, such as insecure title (Rose-Ackerman, 1985; Leshy, 1987). In the context of land development, legal access that does not support the proposed land use can dissipate property rights and values. For instance, adopted fire codes have minimum “free clear and unobstructed” vertical and horizontal clearance requirements to assure the safe operation of fire apparatus. A project that fails to meet these or other health, safety, and welfare standards has a development challenge, as lack of compliance with health and welfare is grounds for denial by land use planning departments.

Not knowing the answer to development questions, including issues of road adequacy for development or if a property will receive various land use entitlements within a specified timeframe, are further sources of uncertainty that can dissipate property rights and values. For instance, if a contingency of sale for a real estate closing stipulates an approval of a land use permit and that permit is not readily forthcoming due to long entitlement timeframes or other measures of regulatory complexity, the rights and possibly the land values of a property can be negatively affected.

When a development permit for a proposed land use is not readily forthcoming, a degree of uncertainty, an increase in "soft costs" (e.g., non-construction costs, such as planning, engineering, and architectural fees), and a reduction in qualified buyers' results. Lengthy permit review timeframes, from pre-application meetings, to formal staff reviews, to publicly noticed hearings and the adoption of findings, to the tolling of appeal periods, affect land development. Similarly, shorter land use development entitlement timeframes and fewer regulatory hurdles lower PLM redevelopment costs and coincide with a more "facilitative" local jurisdiction. In this manner, land use entitlement timeframes are a relevant factor in PLM owner decision-making that leads to lesser and greater degrees of development uncertainty depending on the proposed land use and the jurisdiction within which approval is needed.

Another source of land development uncertainty is "'information impactedness,' … [which] represents limited and/or asymmetric information about a transaction" (Alexander, 2001, p. 52). With patented mineral land, information asymmetry between buyer and seller on possible environmental issues or mineral estate deposits require consideration. Land issues and regulatory processes can cause concern. Other notable issues that can worsen economic outcomes include: the distance the project is from police, fire, and other essential services; year round road access; and, questions of liability.

Various liability issues may arise when dealing with mineral patent lands. On one occasion, for example, the author's land use planning and engineering firm helped a public school district perform due diligence on whether to accept a proposed gift of a PLM that resulted in the school district's attorney recommending the gift not be accepted because of liability unknowns. As McCarthy's (2002) research on brownfields showed, properties with uncertain legal liability are less attractive to investors. Possible public safety concerns can also exist with former mines, as when shafts have not been appropriately closed (NAAMLP, 2013).

Complicated liability and safety concerns can arise with PLMs. For instance, potentially responsible party, §107 provisions of CERCLA (inclusive of amendments in 2002) are incredibly complicated and nuanced. A reading of the statute, if nothing else, makes it clear that the issues of CERCLA are very complex. As Baird (2002) contended in his *Mineral Law Institute* article, while the 2002 amendments "cannot be considered a 'major' amendment to CERCLA for the mineral resource industries, it does have some noteworthy provisions" (p. 5-22). One such noted provision, Baird (2002) emphasized, was to begin limiting liability for "bona fide prospective purchasers" (p. 5-25).

When concerns and liabilities are properly addressed and resolved, property rights are enhanced. If unresolved, as appears more common with PLMs given property title records extending over a century and legal liability complexities, such as CERCLA, property rights and values are reduced. As Lueck (1998) aptly noted, "When property rights are well-defined, voluntary transfer is always wealth enhancing. If not, transfers can cause wealth-reducing externalities" (Lueck, 1998, p. 11). Such dynamics are intrinsic to PLMs (NAAMLP, 2013).

The attractiveness of the surface estate of patented mineral lands for a use other than mining given the daunting array of laws required to renew mining deserves consideration. Driving the conversation might simply be, as Breckenridge (2014) observed, a mine's life is not forever with most mines closing or becoming inactive when the deposit proves too small, the search for minerals runs up a dead end, production costs exceed mineral value, or other mines can do it more profitably. Or, as Leshy (1987) suggested, "Where minerals exist in quantities that can be physically mined, but their value is low relative to surface uses, assigning automatic priority to mineral development makes little economic sense" (p. 369). Exacerbating the answer to the question concerning relative surface to mineral values, and vice versa, is the very nature of the mineral estate. It is underground.

The surface estate is above ground and, empirically, readily observable. The trees, the road, the fence line, the view, and the building area are tangible. They are taxed (Leshy, 1987). Factors that improve property valuations are identifiable, such as a nearby all-season road or natural amenity. The PLM might be near a city and in a county with high property valuations. The appraiser can see the land's value and compare it to other fee-simple property.

In contrast to the surface estate, the mineral estate is speculative. It cannot be taxed.[17] Its characteristics, while attested to at least once by the federal government when the patent was issued, are private. As Leshy (1987) observed, "The Law contains a fairly

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[17] Additional detail on property taxation in Idaho is provided in the policy issues section.

elaborate procedural code for applying for title (patent), yet is silent on the evidence required to justify title” (p. 20).

In the context of private initiative, a limited role for government, economic liberalism, and the whispered legends of El Dorado and the secret bounty of pirates, it was fitting the mineral finds of prospectors and the exploration results of mineral production would be kept secret. In the words of Leshy (1987), this “heavy emphasis on private enterprise created … an unrecognized ‘monopoly of information’ concerning the value of western raw materials” (p. 295). As Leshy (1987) reiterated, “Federal government … has systematically deprived itself of the most important source of information concerning the availability of mineral resources” (p. 368).

New technologies, nonetheless, now allow researchers to be awash in data and use tools such as Google Earth and geographic information systems (GIS) to observe surface phenomena related to mineral patent lands, on the ground, in real time. Data and insights that would have taken countless hours to gather can be attained readily by using open software and public databases. GIS and various data files can be analyzed to show the location of certain features (roads, amenities, and municipal boundaries) relative to identified private parcels, like PLMs. Government websites make this data available to researchers, including a recently compiled United States Geological Survey (USGS) mineral resource data system (MRDS). These MRDS records of the USGS include “economic information about deposits and operations” of some PLM in the West (USGS, 2015). The USGS mineral resource data is valuable to PLM investors and researchers in search of precious metals, such as gold and silver. The data characterizes deposit sizes, cites professional studies, and recounts where available the source and quantity of past discoveries.

Practical Challenges in Land Use Policy: Brownfield Redevelopment

The decision-making process cited in the literature on brownfield redevelopment is relevant to PLMs. To help understand this relevance, it is helpful to recognize that scholar's view redevelopment from both an economic and community redevelopment perspective. Community goals with redevelopment may be economic, yet frequently take a non-economic form as communities try to address unmet needs or market failures in a community. With brownfield sites the market failed to account for site remediation (Bromley, 2007). Other market failures that might occur in a community and for which goals are set might include the market not providing suitable housing for residents. A market failure in some inner city urban areas might be a lack of grocery stores, resulting in food deserts. With community redevelopment the goal is to reverse negative trends and to meet identified community needs. The result, community redevelopment is difficult because it involves more than economics.

An economic venture on a brownfield site must connect to community goals. It must meet community requirements, as defined by zoning, reclamation requirements, and terms of approval. The result is that investors and developers must consider terms of approval that extend beyond typical cost-benefit analyses (BenDor *et al.*, 2011). As McCarthy (2002) observed, "connecting brownfield redevelopment to broader community goals has been difficult [for many investors] because it involves more than purely economic factors" (p. 295).

More than purely economic, incentive-based motives are required in brownfield redevelopment. Successful redevelopments of brownfield sites must merge with community goals. In some instances, community and investor goals readily align. For instance, with centrally located brownfield infill developments, both public and private parties benefit from making use of existing road networks and public transportation (Syms, 1999). As McCarthy (2002) observed, “For the private sector, brownfields offer opportunities to profit from a large under-exploited source of land within established communities” (p. 287). However, more difficult alignment of community and investor goals is expected where the goals of the community are less tangible (BenDor *et. al.*, 2011), such as in remote locations that can frequently occur with PLMs.

As defined by the USEPA, brownfields are “abandoned, idled, or under-used industrial and commercial facilities where expansion or redevelopment is complicated by real or perceived environmental contamination” (USEPA, 1995, p. 2). This definition readily includes previous mining properties and PLMs that are now abandoned or neglected and where reuse is complicated by such telltale environmental concerns as tailing piles, mine dumps, and abandoned mine portals in often mountainous regions.

Properties with both real and perceived environmental contamination exist worldwide and have been studied extensively. Journals in urban studies host peer reviewed articles related to comparative policy approaches between countries (Adams *et al.*, 2010) and brownfield redevelopment in urban environments (Nijkamp *et al.*, 2002). In sustainability journals, the dynamics of brownfield redevelopment are researched (BenDor *et al.*, 2011) and in environment management journals, articles such as De

Sousa (2000) on private sector perspectives on the costs and risks associated with brownfield redevelopment versus greenfield development are not uncommon.

Common to all of the brownfield redevelopment research is the importance of location. As Syms (1999) noted, "While location may be of significant importance in most, if not all, development situations, when it comes to redevelopment of previously used land it is only one of a number of factors which will vie with each other in terms of importance" (p. 482). From the investor's point of view, factors such as position quality (e.g., centralization) and traffic links must be weighted, however opportunities and restrictions of re-use, planning and official approval conditions, and liability protections are important as well (Syms, 1999, p. 486).

Brownfields properties can be less attractive to investors because of uncertain legal liability, cleanup, and complicating regulatory requirements (McCarthy, 2002; Tam and Byer, 2002). These factors lend themselves to cost-benefit and risk-reward analyses. De Sousa (2000) studied the perspective of the private sector by performing a cost-risk analysis associated with brownfield redevelopment.

The cost-benefit brownfield redevelopment analysis De Sousa (2000) performed was set against a comparative backdrop of greenfield development, where uncertainty risks and economic costs attributable to former industrial sites are avoided. De Sousa's (2000) research "found that the perception that brownfield redevelopment is less cost-effective and entails greater risks than greenfield development, on the part of the private sector, is true for industrial projects … but not for residential ones" (p. 831). The research also concluded that "minor policy changes" that encourage private development are all that is sometimes needed to make residential reuse projects viable on distressed properties.

The relevance of financial and environmental factors in the redevelopment of distressed properties is of critical significance. As Syms (1999) noted, “While property professionals do not undertake a formal ‘risk assessment’ procedure, they do take account of environmental as well as financial issues when deciding whether or not to proceed with the redevelopment of brownfield land” (Syms, 1999, p. 481). Financial matters include capital availability, possible loan terms, as well as pro forma items, such as the marketability and property values associated with a project. As Klapperich (2002) argued, “regenerating brownfield is a recommended recipe to improve social, economic and environmental sustainability” (p. 11). As such, investments in the redevelopment of distressed properties involves more than purely economic factors and must also factor-in connectivity to broader community goals.

McCarthy (2002) aptly described brownfield redevelopment as a dual land use policy challenge. The first challenge is to connect the reuse of the brownfield to the community’s broader goals, while the second challenge involves incentivizing private redevelopment by reducing regulatory barriers (McCarthy, 2002).

Adams *et al*. (2010) reframed McCarthy’s (2002) dual policy challenge, finding that “advanced economies increasingly view vacant and derelict legacy land as a ‘development opportunity rather than planning problem’” (Adams *et al.*, 2010, p. 75). A merit of the research is how it views the physical and institutional factors affecting brownfield redevelopment by studying policy maturation. The analyses showed policy distinctions, ranging from the perspective that brownfields are merely an inherited problem with externalities to a land use opportunity to forward community goals.

Forwarding community goals related to land use redevelopment of distressed properties was studied by BenDor *et al.* (2011), too. As these researchers noted, the costs and benefits of redevelopment relate to land use issues that many local governments do not fully control. The authors found that redevelopment often aligned with sustainable land use planning strategies, including smart growth initiatives forwarded in the environmental protection ethos. Measuring the alignment of distressed property redevelopment with community goals was an analysis challenge, however, as the community perspective "involves intangibles and externalities that extend beyond the cost-benefit analyses often utilized in planning" (BenDor *et al.*, 2011, p. 930). Noted though was that "quantification of site-specific factors … improve[d] public and private evaluations of redevelopment projects" (BenDor *et al.*, 2011, p. 930).

Brownfield redevelopment, like the reuse of PLMs, involves both community and investor goals. For communities, regenerating brownfields is a recommended recipe to improve social, economic and environmental sustainability (Klapperich, 2002). In large measure, this is due to the centrality of many brownfield sites (e.g., former gas stations) within communities (Syms, 1999). The recipe for PLM redevelopment also contains the same social, economic, and environmental ingredients desired by communities. However, PLMs in the West are often in less developed areas than the brownfields analyzed in the literature and, consequently, are not centrally located within communities and have varying access to road networks, services and amenities. Other considerations for both brownfields and PLM redevelopments are the social, economic, and environmental sustainability community goals that tend to vary by jurisdiction.

The social and environmental sustainability goals of both brownfield and PLM investors are often secondary to economic market considerations. Compliance with regulations and processes to ensure that a community's social and environmental goals are met requires time and money, which investors tend to ration.

Investor's ration each of these elements: time, money, and social/environmental quality. Differing jurisdictional factors, from entitlement timeframes to market conditions, impact investor decision-making. Investor redevelopment choices are affected by the time and costs of complying with the social and environmental quality goals of a community. Balancing and aligning these two sets of goals, the communities and the investors, is a central challenge for successful PLM and brownfield redevelopment. Of particular note is that the *quantification of site-specific and jurisdictional factors improves evaluation and is useful at aligning investor and community goals in land use decision-making*.

Gaps in the Literature

There's a philosophical competition in environmental policy that is unique to land use, and although research on issues such as brownfield redevelopment provides some insights, *there are limitations to current scholarship when it comes to PLMs.* Patented lode mines are studied, but predominantly as a land assessment exercise by individual counties for taxation. PLMs receive scholarly attention primarily as a function of active mining (IDL, 2015; IGS, 2015; IMA, 2015; USGS, 2016), as a minor subset of the federal government's abandoned mine land program (Alexander, 2007; GAO, 2011;

BLM, 2015), and to the extent that environmental concerns or large scale mining is occurring or proposed on PLMs (IDAWA, 2016).

Scholars have not studied competing viewpoints in land use issues in the context of PLMs. While scholars have looked at similar land use issues (e.g., in the context of brownfields), academics and practicing professionals alike have not studied PLMs. Scholars have not analyzed the factors that individually or, in aggregate across jurisdictions, explain current use of PLMs. For instance, only recently has the government grasped the extent of the abandoned mine land issue in the West. Yet, among these newly published works by Alexander (2007), the GAO (2011), and the BLM (2015), the complicating private PLM ownership issue is only tangentially addressed.

This analysis helps overcome the complicating private ownership issue and some of the reasons other scholars have not studied competing land use perspectives in the context of PLMs. It does so by building on the practical factors that the author’s land use planning and engineering firm has observed that affect PLM use. Observed over 25 years of representing both public and private clients on a range of planning issues in the West are a series of recurring conflicts. Areas of conflict pertain to development proposals that regulators and the public believe will change the character of an area. Another recurring land use conflict is when owners propose new development in sensitive areas, such as on hillsides, along rivers, or in areas identified for conservation.

This study analyzes differences in worldviews, whether that of the community or landowner, as one of the key factors affecting PLM use. This research aims to fill a gap in the scholarly literature. Observed is that PLMs in the 21st century are most often neglected, often gentrified (as residences), at times reclaimed, and seldom actively mined. Yet, the underlying reasons for which one-of-these-four patterns of use occur on mineral patent land in a given context is poorly understood.

A challenge scholars encounter when studying PLMs includes properly identifying the competing worldviews. To address this challenge, previous scholarly research on brownfield reuse was analyzed to help make the connection to PLM use. McCarthy's (2002) dual land use policy research, for instance, frames the challenges confronted by communities and investors with brownfield redevelopment. While her research did not address PLMs as its unit of analysis, the literature on brownfields and the decision-making processes identified logically extend to PLMs. Addressing barriers to private redevelopment and connecting reuse to broader community goals is a land use challenge confronted by brownfields and PLMs alike.

Differences in locational factors and the nature of the patenting of PLMs, originating with the 1872 Mining Act, underscore some of the distinctions between brownfields and PLMs. Yet, as the research of BenDor *et al.* (2011) demonstrated, site-specific and jurisdictional factors are essential when evaluating and aligning investor and community goals in land use decision-making. Applying these brownfield redevelopment findings to land use decision-making in PLMs is the second significant way this research strives to overcome the challenges previous scholars have had when studying PLMs.

A third challenge scholars have had with studying PLMs is methodological. Unlike previous research, now, like never before, advances in GIS and newly published databases related to PLM use and mineral resources make studying PLMs over large geographic regions possible. Studying Idaho's 1,908 PLMs and approximately 60,000 acres was a sizable task, yet far more attainable today than decades previous when databases, GIS systems, and AML initiatives were just beginning.

Part of the scholarly challenge of analyzing competing values affecting PLM use prior to initiation of this research was determining the current use of PLMs and finding the right means of characterizing the community land use ethic. Of course, community values range broadly depending on the issues. Yet, land entitlement and the often challenging processes PLM owners and investors go through to redevelop land depicts identifiable community characteristics and an ethos of a local jurisdiction.

The land use permitting timeframes and entitlement challenges PLM redevelopments encounter reflect a local jurisdiction's community worldview and associated land use ethic. Counties with facilitative entitlement timeframes, on a relative basis, are more utilitarian, *laissez faire*, and economically liberal, while the least facilitative (obstructive) counties characteristically have more of a preservationist community viewpoint. As characterized, entitlement timeframes, from most facilitative to least facilitative, reflect a jurisdictional governments priority in assisting owners and investors through the development process. This prioritization takes the form of staff competency, frequency of hearings, gatekeeper requirements, additional notice provisions, and appeal frequency. Each of these determinants occasioned the work of the author's land planning and consulting firm over 25 years of representing government and private clients on planning issues in the West.

Scholarly research on the West's century-old mines and, in particular, the effect jurisdictional, mineral, and surface estate variables have on PLM use is important to study. A framework to analyze competing values in PLM decision-making and the key jurisdictional, mineral, and surface estate factors affecting patented lode mine use follows in Chapter 4.

CHAPTER FOUR: RATIONAL CHOICE AS THE CONCEPTUAL FRAMEWORK FOR UNDERSTANDING PATENTED LODE MINE USE

The theoretical framework of rational choice was selected to analyze the research question of this dissertation: *what* factors affect PLM use? Using the same start at the beginning with a really good question mindset that accompanied the classic Newtonian inquiry about why the apple fell, this dissertation observed the phenomena that PLMs in the 21st century are most often neglected, often gentrified (as residences), at times reclaimed, and seldom actively mined.

Background on Rational Choice

Theoretically, multiple frameworks could be used to test the factors affecting these four PLM land uses, however, the lens of rational choice best aligns with the unit of analysis (pre-1920 PLM use in Idaho, as more fully described in Chapter 5) and the rational individual making PLM use decisions for which test results are desired. Rational choice has added attractions, too. “The attractions of rational choice theory,” as Frederickson (2003) wrote, “are not only its internal consistency but also its ability to generate logically deduced, empirically testable hypotheses” (p. 203).

Theories of rational choice were originally developed in the applied field of economics to explain market behavior and can be traced back at least a century. For instance, both Weber (1922) in *Economy and Society* and Lasswell (1950) in *Power and Society* advocated making the social sciences more efficient, scientific and objective.

Similarly, Simon (1947), who earned a Nobel Prize in economics, forwarded the application of the scientific method to public administration and emphasized empirical research, the principle of efficiency, and the need for objectivity. As Stone (2012) more recently observed in *Policy Paradox*, “The fields of political science, public administration, law, and economics…. inspire to make policy … with rational, analytical, and scientific methods” (p. 9).

“In its simplest form, the rational choice model of the individual assumes a *self-interested welfare maximizer* whose ability to make optimal choices is curtailed mainly by imperfect information” (Sabatier, 2007, p. 492). Rather than choose randomly, the framework assumes people will choose strategically. As Frederickson *et al*. (2003) observed, “If there is a subject basic to the practice and theory of public administration it is rationality. The conscious application of knowledge to achieve a generally agreed upon objective is fundamental to the field” (p. 59).

Rational choice is a valuable framework for describing and explaining how certain patterns of phenomena have come about, such as why PLMs in some instances are actively-mined and in others neglected or gentrified. It is, however, not the only view. As Frederickson *et al.* (2003) noted, “Rational choice is criticized as a normative theory because it equates market values with democratic values (p. 243).

Critics of rational choice argue that the approach is overly simplistic, ignoring issues that might also be critical determinants of behavior. For PLM owners, critical determinants of behavior might be non-economic. A sentimental attachment could exist, such as if the property was inherited from a loved one who owned and worked the mine a century prior. A government entity might own the property to prevent development as in a protected environmental management area. A number of other ownership factors could apply that affect PLM use.

A typology for PLM owners is not pursued, but both Radin's (2000) and Weimer and Vining's (2017) three analyst typologies are informative to the non-economic perspective (Radin, 2000; Weimer and Vining, 2017). As noted by Weimer and Vining (2017) and Radin (2000), there are objective technician types with fundamental values of analytical integrity. A second typology is the issue advocate, who adheres to one's conception of good. The third typology is the client advocate, who advocates the client's goals which for a PLM owner might be inherently economic and incentive driven or possibly non-economic.

The proposition of rational decision-making in all instances of PLM use will, no doubt, upon investigation reveal illogical, political, or pursuits other than self-interested welfare maximization. For instance, an owner or investor overly concerned with local political factors might not renew mining on an economically viable PLM. To address this viewpoint, a narrower in scope community (or *polis*) model of political preferences is useful. This community perspective juxtaposes the rational choice market worldview and helps describe how community politics and not necessarily economics can be reflected as a factor affecting PLM use.

Contradicting rational choice are possible ecological and community value explanations for land use outcomes affecting PLM use. As Stone (2012) postulated, rational decision-making "fails to capture … the essence of policy making in political communities: the struggle over ideas" (p. 13). In the *polis* model, community preferences and values determine outcomes, not economics. As McCarthy (2002) attributed to the

Chicago School of Human Ecology, “theories to explain land use differentiation ... have drawn on the ideas of open competition for space based on classic economic theories and the ecological processes of invasion and succession” (p. 288). In the ecological model, as Hardin (1968) observed, “ecology is the overall science of which economics is a minor specialty” (p. 1245).

The framework of rational choice draws on the ideas of competition and ecological process by recognizing that people respond to situations with strategic behaviors. As Bartlett (2010) wrote, “Human behavior is not real, intentionally or unintentionally. It is strategic” (p. 2). Such strategies, as set forth in the rational choice framework allow choices to be analyzed. If the mineral estate under the PLM lacks any significant minerals and both the surface estate and jurisdictional characteristics are attractive for residential uses, *ceteris paribus*, a strategic use for the PLM given these key factors affecting the property yield a scientifically higher probability of a residential use. Or, if tax policies favor disuse of land over redevelopment, then PLM neglect and freeriding will increase.

When government regulations or jurisdictional characteristics make it easy (or hard) to gain approval for a proposed PLM use, the strategies chosen by rational decision-maker’s investing (or not) in a PLM are affected. Rational decision-makers

value the time and costs associated with land use permitting. As Bartlett (2010) noted, “In a world of scarcity nothing is truly free … any use of a limited resources for one purpose is forever gone for another” (p. 4). *In business first, “time is money,” economic liberalism communities a de-emphasis on expensive or lengthy government permitting and entitlement processes might be expected.* When a conservation land use ethic is the prominent community value in a jurisdiction, development proposals might be expected to move more slowly within the bureaucratic machinery resulting in longer entitlement timeframes. Thus, the strategies chosen by rational decision-maker's investing (or not) in a PLM are affected by the ease (or difficulty) of land entitlement.

Besides jurisdictional considerations, such as entitlement timeframes, the strategies chosen by rational decision-makers investing in PLMs are affected by the characteristics of the property estate itself. Logically, the richness of an ore body and the commodity value of minerals in the ground are cogent factors for a rational investor interested in renewed mining on a PLM. Similarly, an investor or owner seeking to reuse a PLM for residential purposes will want to analyze the surface conditions of a PLM and certain other jurisdictional factors within which a PLM is located, such as real estate values. Without roads, nearby amenities, and services rational individuals will hesitate to invest. Other factors that rationally inhibit investment include liability considerations, long entitlement timeframes, and complex laws.

Viewed through the purely rational choice lens, a landowner will only reclaim, develop and repurpose PLMs if it makes economic sense. This is the economic or market model, to maximize personal gain and profit and minimize loss. If the mine has no valuable minerals and a PLM's underground mineral estate has no economic value, according to the theory, there will be no mining. If the surface estate is unattractive because there are no roads, amenities, or value in the property for a gentrified use such as a residence, then the logic of the rational choice framework follows that a PLM will remain neglected or abandoned.

Conversely, in the *polis* model, the key criteria for decision making is not maximizing personal gain or the incentive of profit, but the promotion of public interest and the political community (Stone, 2012, p. 35). This includes aligning redevelopment with local planning strategies (BenDor *et al.*, 2011). It includes government becoming a PLM owner by buying land for an elevated municipal water tank. It includes government re-purchasing lands sold by patent a century earlier in order to protect a public resource for future generations. It includes community priorities being reflected in local land use codes, as enabled by state planning acts in the 1970s. It includes PLMs being used for residences near all-season roads and municipalities as a means of land conservation. It includes increased instances of PLMs being subdivided and used as backcountry cabins in jurisdictions that prioritize utilitarian and *laissez faire* land use principles. In each instance, processes that slow development might represent more of a conservation set of community values, while principles of economic liberalism might better exemplify communities that expedite developer investment.

In the *polis* model, the focus is on what the community wants, its objectives and passions (Stone, 2012). Neglected PLMs, viewed through the *polis* lens, might well be the result of politics and policies aimed at preserving the *status quo*. The number of reclaimed century-old PLMs from this worldview might be expected to be lower in a state with voluntary reclamation provisions than a state with mandatory requirements. Or, in the *polis* model, the redevelopment of PLMs might be an expected outcome if development policies encourage investment.

Analysis of public interest and the political community in the *polis* model exposes an analysis challenge, however, as each level of governmental (federal, state, local) affects PLM use. Fortunately, federal and state regulations can be treated, for the most part, as background conditions in this analysis for two reasons. First, the unit of analysis of this dissertation is Idaho, which means –in theory—that federal and state regulations are the same across county and other jurisdictional boundaries within the state. The rules affecting these private lands are uniform, regardless of the county or local jurisdiction within which the PLM is located. The second reason follows the principles of federalism, including, in this instance, that the State of Idaho has granted local county and municipal jurisdictions the right to zone and determine county land uses (Idaho Code §67-65). In particular, Idaho's local land use planning act (LLUPA) enables jurisdictional politics[18] to determine at a local level what uses are permitted (or not) and the terms under which development may occur.

Development terms in LLUPA-adopted regulations in Idaho follow county growth strategies, such as annual capital improvement planning for road construction and other county government functions that reflect locally adopted land use preferences (Givens Pursley, 2009). For example, if the prominent land use ethic within a given county features conservation, then open space zoning and other land use rules that slow or limit property development would not be uncommon. If a sustainable development ethic has been adopted, then smart growth initiatives and planned unit development regulations likely have been adopted (Givens Pursley, 2009; Saha and Peterson, 2008). Conversely, if economic liberalism and an emphasis on the development rights of

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[18] There are preemption limits to the authority of city or county to regulate. As Givens Pursley (2009) noted, "Preemption may be either direct or implied. Of course direct conflict (expressly allowing what the state disallows, and vice versa) is a 'conflict' in any sense" (p. 18).

property owners is the prominent community worldview, then rules that reduce barriers to development (Klyza, 1996) and better facilitate cooperation between resource users and government (Ostrom, 1990) through less obstructive land use entitlement processes would more readily characterize the jurisdiction.

Rational Choice in Context: Brownfields

In the context of PLM redevelopment in the 21st century, the literature on former industrial sites ("brownfields") possibly best highlights the tension between public and private perspectives. As Adams *et al.* (2010) noted, the redevelopment "process becomes effective when it creates an institutional framework in which brownfield land is consistently seen as a source of strategic profit by the private sector and as a means of strategic policy delivery by the public sector" (p. 99).

Examples of private and public sector priorities merging with brownfield redevelopment exist, including Summerset at Frick Park (Summerset) near downtown Pittsburgh, Pennsylvania. Encompassing 238 acres and costing over 250 million dollars of public and private funds during a 20-year development timeline starting in 1995, Summerset is one of the largest brownfield redevelopment projects in the United States (Li *et al*., 2016). A key reason for the project's success, as Li *et al*. (2016) noted, was "Consensus between public and private sectors" (p. 1536), including the "flexible business environment" provided by Pittsburgh's Urban Redevelopment Authority (p. 1537).

In contrast, the researchers of Li *et al*. (2016) found that the redevelopment of the Hazelwood brownfield site also near downtown Pittsburgh was unsuccessful because the project lacked public and private collaboration. Consensus was not reached between the

Pittsburgh Urban Renewal agency and private developers. The result has been the continuation of a vacant brownfield site. When private economics and community values compete, brownfield redevelopment is difficult (Li *et al*., 2016).

In a study that analyzed non-impacted (greenfield) sites versus previously impacted (brownfield) redevelopment properties, De Sousa, C. (2000) found that brownfields were generally closer to services and roads and, thus, redevelopment of these sites (over greenfields) better aligned with community goals of nature conservation and sustainability. This public policy preference is echoed by Syms (1999), who weighted transport issues, like road connectivity, as the most important factor for both the communities and investor’s point of view.

In addition to transportation and road connectivity issues, other factors affect investor redevelopment decisions. For instance, in brownfield redevelopment a significant constraint is regulatory complexity (De Sousa, 2000; Adams *et al.*, 2010; BenDor *et al.*, 2011), including long development periods (McCarthy, 2002) and liability concerns (McCarthy, 2002; Sardinha *et al.*, 2013). These factors impact project costs in terms of time and money, which investor’s ration.

Investor’s strategically allocate time and money spent on a project. With brownfield redevelopment varying degrees of investment are required to address site contamination issues. If site contamination is extreme as with designated superfund sites, remediation standards are coordinated by the USEPA consistent with CERCLA regulatory requirements. In less extreme examples, regulatory liability concerns may be voluntarily addressed.

<u>Rational Choice in Context: PLMs</u>

In the context of PLM redevelopment in the 21st century, tensions between public and private perspectives are not always significant. One such instance is found in Idaho's Abandoned Mine Reclamation Act (Idaho Code §47-1703), which includes a voluntary "abandoned mines on private land" provision to address shared liability concerns of the investor and community. Reclamation acts, like in Idaho, help to mitigate barriers of liability in PLM redevelopment. Yet, as reported by the Idaho Department of Lands (2016), which administers the Abandoned Mine Reclamation Act for the State of Idaho, over the 20-year history of the program only 10 different lode mines patented prior to 1920 made use of Idaho's voluntary program (pp. 2-3). Given an inventory of 1,908 pre-1920 PLMs, Idaho's voluntary reclamation program has served only a small fraction of the total number of PLMs with assessment, re-use and remediation needs.

One of the PLMs reclaimed under Idaho's Abandoned Mine Land Reclamation Act shows how PLMs are different than brownfields and exemplifies the competition between rational economic and community values. Located in Blaine County the Triumph Mine has been characterized by the USGS (2016) as a world class deposit. The mine was once valued for its rich ore deposits, but in 2007 was purchased by a brownfield developer for a reported six million dollars ($6,000,000). After purchase, additional site reclamation occurred and then from late-2007 to early-2009 the property was proposed for a 36-lot residential subdivision to be annexed into the City of Sun Valley.

Approximately two years after the property was purchased, the proposed redevelopment of the Triumph Mine 36-lot residential community project was denied. In its findings, the City of Sun Valley found the proposal incompatible with its goals, as set forth in its adopted comprehensive plan. Other noted reasons for denial included inadequate road access and, as a result, an inability on the part of the City to provide essential public services (Sun Valley, 2009). The city further documented that it was "not in the best interest of the City to include contaminated lands in its Future Land Use Map for residential development because of the hazards associated with…. [k]nown contaminants, include[ing] … arsenic, cadmium, lead and cyanide which pose threats to people and wildlife" (Sun Valley, 2009, p. 4). The proposed residential development on 54 PLMs was found inconsistent with the goals of the community. Misrepresentation lawsuits have since been filed and settled. The project shows how competing values in environmental decision-making can manifest on PLMs. In this instance, not unlike the failed Hazelwood brownfield redevelopment project near Pittsburgh, there was a clear disconnect between the economic pursuits of the PLM investors and the priorities of the community.

Whether PLMs are re-activated as mines, gentrified and re-used as residences, neglected, and/or remediated, this study's investigation into *what* factors affect patented lode mine use reveals two possible sets of competing worldviews. The first of these is the self-interested economic outlook of the PLM owner, which is methodologically tested in the following chapter with results and conclusions presented thereafter. The second worldview is that of the *polis* and incorporates the perspective of the political community within which the PLM is located. In such instances, long entitlement timeframes are postulated as inhibiting PLM redevelopment, particularly when the PLMs are remotely located, not readily accessible, and municipal serves and nearby roads are not available.

The Rational Actor

The rational choice perspective suggests that individuals do what they do for their own interest first and societal interest second. For instance, a PLM owner may decide to gift a 20.66-acre property to the community as a park or a historic landmark, but from the rational choice perspective that is a less likely scenario. When individuals place their own interest first, as Frederickson (2003) in *The Public Administration Theory Primer* noted, the assumptions are "the individual knows his or her preferences, can rank order identified preferences, and when faced with a set of options to achieve those preferences choose those expected to maximize individual benefits and minimize individual costs" (p. 186). From this market, incentive-based worldview, an individual interested in his/her own welfare first would not voluntarily gift property for the sole purpose of the public. As Olson (1965) noted, "individuals … interested in their own welfare … will not voluntarily make any sacrifices to help their group attain its political (public or collective) objective" (p. 126).

In contrast to the market worldview, the *polis* worldview moves beyond individual self-interests, finding it inadequate, although not to be wholly dismissed (Stone, 2012). As Bermeo *et al.* (2010) cautioned, "Critics who argue that rational choice analysis neglects nonmaterialist motivations should ponder Ostrom's assertion that 'non-monetized relationships' may indeed be 'important' for political actors and that we should avoid assuming that choices 'are made to maximize some single observable variable'" (p. 207). For political actors, such as the Idaho legislature, a goal could be ideological as with Klyza's (1996) analysis of policy regimes and the enduring power of economic liberalism. In such an instance, an extremely low property tax assessment valuation policy of PLMs, as exists in Idaho, might be viewed in the context of Olson's (1965) view on rewards, as a non-monetized relationship between PLM owners and a state that hopes to encourage mining uses.

The competing worldviews of economic and community preferences lead to and possibly explain different conclusions as to how and why PLMs are used as they are in Idaho. Theoretically, it seems likely that local political interests that promote development over preservation would each lead to different land use outcomes. In brownfield research this was true with BenDor, *et al.* (2011) and De Sousa (2000) finding that community regulations affect investor land development decisions. As the research of Li *et al*. (2016) found in Pittsburgh, a key reason for the success in Summerfield brownfield site was reaching consensus between public and private sectors, while the unsuccessful redevelopment of the Hazelwood brownfield site was the result of a lack of public and private collaboration. The extension of these literary studies to PLMs suggests that regulations incentivize PLM investment or, conversely, can dis-incentivize PLM investment.

One circumstance that dis-incentivizes investment is when government penalizes something, such as late tax payments resulting in the government assessing late fees and penalties. Whether the penalty is (or is not) justified is a secondary point. The point is, people –or, PLM owner interests, in some cases-- will do less of something if penalized. In other cases, developers take steps to reduce or hide liability, as when limited liability companies proliferate for purposes of conducting business.

In market terms, economic factors matter. In particular, the jurisdiction within which a PLM is located, as well as the characteristics of the mineral and surface estates are paramount factors affecting patented lode mine use. If a jurisdiction penalizes or makes difficult residential use of PLMs, less residential PLM use occurs. If a mineral taxation statute prevents total valuations in excess of five dollars an acre ($5/acre) unless a use other than mining occurs, the statute dis-incentivizes doing anything with PLMs. If land reclamation is voluntary, fewer PLMs will be cleaned up.

Rational investment, whether in a county that is keen to help an applicant entitle property or a county that is not, is not likely to occur in either scenario, however, if the project makes no economic sense. Stated differently, from an economic rational choice perspective, opening a mine with inferior subsurface characteristics and without valuable minerals would not warrant investment under even the most favorable regulatory conditions. Similarly, building a home on a PLM, in even the most facilitative of local regulatory environments would generally be considered irrational if the property were not marketable, property values were low, and there were no roads, services or other amenities nearby.

If there are no valuable minerals, or there are not services, access, and amenities available, then even if facilitative jurisdictional controls and favorable land use regulations exist, the incentive for PLM investment does not. With rational choice, the essential message is people, like PLM owners, respond to incentives. Economic factors matter. In particular, the jurisdiction within which a PLM is located and its surface and mineral estate characteristics are paramount to determining patented lode mine use. This is at the heart of the rational choice theoretical framework used to analyze the factors affecting PLM use in Idaho in the 21st century.

An additional economic factor that logically appears to be influencing PLM disuse or neglect by PLM owners is the dis-incentive caused by Idaho Code §63-2801. This statute and the value of using rational choice as a framework to analyze PLM use is evident in the context of the nested policies that stem from the rights and provisions set forth in the 1872 Mining Act. Recall, as previously noted, that the 1872 Mining Act lacks a mineral notice provision. The result is that neither county assessors nor, in the majority of instances, the federal or state geological survey organizations know the true nature or specific assay results of the 1,908 pre-1920 PLMs in Idaho.

Given the secrecy behind early mining discoveries, it is not surprising the 1872 Mining Act did not require mineral disclosure by PLM owners. However, this provision in the 1872 Mining Act, among other factors, has resulted in the State of Idaho granting local authorities broad discretion on whether or not to collect property taxes on mineral patent land.

A little over 25 years ago, the Idaho legislature last amended its mineral lands taxation statute and granted local county assessors' discretion to exempt mineral patent land from property taxation "when in the opinion of the county assessor, the value of reserved mineral rights does not warrant the expenditure to appraise and assess such value" (Idaho Code §63-2801). At that time and, as set forth in greater detail in the background chapter presented earlier, local assessors were given the option to look into the *de minimis* values of reserved mineral rights and determine if an appraisal was warranted or unnecessary. No guidance was given and the availability of data for local county assessors to make a determination of *de minimus* value is uncertain. This uncertainty stems, in part, from the 1872 Mining Act, which as previously noted does not require evidence beyond the showing of $500 of work or investment prior to patent.

Impacts of Information Asymmetry

An information asymmetry exists on PLMs that is unnecessarily inefficient and ripe for improvement. To attain these improvements, from a societal or community point of view, requires defining the nature of the information asymmetries related to PLMs and addressing some of the scenarios where individuals' pursuit of pure self-interest has led to inefficient results. The logic follows a three-step sequence. First, the 1872 Mining Act lacks a mineral notice provision. Second, *net output*, as interpreted by the Attorney General, is the basis of Idaho’s mineral taxation policy. Third, Idaho’s net output provision and taxation of a PLM regardless of mining activity (Idaho Code 63-2801) allows *inactive PLMs* and particularly PLM owners with no mining interests other than ownership of a patented mine to freeride.

Information asymmetry exists when one individual knows a lot more than another individual. Kleiman and Teles (2006) describe *information asymmetry* as a situation “where some participants are known by others to have knowledge not generally available” (p. 630). For example, the heirs and successors in interest of a pre-1920 PLM may have mineral assay data, yet are under no obligation to share that information with local county assessment offices, who –likely as not-- neither have this data nor the expertise to assess the mineral value of a PLM. This situation is asymmetrical.

Information asymmetry logically disadvantages county assessors. As Kuruvilla & Dorstewitz (2010) observed, "The complexity of public decisions seems to require highly specialized and esoteric knowledge, and those who control this knowledge have considerable power" (p. 264). Consequently, local county assessment offices are inhibited from speculatively valuing PLMs for tax assessment purposes. In fact, if local governments are acting rationally, it is expected without risk of default to the PLM owner, a local county assessor may decide to not collect taxes at all for a PLM if it is determined that assessment expenses exceed possible tax revenues and a waiver is extended. Alternatively, a tax assessor may look for other means to establish higher valuations, particularly in lower income counties.

The option the Idaho legislature granted to local county assessment offices to “remove the burden” to assess mineral rights when not economically feasible echoes the rationality of institutional rules observed by Ostrom (1990). As Ostrom (1990) noted, "rules that work relatively well will not be changed by individuals, because searching for rules that will work even better is too costly” (p. 211). Minor amendments were made to Idaho’s mine valuation statute §63-2801 in 1937, 1941, and 1988. With each of these amendments however, in general terms, the Idaho legislature kept with the same rules and approach that had served the state since 1903 with the legislative history implying that its 1988 allowance would save fruitless hours and costs at the local county level.

Bounded Rationally

The economic logic implied in the legislative history and statutory language of the 1988 amendment to §63-2801 is consistent with the classic model of *bounded rationality* and *satisficing*, as developed by Simon (1947) in *Administrative Behavior*. Policymakers are constrained by a scarcity of time, resources, and political attention. With PLMs searching for new rules is time consuming and requires political considerations, while acquiescing to the *status quo* and leaving rules that already exist alone is not. As Simon

(1947) asserted, administrators do not have the consumptive ability to look at everything, so instead they best fit answers to questions.

From the viewpoint of opportunity costs, administrators and legislators will “satisfice” and not necessarily aim to maximize preferences or optimize solutions. “As a rational decision-making process,” Bartlett (2010) asserted, “there is a full range of consequences of each of the various alternative uses of our time and resources…. In a world of scarcity nothing is truly free … any use of a limited resources for one purpose is forever gone for another” (p. 4).

Fittingly, Idaho Code §63-2801 remains virtually unchanged, except for three minor amendments, since Idaho’s mineral taxation statute was first enacted over a century ago in 1903. It gives credence to an observation of Leshy (1987), who wrote, “The inertia of the status quo remains probably the most powerful single force in policy making” (p. 353).

Idaho’s mineral taxation policy discourages county assessors’ offices from evaluating mineral patent lands based on speculative mineral values. Rational analysis, however, notes that this policy may have the unintended consequence of encouraging freeriding by some users and land speculation and neglect of mineral patent land by others. In the case of freeriding, as Scotchmer and Slemrod (1989) noted, it occurs when there is a common interest in benefits, but without a sharing of costs. As noted, with freeriding a person or property receives a “positive externality” (e.g., road service to a PLM) without contributing to the costs of producing those benefits (e.g., nominal if any property tax payments as compared to a neighboring property).

From a *polis* perspective, if the goal is less land speculation, freeriding, and neglect of PLMs, then possibly higher taxes for *inactive* PLMs as a form of coercion, as Olson (1965) invoked, could be used to achieve this common group interest. Stated differently, incentivizing an inactive land use with preferential tax treatment is, statutorily, opposite other approaches taken by the Idaho legislature. For instance, only homeowners actively living in their primary residence are eligible for exemptions that lower the taxable value of home improvements. If the goal is less freeriding and a sharing in costs as well as benefits, then Idaho's mineral taxation policy should be amended.

Consequences of the *Polis* Versus the Market Perspective

Application of a market worldview to the public sector implies that market mechanisms can be applied to produce collective benefits. It is when the market fails, as evidenced by mounting examples of negative externalities with mining, and the market no longer produces goods and services efficiently that government programs are formed. Such cases of public intervention, in principle, are the result of market failures. As Kleiman and Teles (2006) noted, the threat of a "public intervention can create market failure, as when publicly supplied disaster insurances induces home building in floodplains or on eroding beach fronts" (p. 632); or, in other instances, "potential market failures arise from uncertainty and imperfect information" (p. 630).

A number of factors, distinct from market failure, can lead to the adoption of government programs. For instance, the advent of smart growth initiatives began in part to improve the quality and sustainability of land development. These initiatives use an incentive model to reward land use developers with greater design flexibility and density bonuses when certain criteria are met (Saha and Paterson, 2008; Sardinha *et al*., 2013).

As practiced, development scorecards are used to evaluate projects in a manner that encourages certain design features valued by the community. Using an incentive structure, density bonuses and building height waivers are offered in return for developers providing design features that benefit the community, including bike racks, bus pullouts, pedestrian ways, street lighting, water reuse, and spaces available to the public.

Adopted government programs to benefit an identified public need are not always successful. Following the theory of incentives in the *polis* model, Stone (2012) described how "Targets of incentives can 'game the system' by trying to reap a reward or avoid a penalty without changing their behavior" (p. 282). Aptly, Stone (2012) described a brownfield site in New Jersey where the facility owner took steps to evade government penalties. Of note in the New Jersey example was that evasion tactics take many forms, including the formation of limited liability companies for the purpose of protecting the personal assets of individual investors to legal claims. Another gaming of the system example includes PLM owners paying nominal if any taxes without any intent whatsoever to use a PLM for an active mining purpose.

Targeted government interventions in mining activities occurred in the United States in the latter part of the 20th century. The new regulations focused on environmental and public health protections. As Leshy highlighted (1987), "the basic reason for increasing governmental control over mining activities [was] to satisfy the increasing societal demand … that environmental costs association with mineral development be internalized" (p. 222). In particular, the golden era of environmental law making in the late-20th century included a number of statutes directed at mining including CERCLA and SMCRA. These statutes, among others, were implemented to address a century of market failures where waste cleanup transaction costs were not integrated into –and, thus, not mitigated by-- the business models and practices of American industry (Leshy, 1987; McNeil and Vrtis, 2017). Such remediation practices were not part of the rational calculus of mining and other industries until the 1970s when regulation was required to safeguard public trust lands and waters and to guard against the negative externalities produced at times by industry.

In market terms, the mining policy of the United States can be viewed as incentive-based. In 1872 a miner could place survey monuments on the ground, work a claim for five years, pay certain monies, record notarized papers, and end up owning for a nominal amount of money 20-acres of fee simple property that was not subject to royalties on minerals extracted. This was during an era where settlement and land sale proceeds were paramount to national interest. Within a century patent issuances had ceased through a process of annual Congressional moratoriums (Earthworks, 2015) and, by the latter part of the 20th century, almost all mining activities were subject to some form of government control. CERCLA, for instance, created liability for potentially responsible parties.[19]

The application of economic principles to patented lode mines has a rational appeal with apparent contrasting results over the last 150 years. The contrast is between numerous active gold and silver mines in Idaho during the 19th century compared to very

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[19] A potentially responsible party, as set forth in §107 provisions of CERCLA, is a party who may be held liable for polluting. CERCLA provisions involve chain of title issues that owners of PLMs should be aware (Baird, 2002).

few in the 21st century. Maps 1, 2 and 3 graphically tell this story. Maps 1 and 2 show a plethora of gold and silver mining activity and the formation of numerous mining districts in Idaho by the late-19th century, while contrastingly Map 3 shows a total of five active gold and silver mines over a century later in 2015.

Dobelli (2013) made an interesting commentary on contrasts that reflects on Idaho's 150-year mining history. In *The Art of Thinking Clearly*, Dobelli (2013) stated, "When we encounter contrasts we react like birds to a gunshot. We jump up and get moving. Our weak spot: we don't notice small, gradual changes" (p. 27). With patented lode mines, a small gradual change has occurred as PLMs are now rarely mined in contrast to a century ago.

Idaho has not moved away from giving priority status to mining. In fact, extractive industries, such as forestry, farming, and mining have traditionally held priority status. This is evidenced in an earlier table (Table 1.2), which shows the net taxable values of agricultural, mining and timber uses by tax commission land use category. Specifically, county property tax assessment offices are directed, by statute, to *not tax the speculative value of extractive uses*. As reported by the IGS (2016), however, only five active mines occurred on PLMs in Idaho in 2015. This contrast between a lot of active mining 150 years ago and today reflects a small, gradual change over time. Whether a "jump up" moment is needed is not the point, while observing the small, gradual changes is.

PLM Decision-making in Practice

No major land use theory has directly been applied to conceptually frame the research question of this dissertation: *what* factors affect patented lode mine use? This lack of attention provides an opportunity to analyze competing values in land use decisions by PLM owners and investors. By juxtaposing a community value worldview against the rational economic worldview of the PLM owner, a clear description emerges about why PLMs in the 21^{st} century is most often neglected, often residential, at times reclaimed, and seldom actively mined.

In an applied sense, what happens in PLM decision-making can be explained using a rational choice framework. This framework begins by assuming strategic, self-interested welfare maximizing behaviors by PLM owners. It assumes people respond to incentive and dis-incentives. However, competing explanations exist regarding PLM decision-making. One such competing explanation is set forth in the *polis* model.

The *polis* model recognizes economic rational behaviors, but interjects the importance of community and public policies into the PLM use decision-making process. These policies take multiple forms, including short entitlement timeframes that can be characterized as encouraging property redevelopment consistent with a liberal economic land use ethic. Expected is that PLM owners will strategically respond to the interests of the community. Because individuals ration the time and money spent on matters, there are opportunity costs with each decision affecting PLM use. The result is that PLM owners are impacted by the cost and time required to address such matters as site remediation of contaminated property and matters of legal liability.

PLM investors, like brownfield redevelopers, quantify site specific and jurisdictional factors when strategically deciding on a PLM land use. While brownfields are often centrally located, PLMs are not. Yet, in context, both PLMs and brownfield redevelopers are concerned with the presence (or not) of services, amenities, and nearby roads. Site specific factors, such as if valuable minerals deposits exist on the property are critical to a market worldview, a renewed mining PLM use, and the decision-making process of a PLM investor. Jurisdictional rules, which can be measured by analyzing the facilitative nature of local jurisdictions and required timeframes for entitlement and relative property valuations by county, matter to both PLM and brownfield owners.

The PLM land use decision-making process is impacted by politics, too. The politics behind the 1872 Mining Act did not then and do not now require the patentee or PLM owner to disclose mineral information. The accepted logic that minerals exist on the property is that no prudent individual would spend five years working a mine if there were not any minerals. A century later, assessor's and state legislators live by a decision from 150 years ago and, in the case of Idaho, a statute from over a century ago that only values PLMs for the *net output* of mining activity, regardless of whether the mine is active or inactive. PLM neglect is the outcome, as well as freeriding.

Conclusion

This dissertation investigates the small, gradual changes occurring to the West's historic patented lode mines. It seeks to understand, as the primary research question of the study, *what* factors affect patented lode mine use? As a result of the density and richness of the research material, a number of related questions apply. Subordinate questions include, *why* are patented lode mines often abandoned and not used for more beneficial purposes? *What* roles do public policies, like federal non-disclosure, state tax exemption, and local "facilitative" or "obstructive" policies contribute to patented lode mine neglect? *What* are the consequences of not having a mineral disclosure requirement in the 1872 Mining Act have on 21st century patented lode mine use? With gold commodity prices so high, in real dollars, compared to the pre-1920 era, *why* is there so little renewed mining? *What* is known about the mineral estate of PLMs? *What* surface estate or jurisdictional features lead to gentrification of patented lode mines?

The theory of rational choice provides a meaningful framework to analyze the questions into what factors cause land use patterns of neglect, gentrification, renewed mining, and reclamation of PLMs. As the logistic regression output and descriptive statistics presented in Chapter 6 will highlight, PLM use is influenced by jurisdictional factors. Patterns of PLM land use adhere to what Van Velsen (1967) refers to as the "interrelation of structural ('universal') regularities, on the one hand, and the actual ('unique') behavior of individuals, on the other" (p. 148).

Local land use entitlement requirements and state mineral taxation rules are structural factors that strategically affect PLM decision-making. When buying and holding a mineral patent poses negligible risk or minimal, if any, property taxes compared to the uncertainty, payoff and risk of investing and developing a working mine, then conditions for neglect heighten. Similarly, a rationalistic, economic, profit-maximizing worldview suggests that a capital investment in renewed mining or residential use of a PLM is, *ceteris paribus*, logically preferred in a "facilitative" versus "obstructive" jurisdiction.

From a policy and legislative standpoint, it is logical to infer that (1) owners of PLMs are influenced by local and state rules and (2) representatives of successful institutions would seek to revisit rules having undesired consequences. If there is little land reclamation on PLMs, yet this is desired, a revisiting of applicable policies affecting reclamation makes sense. If PLM land valuations are low relative to comparable lands, then assessors tasked with valuing properties might upwardly adjust PLM valuations. If there is little renewed mining and promising lodes are inactive and being held for speculative purposes contrary to the goals of the original mining districts and 1872 Mining Act, then a review of jurisdictional rules, situational variables, and program alignment with legislative intent is merited.

If PLM neglect and freeriding is troublesome, then revisiting policies, such as Idaho's non-taxation alternative as set forth in Idaho Code § 63-2801, makes sense. In each of these scenarios, the rational choice theoretical framework offers tools to help understand the empirical results and policy outcomes, as more fully described in Chapters 6 and 7. Prior to this, however, the research methods necessary to generate empirical output and results require attention as follows.

CHAPTER FIVE: RESEARCH DESIGN AND METHODS

This chapter sets forth the materials, methods, and design of this dissertation's inquiry into *what* factors affect patented lode mine use. Quantitative research design methods are employed. Developed is a snapshot and latitudinal analysis showing patented lode mine use in Idaho in 2015. Quantified using descriptive statistics and logistic regression is the effect key independent variables identified in the literature have on the use of PLM lands. The research design creates empirics from which the key factors affecting PLM use can be objectively described and explained.

The advantage of the research design is the objective quantification of empirical evidence that results. Logistic regression (logit or logit regression) allows each of the jurisdictional, mineral estate, and surface estate regression coefficients to be analyzed for its effect on the dependent variable (land use), controlled for the effects of all of the other independent variables included in the regression. This permits the competing perspectives of PLM land use, such as the rational economic perspective of the PLM owner and the worldview of given communities, like counties in Idaho, to be evaluated. Together the use of descriptive statistics and logit results in empirical data being gathered and allows a clear picture to form about how rational choice and community land use preferences have affected PLM use.

The research design set forth in this chapter integrates quantitative, numerical data with relevant descriptive data and the rational economic perspective of PLM owners and the worldview of communities. The integration of these data gathering and analysis techniques into the operationalized variables has the benefit, as Maxcy (2003) observed, of allowing researchers to assemble knowledge on pragmatic grounds. This is relevant, as PLM investors, like brownfield redevelopers, quantify site specific and jurisdictional factors when strategically making land use decisions (BenDor *et al.*, 2011). Consequently, both pragmatic and practical insights about PLM decision-making occur when a quantitative research design is employed.

In an applied sense, to capture what happens in PLM decision-making, variables relevant to PLM decision-making are needed in the research design. Noting that PLMs and brownfield redevelopers are concerned with the presence or absence of services, amenities, and nearby roads, the design of this research analyzes the distances individual PLMs are from each of these features using geographic information system (GIS). Recognizing that renewed mining on a PLM will not occur without the presence of a valuable commodity and vehicular access, available USGS mineral resource data and road data, among other factors, are collected and analyzed. Because land use outcomes are significantly affected by land use processes that slow development, an entitlement timeframe model for all counties within which PLMs are located, is developed and featured in the research design of this dissertation.

This research design and methods chapter is organized into four sections. The first section describes the data analysis methods. Featured are quantitative methods, including descriptive statistics and logit regression, which together provide great insight into the factors affecting PLM use. The second section describes how data in this research is collected and measured. Included in this section are details on the unit of analysis, data sources and each of the operationalized study variables. The third section sets forth the research propositions investigated. The fourth and final section of this chapter concludes by describing how the research design forwards the purpose of helping determine how rational choice and community values affect PLM use.

Quantitative Data Analysis

The research design of this dissertation is quantitative and features a latitudinal analysis of how pre-1920 patented lode mines in Idaho were used in tax year 2015. The research design provides an opportunity to empirically analyze each of the factors that brownfield redevelopment scholars found significant to how rational choice and community preferences affect land use. The creation of a numerical dataset tied to key jurisdictional, surface and mineral estate factors creates an opportunity to quantitatively test this land use decision-making theory on PLMs

A land use snapshot of how PLMs were used in 2015 in Idaho is possible because patented lode mines are privately owned and, as such, are on county tax rolls. The federal government sold the PLM and title to both the surface and mineral estate transferred to the patentee. The PLM became private property and, thereby, is subject to a given jurisdiction’s property taxation requirements. In Idaho, PLMs are on county tax rolls and, consequently, each PLM in each jurisdiction is given a total assessed value by each of the local county assessment department offices. Valuations may differ by PLM and jurisdiction in Idaho. However, as stipulated by Idaho Code and a supporting Idaho Attorney General’s Opinion, PLMs are to be assessed at five dollars an acre ($5/acre), unless used for non-mining purposes.

There is a statewide uniformity to property tax assessments in Idaho. A series of land use codes are assigned properties by county assessment offices following a set of state instructions. This coding creates an opportunity to describe how PLMs are used in the specified study year, investigate possible causal factors, and begin to explain patterns of land use. Data patterns, as Van Velsen (1967) observed, can be studied by looking at the "interrelation of structural ('universal') regularities … and the actual ('unique') behavior[s] of individuals" (p. 148). In this regard, local land use regulations and state mineral taxation rules are structural factors that, methodologically, are worth studying as each has the potential to alter the unique behaviors of individual PLM owners.

The research design of this study features the compilation of a disparate data set comprised predominantly of continuous level data from county, state, and federal government sources. A complete census of the unit of analysis was attained from the BLM's General Land Office (GLO) records and yielded, once the filters were applied to the database, 1,908 pre-1920 patented lode mine records in 28 of the 44 counties in Idaho. This output from the BLM's GLO records provided a reference point and frame[20] for the analysis and data received from all other sources, including the USGS mineral resource data system, county jurisdictional data, and assessment data from county offices for each of the patented lode mines.

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[20] PLM reference data from the various county assessment offices throughout Idaho, at times, included observations for mineral lands patented after 1920 or for other types of patented mines, such as placer claims. With the exception of two sets of placer claims patented in the 1960s, as noted in the appendix of this manuscript, such data were discarded and not analyzed as it was not the unit of analysis for the study.

The quantitative approach used in this dissertation and the resulting dataset are significant to understanding the factors that affect PLM use. If incentives exist, as viewed through the rational choice framework, and statistical probabilities indicate a relationship between PLM use and a study variable, a causal explanation becomes possible. If certain combinations of quantified site and jurisdictional factors affect land use decision-making, as the research of both Syms (1999) and McCarthy (2002) indicate it should, this is relevant to both the investor and community worldviews and to understanding factors affecting PLM use. As such, strategic, self-interested welfare maximizing behaviors by PLM owners can be better understood. Or, the outcomes of policies affecting PLM use, such as the 1872 Mining Act, Idaho's mineral taxation statute §63-2801, and county entitlement timeframes, can be analyzed and the effectiveness of the policy determined.

Logit Regression

One set of statistical tools used with the study data to present and subsequently analyze the results is logit regression. Logit regression analysis is used in this research to draw inferences about the entire statewide sample census of patented lode mines. Logit is a special form of regression analysis, which is properly used when the levels of measurement for the data set being analyzed comply with the following three assumptions: (1) level of measurement[21] for the independent variables are predominantly interval and the dependent variable is categorical; (2) the dependent variable is binary (0,

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[21] The level of measurement for the dependent variable, land use in tax year 2015, is nominal. The level of measurement for the USGS mineral resource data system, as indexed, is ordinal. All other variables are an interval level of measurement. This is important to this study's research needs as it determines the selection of test statistics and affects the amount of information collected about variables (Berman and Wang, 2012).

1) or yes/no; and, (3) there is a non-linear relationship, which introduces the need for a log transformation to create a linear relationship that allows regression to be used.

The assumptions of logit regression analysis are met with the operationalized variables of this study. In particular, the two categories of tax year 2015 patented lode mine use are mineral: (1) mineral / rural residential tract property with residential improvements (secondary category codes 9, 12 and 34; 9, 10 and 31; 9 and 46; 9 and 47; 9 and 48; or 9 and 49) and (2) mineral / not rural residential tract property. PLMs that were not residential tracts, consistent with the Idaho Tax Assessor classification system, were classified as mineral (secondary category code 9) and possibly any one of the following secondary category codes or numbers: 1, 2, 3, 5, 7, 14, 19, 32, 36, 50, 60, 64, 66, or 81. They are not classified with a 10, 12, 18, 31, 34, 40, or 46-49. Thus, the first dependent variable category is mineral / rural residential use in tax year 2015 (Residential PLMs) and the second dependent variable category is mineral / not rural residential use in tax year 2015 (Non-Residential PLMs).

The statistics of this study provide a useful medium for describing data in a manageable manner and for proposition testing with tests for statistical significance. One consideration with logit analysis[22], however, is the need to aggregate land use state codes in the Non-Residential PLM use category. This is required in order to meet the binary dependent variable assumption. To address this possible shortcoming, summary data for the uses of PLMs in Idaho in 2015 is provided and analyzed. In combination, the

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[22] Another consideration with the use of logit is the special treatment required with the mineral estate index scores used to rank combinations of applicable attributes from the USGS mineral resource data system. This score is ordinal and not interval and, therefore, is a dummy variable that is not in Pearson’s Correlation Coefficient.

descriptive statistics and logit regression analyses set forth in this study yield results that ultimately provide meaningful conclusions that are not due to chance alone. The ability to operationalize variables and use statistics in this quantitative analysis is a significant strength of the research design.

Descriptive Statistics

The second set of statistical tools used with the study data to present and subsequently analyze the results are a series of summary statistics, including distribution, central tendency, dispersion measures, and the relative comparisons and associations of interval level data from the Pearson's Correlation Coefficient. These techniques are applied to the census of the PLM study results in order to provide an overview of how PLMs in 2015 were used statewide. Thereafter, descriptive techniques are used to analyze subsets of the data in an attempt to better understand the various combinations of situational factors affecting the dependent variable (land use).

To help characterize the data and the various combinations of situational factors affecting the dependent variable, each of the classifications of PLM land use are individually analyzed. *The combinations of data factors affecting the active mining, residential use, neglect, and reclamation of PLMs are evaluated.* Factual evidence on the effect jurisdictional, surface and mineral estate factors have on PLM land use are explored using statistics and documents related to each of the variables. Maps and tables, and pictures are provided to help explain the observations and evidence discovered.

The descriptive statistics used in this dissertation are helpful for purposes of analyzing how each of the independent variables affect competing perspectives of PLM land use, such as the rational economic perspective of the PLM owner and the worldview of a given community. As detailed in the next section on data collection and measurement, three sets of independent variables (jurisdictional, mineral estate, and surface estate) are operationalized to show the effect each of these factors have on PLM land use. Logit allows each of the aforementioned jurisdictional, mineral estate, and surface estate regression coefficients to be analyzed for its effect on Residential PLMs (dependent variable), controlled for the effects of all of the other independent variables included in the regression. Similarly, descriptive statistics provide an opportunity to look at key variables in the study dataset and quantitatively test PLM land use decision-making theories.

By using descriptions of central tendencies and by looking at patterns or anomalies in the data, descriptive statistics is a useful tool for presenting and analyzing results. Assimilation is helped, for instance, in the residential land use analysis of PLMs by analyzing the effect of protectionist land use ethics, as measured using entitlement timeframes. Similarly, analysis of mineral estate data informs the likelihood of active mining on PLMs and, inversely, is a noteworthy factor when analyzing residential PLM use or recurring instances of PLM neglect.

The study of tax records, USGS data, maps, and other documents provides an opportunity to study patterns of land use. For instance, the study of factors affecting the residential use of pre-1920 PLMs provides an opportunity to analyze subsets of data. It provides a chance to evaluate road accessibility distinctions to residential PLMs and to look at varying levels of improvements to residential PLMs statewide. More specifically, remotely located seasonally accessible PLMs with residential improvements of at least $5,000 on pre-1920 PLMs are analyzed. Linking tax records to the BLM’s GLO records for PLMs allows residential PLM uses with improvements to be identified by county on each of the pre-1920 PLMs. In this instance, GIS data is used to help calculate the approximate distance each PLM is from the nearest city, all-season road, seasonal road, and defined amenity feature, notably natural amenities such as national forest land and water features (Gosnell and Abrams, 2011).

To give depth to empirical observations on residential PLM uses, statewide data showing the effect of county entitlement timeframes on residential PLMs is analyzed and described. As posited, counties with facilitative entitlement timeframes, on a relative basis, are more utilitarian and economically liberal, while the least facilitative (obstructive) counties characteristically have more of a preservationist community viewpoint. To help test this land use theory and proposition, data are evaluated. The results, as set forth in the next chapter, show the effect entitlement timeframes can have on land use outcomes, like residential PLM use.

The quantitative approach taken in this research design makes use of logit regression and descriptive statistics. This approach edifies the issue of land use choices made by PLM owners and investors and, in particular, factors affecting the use of PLMs. While in many ways the methodology of this study focuses on PLM gentrification, the research design is also significant to understanding other PLM uses.

One operating premise with the methodology of this dissertation is that a series of factors, notably high land values and increased service availability (e.g., year round roads) close to incorporated areas result in higher incidences of residential PLM use. However, as postulated, long entitlement timeframes act to decrease incidences of residential PLM use, despite the attraction of high land values and nearby services, amenities, and roads. This is consistent with Syms (1999), who found, “opportunities and restrictions of re-use” and “planning official approval conditions” to be significant redevelopment factors from the investor’s point of view.

The unique combination of situational factors, such as land values and entitlement timeframes, is purposely studied using quantitative techniques, document analysis, and a rational choice framework. Studying these factors is consistent with the principles of smart growth where redevelopment tends to be encouraged in centralized, readily serviced, and accessed locations (Givens Pursley, 2009; Saha and Peterson, 2008). Specific observations on each of these factors are studied. Sought are relationships between factors that are more than mere associations, but where observed outcomes can be logically attributable to the evidence gathered for each relevant factor.

The quantitatively-derived empirical evidence gathered in this research provides an opportunity to analyze the three sets of factors that most affect PLM use. Analyzed are jurisdictional, surface and mineral estate data.

Mineral estate data are analyzed to better understand if renewed mining is probable given past discoveries and the assignment of a high mineral index score; or, if neglect and gentrification are more likely on a PLM with a low mineral index score. Surface estate data, such as the proximity a PLM is to services, roads, and amenities, are analyzed statistically to understand the importance of these adjacencies to PLM subdivision, residential and backwood cabin use. Jurisdictional factors, like real estate values and entitlement timeframes, are quantitatively studied to understand the impact less facilitative and more obstructive entitlement timeframes have on PLM land use, such as PLM neglect and gentrification.

Data Collection and Measurement

Empirical data are collected and measured quantitatively in this dissertation. This section describes the unit of analysis and, in particular, the unique attributes of pre-1920 PLMs in Idaho in 2015. This section also describes the wholly unique dataset and the sources from which this dataset was derived. Noted is the use of tax parcel data to determine PLM use in 2015[23] and how data from county tax parcels, GIS, and USGS mineral resource data systems, among other sources, are linked to discrete BLM general land office records on PLMs for analysis.

The second and final part of this section enumerates the study variables. The dependent variable of this dissertation is land use. The factors and independent variables affecting land use include jurisdictional, surface and mineral estate factors. Measured and operationalized are USGS mineral resource data that impact whether renewed mining is, in general terms, viable. Also measured and operationalized are a series of surface and jurisdictional factors that brownfield research and, by extension, PLMs clearly denote as meaningful to investor and community decision-making.

<u>Unit of Analysis</u>

The unit of analysis of this research is pre-1920 patented lode mines in Idaho in 2015. This unit of analysis is both practical and distinct for five main reasons as follows.

One, the provisions of the 1866 Mining Act, as amended by the 1872 Mining Act, required that each patented mine include a discovered, located, and worked mineral,

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[23] Reports of the IGS (2016) and IDL (2016) are also useful to confirm instances of active mining use and reclamation of PLMs. This is particularly true with reclaimed PLMs, as assessor’s offices are not required to assign separate category codes for reclaimed PLMs.

which in Idaho's early history, as evidenced by Maps 1 and 2, primarily included mining for either gold or silver. That gold or silver was discovered and attested to by agents of the federal government as a condition of patent provides, except in instances of abuse or fraud, an opportunity to study mineral estate attributes.

Two, patent conveyance includes fee simple transfer of the surface estate of typically not greater than 20.66 acres to the patentee. The conveyance was to both the surface and mineral estate, meaning the mineral rights stay with the PLM. The mineral rights are not reserved by the federal government, which increasingly occurred after 1919 when the United States moved to a mineral leasing program. Thus, this unit of analysis avoids split estate issues.[24] Importantly, patent and fee simple title also allow the dependent variable (land use) to be more readily studied since patented land is private land and, thus, on county assessment rolls.

Three, patented lode mines are a distinct grouping of mines, which distinguishes it from unpatented claims, placers, surface, open pit, and various types of leaching operations. For instance, patented mines are different from unpatented mines or claims in that title to the surface of the property is held privately for patented mines, but retained by the federal government with unpatented claims. Underground lode mines feature veins and rock in place, which differ from gold placer claims for instance that occur in gulches, old channels, and in areas of loose gravels and sand (Costigan, 1908).

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[24] As Leshy (1987) observed, "The Mineral Leasing Act … demands federal retention of title to both the surface and the minerals to which it applies. Even when the Mining Law still applies, as to hard rock minerals, statutes in some special cases limit patents to the mineral deposit, and do not extend them to the surface" (Leshy, 1987, p. 28).

Four, there is an additional logical appeal to studying pre-1920 patented lode mines. Early lode mining while not necessarily a folk industry pre-dated the advent of deep, industrial underground mining techniques. As such, early lode and hard rock mines generally used timber framing to hold back the rock in tunnels and shafts. These underground timber mines also generally occurred prior to the open pit or surface mining era, which featured large low-grade ore bodies being worked from the surface. As Leshy (1987) reported, in 1921 the Bureau of Mines found "'the development of new mines … will be to a large extent done in a different way from what has prevailed in the past'" (p. 289). Pre-1920 was a period when land conveyances were generally small, as the emphasis was on the individual miner in the Jeffersonian style of government.

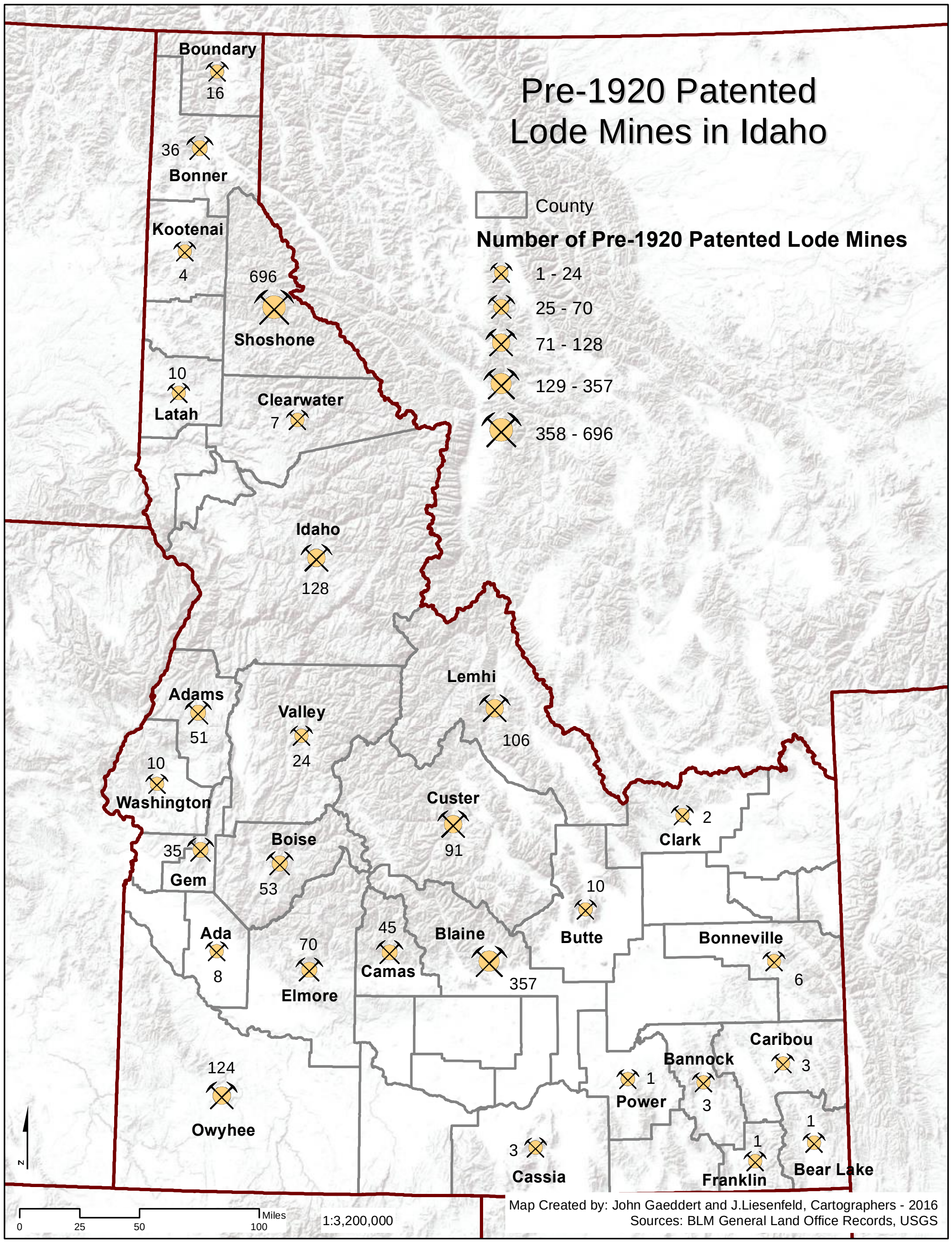
Finally, the choice of studying PLMs in Idaho has the practical feature of building on contacts and statutory knowledge from the domicile state of the author's land use planning and engineering company. Bringing this expertise to the analysis is valuable and also complementary to Idaho's geographic and representative position in the midst of other intermountain mining states, such as Colorado, Montana, Nevada, Utah, and Wyoming.

Data Sources

The primary data sources used in the research design of this dissertation were databases, documents, digital maps and tools. Quantitatively, information for each of the variables was organized into columns in an excel spreadsheet for every one of the 1,908 PLM records. Identified were assessor category codes, assessment valuations, distances to various attributes, jurisdictional measures, and mineral index scores where available. Also analyzed were GIS map distances, tax parcel data, and records of various agencies. In particular, data gathered in this dissertation for the unit of analysis and each of the study variables (dependent, independent, control) are available for replication by going to the following sources.

First, the unit of analysis data was attained from the BLM's GLO records. The BLM's website allows data to be filtered a number of ways, including by: (1) state, (2) county, (3) date (prior to 1920), and (4) patent authority (1866/1872 Mining Act for lode claims). For this dissertation, pre-1920 PLMs authorized under the 1866/1872 Mining Act in each of the counties in Idaho were used to establish the study census of this dissertation. These four filters of the BLM's GLO records yielded 1,908 discrete entries for Idaho, which are distributed throughout 28 of the 44 Idaho counties as shown in Map 4 on the following page. *The BLM's GLO records form the population census for the unit of analysis*. Further, database records and all other data from each of the sources from which data was gathered for the variables were merged around the master accession number list attained from the BLM's GLO records.

Second, county population density per square mile $(mi)^2$ is included to control for population. The population density per square mile $(mi)^2$ data source was calculated using data from two sources: (1) population data was attained from Woods and Poole Economics, a Washington, D.C. based firm that analyzes United States



Map 4. **Number of Pre-1920 Patented Lode Mines in Idaho by County**

Census data; and, (2) county land area data was retrieved from a land parcel website source.[25]

Third, information regarding the dependent variable (tax year 2015 property use) of this study was provided by each of the 28 county assessor offices in which patented lode mines are located and, in part, from the Idaho State Tax Commission. The dependent variables are the current uses of these PLMs, as measured using tax year 2015 assessment data.

The current use of every patented lode mine was determined by accessing the tax rolls of every county in Idaho where a PLM is located. In Idaho there are 28 counties where pre-1920 PLMs exist. As private property, PLMs are assessed for taxation purposes in the county in which the patented land is located. The Idaho Tax Commission has developed a common set of secondary category codes, as described in Appendix E, which each county generally follows. The assigned codes range from 1 to 81 and aptly describe tax assessment year property use for each of the observed pre-1920 patented lode mines.

The Idaho State Tax Commission and the 28 County Assessor's Offices where pre-1920 PLMs are located provided assessment records for tax year 2015. These compiled secondary category codes reflected the land use of each PLM in Idaho in tax year 2015. For instance, a secondary category code or number 9 on the tax rolls referred to "mineral" and is associated with all patented mines. If there was "forest land" on a PLM, a secondary category code (SCC) of 7 and 9 was typically issued. If "dry grazing"

[25] The referenced land parcel website link was http://www.indexmundi.com.

was occurring on a PLM, a SCC of 5 and 9 will be issued. If there was an improved residence on a PLM, a SCC of 31, 34, 46-49, and possibly 40 will be issued.

Other secondary category codes that are found in combination with “mineral” (SCC 9) and PLMs include: rural industrial tracts with improvements (SCC 14 and 36); investment related agriculture with improvements (SCC 1, 2, 3 or 5 and SCC 32); other rural lands and improvements (SCC 18 and 40); waste acreage (SCC 19); and exempt property (SCC 81). If a PLM has improvements, it will be issued a SCC of 32. Finally, a SCC of 66 is affiliated with a PLM with improvements if the PLM also has net mining profits. In each of these instances, where available, total assessed valuations by category code entered were gathered and assigned to the applicable BLM GLO accession record for the noted PLM.

Fourth and finally, data for the independent variables were gathered as follows. For the mineral estate, the USGS mineral resource data system is available to the public and was searched. Results for a subset of the pre-1920 PLMs were identified. Gold and silver commodity prices data sources are available from numerous websites.[26] For the surface estate, the 28 county assessor offices in which patented lode mines are located, as well as the Idaho State Tax Commission, proved invaluable resources. Other valuable information sources on PLM use proved to be the IDL and IGS. The IDL administers Idaho’s reclamation program and provided records on reclaimed PLMs. The IGS provides annual reporting on active mining operations in Idaho.

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[26] Referenced commodity websites include: http://minerals.usgs.gov/ and www.kitco.com.

Geographic information system data were used to determine distances of the located patented lode mines to roads, amenities, and municipalities. Jurisdictional data were attained through content analysis of planning and zoning hearing minutes retrieved from the websites of or personnel from each county.

Operationalized Study Variables

Research has found that the quantification of site specific and jurisdictional factors improves evaluation and is useful at aligning investor and community goals in land use decision-making (BenDor *et al.*, 2011). Building on this research, this dissertation identifies three sets of independent variables that affect PLM use. The independent variables of this research are: jurisdictional, mineral estate, and surface estate.

This section sets forth the operationalization of each of these three sets of independent variables (mineral estate, surface estate, and jurisdictional factors) as follows.

Mineral Estate

The first main independent variable features the gold and/or silver mineral estate and related commodity prices for each. As set forth more fully in the research propositions sections that follows, the supposition is that as the economic significance of a gold or silver deposit and its commodity price increases, the number of PLMs used for residential purposes decreases. The rational for this proposition is simple and grounded in rational choice theory; namely, the significant rise in gold prices (versus the generally lackluster price of silver) presents an economic incentive for PLM owners with significant gold deposits to renew mining (more so than PLM owners with significant silver deposits).

Gold and silver are two precious metals often identified with pre-1920 patented lode mines in Idaho. In fact, the USGS mineral resource data system has a lengthy listing of “economic information about the deposit and operations” of PLMs in Idaho that feature either gold or silver as the primary, secondary or tertiary commodity in many of its records. The USGS mineral resource data system assigns seven possible attributes to this mineral estate variable. These are “primary, secondary, and tertiary” commodity listings and the “small, medium, large, and world class” significance of the deposit size.[27]

For operationalization purposes, an index was developed that ranked the combination of the seven applicable attributes from the USGS mineral resource data system. This index unfolds in four parts.

Part one was a simple table that assigned points based on the nature of the deposit size and the primary, secondary, or tertiary listing by the USGS researchers of either gold or silver commodities for patented lode mines identified in the mineral resource data system. If gold was the primary commodity and USGS researchers also identified the deposit size as large and significant, then points consistent with Table 1.3, below, were assigned. Similar points were awarded for silver if it, too, was shown as the primary commodity and a significant large deposit size by USGS researchers.

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[27] The mineral resource data system code key identifies “deposit size” as large, medium or small, which the researchers’ determined based on “the tonnage of the deposit including all production, reserves, and resources” and, in some records, whether the deposit was of “world class significance for its size” (USGS, 2016).

Table 1.3 Commodity Listing and Deposit Size Points

Commodity Listing	Points	Deposit Size	Points
Primary	2	World Class	4
Secondary	1	Large	3
Tertiary	0	Medium	2
		Small	1

Part two of the index built on the commodity listing and significance of the deposit size descriptions provided by the USGS and the points assigned to each in Table 1.3, above, by ranking the nine possible combinations for either gold or silver commodities. Table 1.4 shows index scores ranging from a possible low score of 1 to a high score of 6. A higher point total represents an ordinal level increase over a lower score and, conversely, a lower point total represents an ordinal level decrease from a higher score. As set forth in both Tables 1.3 and 1.4, no distinction is drawn between gold and silver.

Table 1.4 Composite Score for Commodity Listing and Deposit Size

Composite Total Points Score	Commodity Listing / Deposit Size	Composite Total Points Score	Commodity Listing / Deposit Size
1	Tertiary / Small	3	Primary / Small
2	Tertiary / Medium	4	Secondary / Large
2	Secondary / Small	4	Primary / Medium
3	Tertiary / Large	5	Primary / Large
3	Secondary / Medium	6	Primary / World Class

Part three of the mineral index begins to draw a distinction between gold and silver that reflects the delta between the 2015 real value (in $) of the commodity, as adjusted for inflation from the median mine patent year of the observations (circa 1900), and (in an attempt to temper the cyclical nature of the mining industry and fluctuating commodity prices) the actual 10-year average price of the commodity (in $) between 2006-2015. In the case of gold this was a net positive amount and in the case of silver was a net negative amount.

Part four concludes with an index table that combines the three previous mineral estate parts. It features a ranking of silver and gold by commodity listing, significance of the deposit size, and the net real values of both gold and silver. As noted in Appendix F, over the last century, silver has experienced a negative commodity price to inflation ratio of 0.91, while gold has experienced a positive commodity price to inflation ratio of 2.2.

For patented lode mines where gold and/or silver was discovered, located, and worked for five years over a century ago, it is informative to index these net real values for gold and silver, the commodity listing, and significance of the deposit size. Table 1.5 indicates that a PLM with gold listed as the primary deposit and world class in size ranks the highest. Ranking the lowest is a PLM with silver listed as a tertiary commodity that is small in size.

Table 1.5 Gold and Silver Index Showing Deposit Size, Commodity Listing and Price to Inflation Ratio

New Composite Total Points Score	Previous Composite Point Score	Commodity Price to Inflation Ratio	Commodity	Commodity Listing / Deposit Size
0.91	1	0.91	Silver	Tertiary / Small
1.82	2	0.91	Silver	Tertiary / Medium
1.82	2	0.91	Silver	Secondary / Small
2.2	1	2.2	Gold	Tertiary / Small
2.73	3	0.91	Silver	Tertiary / Large
2.73	3	0.91	Silver	Secondary / Medium
2.73	3	0.91	Silver	Primary / Small
3.64	4	0.91	Silver	Secondary / Large
3.64	4	0.91	Silver	Primary / Medium
4.4	2	2.2	Gold	Secondary / Small
4.4	2	2.2	Gold	Tertiary / Medium
4.4	2	2.2	Gold	Primary / Small Occurrence
4.55	5	0.91	Silver	Primary / Large
5.46	6	0.91	Silver	Primary / World Class Large
6.6	3	2.2	Gold	Tertiary / Large
6.6	3	2.2	Gold	Secondary / Medium
6.6	3	2.2	Gold	Primary / Small
8.8	4	2.2	Gold	Secondary / Large
8.8	4	2.2	Gold	Primary / Medium
11	5	2.2	Gold	Primary / Large
13.2	6	2.2	Gold	Primary / World Class Large

When attainable, the index set forth in Table 1.5 was applied to each of the 1,908 pre-1920 patented lode mines in Idaho.

From an economic perspective, opening a mine with inferior subsurface characteristics and without valuable minerals would not warrant investment under even the most favorable regulatory conditions. Commodity index scores are helpful at understanding PLM use. For instance, if a PLM's composite commodity index score decreases, instances of Residential PLM use might be expected to increase insofar as the PLM is not likely to be used for renewed mining. Given that the presumption of net output is the statutory basis for five dollar an acre ($5/acre) maximum valuations of PLMs, based on Idaho Code §63-2801, mineral estate data are evaluated when such information is available.[28]

If there are no valuable minerals, there is no incentive for PLM investment in renewed or active mining. A rational basis exists that the PLM should not benefit from low property tax valuations intended for active mining PLM uses. With rational choice, the essential message is people, like PLM owners, respond to incentives. Economic factors matter. In particular, *the mineral estate characteristics of a PLM are critically important to determining patented lode mine use, especially for active mining*.

Surface Estate

The second main independent variable relates to the surface estate and attributes of the land, including the distance each PLM is to roads (seasonal and all-season), amenities (e.g., lakes and rivers), and services (notably, distance to a municipality).

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[28] Special treatment of missing mineral resource data from the USGS system was needed when running the logit regression results. In each case, missing data was treated consistent with the recommendations of Berman and Wang (2012) in *Essential Statistics for Public Managers and Policy Analysts*. Specifically, in some instances missing data was estimated, but the general rule was not to guess (Berman and Wang, 2012).

With this set of independent variables, the concept follows the location, location, location maxim of real estate. The general idea is that as the distance to a municipality or an all-season or season road increases, the probability of the PLM not being used for residential purposes increases as well. Again, as set forth by Syms (1999), each of these factors is relevant from the investor's point of view.

Acreages, valuations, and distances are gathered and analyzed for each patented lode mine. This is a multi-step process that involves the collection of property assessment data from the 28 counties in which pre-1920 PLMs are located in Idaho. It entails going through the data and discarding any patented placer mines or mines patented after 1920.

Assessment data collected includes acreage and valuations by category code. A full description of the methodology and assessment data fields collected by county is provided in Appendix G. Also collected and analyzed are the relative distances of PLMs to seasonal roads, primary roads, incorporated cities, and amenities, as queried with geographic information system software. This step requires using the unique identifiers provided by each assessor's office and measuring distances using geographic information system data on located PLMs, municipalities, amenities, and roads. To arrive at PLM distances to all-season roads, for instance, the subset from the "highways" dataset of the Census 2000 TIGER / Line files geodatabase feature class was selected. This subset of roads includes interstates, U.S. highways, state highways, major roads, and minor roads. Seasonal road distances were measured by analyzing the mapped land descriptions of PLMs to the nearest road, as depicted on either the BLM's GLO accession record maps or county assessor parcel maps.

The distance each PLM is from roads (seasonal and all-season), amenities (e.g., lakes and rivers), and services (notably, distance to a municipality) is operationalized quantitatively in this research design. Each of the aforementioned surface estate regression coefficients is interpreted as its effect on the dependent variable (land use), controlled for the effects of all of the other independent variables included in the regression. Road, amenity, and service proximity affect, by degrees, residential PLM use.

Surface estate independent variables are evaluated. This includes analyzing the distance a subdivided PLM is from a municipality. It includes mapping the proximity of residential PLMs in Blaine County from services and roads. It includes identifying residential improvements on PLMs throughout the state, as well as the measurement and evaluation of the distance a PLM is from all-season roads, amenities, and municipalities.

In the economic worldview, if there are no services, access, and amenities available, the incentive for PLM investment decreases. There may be exceptions, but the essential message is self-interested welfare maximizing behavior will not invest without an economic incentive to do so. Market factors matter. In particular, *the surface estate characteristics of a PLM are paramount to determining patented lode mine use*.

Jurisdictional

The third main independent variable involves jurisdictional matters, such as the median property tax of a county or the number of months required to entitle a project. These two factors are quantitatively analyzed. Varying entitlement timeframes, as practiced by the 28 counties where PLMs are located in Idaho, are studied. This is important from the investor's point of view as "Complying with … local regulatory processes can involve substantial and discouraging financial and time costs for developers and investors—for rezoning and other administrative reviews, approvals and entitlements and other requirements by environmental and land-use regulators" (McCarthy, 2002, p. 292). Two of the propositions tested are: 1) as months to entitle increase in a county and/or 2) as median property tax values increase in a county, the odds[29] of a PLM being used for residential purposes also increase.

The 28 counties where PLMs are located in Idaho are dissimilar. To arrive at possible jurisdictional differences, efforts include collecting and analyzing, by county, real estate values. For instance, an investor or owner seeking to reuse a PLM for residential purpose will want to analyze certain jurisdictional factors within which a PLM is located, such as real estate values. Notably, building a home on a PLM would generally be considered irrational if the property were not marketable, property values were low, and there were no roads, services or other amenities nearby.

To address real estate values, a proxy measure of median property tax by county was chosen. Property tax valuations allow interval level analysis, including quartiles and rankings, and help address economic incentives that are important to analyzing factors affecting PLM use through the theoretical framework of rational choice. Median property taxes by county may be gathered from any number of property tax websites.[30] The

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[29] The regression analysis tool of logit measures the probability or odds of an event occurring. As set forth later in this chapter, logit was used to analyze the data.

[30] Referenced state and county property tax rate data was accessed from http://www.tax-rates.org/.

information showed that in 2015 Blaine County had the highest median property tax of all Idaho counties at $1,977 while Custer County had the lowest at $543.

The median property tax data for each of the counties in Idaho was operationalized. A four-point scale[31] was developed since the data logically fell into quartiles with Custer County in the first quartile and Blaine County in the fourth. Table 1.6 depicts the 2015 property tax for each county in Idaho. It shows Blaine County as having the highest median property tax at $1,977 and neighboring Custer County as having the lowest median property tax rate at $543. Table 1.6 also shows the data by quartile[32] and interval level rankings using a four-point scale.

Table 1.6 Median Property Tax in Idaho by County

Counties	Median Property Tax (2015)	Four-Point Ranking	Quartile
Blaine	$1,977	4.00	4th
Ada	$1,634	3.30	4th
Latah	$1,376	2.77	4th
Kootenai	$1,329	2.64	4th

[31] To arrive at this four-point scale required a few steps. The first step was to divide the median property tax amount for each county by the highest Blaine County median property tax amount. This results in a range of numbers from 1.00 for Blaine County to 0.27 for Custer County. The second step is to convert this range of numbers, 0.27 to 1.00, to a four-point scale, ranging from 1.0 to 4.0 while maintaining ratio. This is accomplished by using the following formula: New Value = ((Old Value – Old Minimum or 0.27) * (New Maximum or 4.0 – New Minimum or 1.00)) / (Old Maximum, 1.00 – Old Minimum or 0.27) + New Minimum or 1.0.

[32] Quartiles are based on all 44 Idaho counties, however only those 28 counties where pre-1920 PLMs exist are depicted.

Counties	Median Property Tax (2015)	Four-Point Ranking	Quartile
Bannock	$1,298	2.60	4th
Power	$1,259	2.52	4th
Bonneville	$1,211	2.40	4th
Valley	$1,123	2.23	3rd
Bonner	$1,111	2.19	3rd
Shoshone	$1,069	2.11	3rd
Camas	$1,058	2.11	3rd
Franklin	$1,051	2.07	3rd
Boise	$1,044	2.07	3rd
Elmore	$1,040	2.07	3rd
Adams	$920	1.82	2nd
Gem	$905	1.78	2nd
Boundary	$902	1.78	2nd
Caribou	$900	1.78	2nd
Washington	$897	1.74	2nd
Clearwater	$872	1.70	2nd
Butte	$800	1.53	1st
Lemhi	$786	1.53	1st
Idaho	$737	1.41	1st
Bear Lake	$699	1.33	1st
Owyhee	$692	1.33	1st

Counties	Median Property Tax (2015)	Four-Point Ranking	Quartile
Cassia	$689	1.33	1st
Clark	$591	1.12	1st
Custer	$543	1.00	1st

A second useful jurisdictional variable to study are the entitlement timeframes of land use applications, such as rezones, subdivisions, variances and conditional use permits. This variable affects the rational decision making of PLM owners. As Professor Bartlett (2010) observed, “Rationality says that you should always choose the option with the highest net payoff [and that] to knowingly choose anything worse would be irrational” (pp. 6-7). When scarcity exists, which is often as resources (e.g., time, money, information) are often limited, opportunity costs must be considered as “any use of time or limited resources for one purpose is an opportunity forever gone to use them for another” (Bartlett, 2010, p. 4).

From application submittal through permit receipt, an entitlement timeframe for land use applications encompasses an averaging of the total number of weeks required to move through the planning and zoning regulatory process in each of the 28 counties investigated. This timeframe was tallied by analyzing certification, notice, and appeal periods adopted by each county and, then, tracking the various land use applications on the agendas and minutes of the decision making body.

The land use application entitlement process varies greatly by county. For instance, some counties have very strict certification and staff gatekeeper provisions that control when an application moves to hearing, while other counties do not. There were other procedural distinctions, too. For example, a subdivision of nine lots or less in Shoshone County may be administratively approved, while this same process in Blaine County requires both a preliminary and final plat public hearing before the Planning and Zoning Commission. Other jurisdictional distinctions that can protract the entitlement process for land use applications include: public notice requirements that extend beyond the minimum requirements stipulated by Idaho Code; infrequent public hearings, difficulties with establishing a quorum or limited available agenda time; delays and additional reviews in adopting findings of fact; slow agency reviews; increased project complexity; understaffing; and, frequent appeals.

To accurately determine the total number of weeks required for rezones, subdivisions, variances and conditional use permits decisions to move through the planning and zoning regulatory process in the 28 Idaho counties investigated, the minutes of each jurisdiction were evaluated. Timeframes for each type of land use application were tracked in the county minutes and, if data were unavailable, estimated to arrive at a composite entitlement timeframe incorporating certification, notice, hearing, and appeal periods. Five intervals, as measured in weeks, resulted when the analysis for each of the counties was compiled.

Table 1.7, below, shows the estimated entitlement timeframes that resulted from studying the minutes and processes of the 28 Idaho counties in which pre-1920 PLMs are located. Entitlement timeframes in Blaine County were estimated as taking the longest at 24 weeks or more. The second longest entitlement timeframes were noted in the counties of Bannock, Bonneville, Boundary and Lemhi at 19 to 24 weeks. Nine counties had entitlement timeframes of less than six weeks (< 6 weeks), including Shoshone County with its generous subdivision rules.

Table 1.7 Estimated Entitlement Timeframes for Select Idaho Counties

Weeks to Entitle in Idaho by County (Aggregate Certification, Notice, Hearing and Appeal Periods)				
≤ 6 Weeks	6-11 Weeks	12-18 Weeks	19-23 Weeks	≥ 24 Weeks
Adams, Bear Lake, Camas, Custer, Idaho, Latah, Shoshone, Valley, Washington	Ada, Bonner, Caribou, Cassia, Clark, Clearwater, Elmore, Gem, Kootenai	Boise, Butte, Franklin, Owyhee, Power	Bannock, Bonneville, Boundary, Lemhi	Blaine

Table 1.8, below, characterizes the estimated entitlement timeframes for select Idaho counties (e.g., the total number of weeks required for rezones, subdivisions, variances and conditional use permits to move through the planning and zoning regulatory process) on a relative scale, from facilitative to obstructive. For purposes of this study, a jurisdiction in which the processes for a lot split, conditional use permit to build a home, or other land use application takes less than 12 weeks is considered “more facilitative,” while a similar application in another jurisdiction that takes more than 18 weeks is considered “more obstructive.”

Table 1.8 Facilitative, Neutral and Obstructive Land Use Application Entitlement Timeframe Model

Facilitative	More Facilitative	Neutral	More Obstructive	Obstructive
≤ 6 Weeks	6-11 Weeks	12-18 Weeks	19-23 Weeks	≥ 24 Weeks

Characterizing jurisdictional entitlement timeframe practices in each of the 28 counties is informative as it allows measurable, objective, quantitative analysis. The result is that the entitlement timeframe variable can be used to both objectively and quantitatively distinguish regulatory differences between 28 counties along a simple to understand spectrum that ranges from facilitative to obstructive.

From an economic perspective, the existence of favorable real estate values and land use regulations incentivizes PLM investment. With rational choice, the redevelopment of a PLM increasingly makes sense as inhibitive economic factors disappear. PLM owners respond to incentives. In particular, *jurisdictional factors such as land values and entitlement requirements critically impact PLM decision-making*.

Research Propositions

The preceding literature, theory, and methods led to the development of three sets of research propositions addressing the effects of jurisdictional, surface estate, and mineral estate factors on tax year 2015 use of pre-1920 PLMs. Each proposition builds on the twin pillars of rational self-interest and methodological individualism (Frederickson, 2003) and the strategic behaviors of PLM owners. As structured, each proposition generates logically deduced, empirically testable statements. In this instance, the policy space of pre-1920 patented lode mine use is analyzed and empirically tested in order to better understand the research question of the study, which asks: *what* factors affect patented lode mine use?

The research propositions of this dissertation, by independent variable, are presented below.

Surface Estate

Proposition 1: As the distance to an all-season road increases, the odds of Residential PLMs[33] in tax year 2015 decrease.

Proposition 2: As the distance to a seasonal road increases, the odds of Residential PLMs in tax year 2015 decrease.

Proposition 3: As the distance to a municipality increases, the odds of Residential PLMs in tax year 2015 decrease.

Proposition 4: As the distance to an amenity feature[34] increases, the odds of Residential PLMs in tax year 2015 decrease.

Jurisdictional

Proposition 5: As months to entitle increase, the odds of Residential PLMs in tax year 2015 increase.

Proposition 6: As the median property tax in a county increases, the odds of Residential PLMs in tax year 2015 increase.

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[33] Patented lode mines used for residential purposes will be classified as 9, 10, 31; 9, 12, 34; 9, 46; 9, 47; 9, 48; or 9, 49 consistent with the Idaho Tax Commission categories for mineral and improved residential purposes.

[34] Amenity features, as defined for purposes of this research, are natural amenities, including lakes, rivers, streams, and lands mostly if not entirely surrounded by federal lands in areas such as national forests.

Mineral Estate

Proposition 7: As the economic significance of the composite commodity index score increases, the number of Residential PLMs in tax year 2015 decreases. [35]

Control

Proposition 8: As the county population density per square mile $(mi)^2$ increases, the odds of Residential PLMs in tax year 2015 increase.

Conclusion

The eight Residential PLM research propositions are specific to the dependent variable of residential land use. The other prominent land uses of active mining, neglect, and reclamation are not individually tested using logit regression. Rather, because the rules of logit require a binary (yes/no) dependent variable, a grouping of all the non-residential PLM land uses was required, including the non-prominent land uses of agriculture/grazing/forestry, commercial/industrial, and government. Observations of PLM neglect, reclamation, and active mining instead are analyzed separately through descriptive statistics as presented in the third section of this chapter.

The goal with the research design used in this dissertation is to reveal how rational choice and community values have affected PLM use. A quantitative approach is used that provides both an effective and pragmatic approach for analyzing the factors affecting PLM use. The research propositions and logit rules provide a quantitatively

[35] Consistent with the rules of logit regression, because of the ordinal level of measurement for the composite commodity index score the mineral estate proposition is not expressed as odds.

significant tool to analyze Residential PLMs, while descriptive statistics provide a meaningful opportunity to analyze Active Mining, Reclaimed, and Neglected PLM land uses, as well as Residential PLMs.

CHAPTER SIX: RESULTS

This chapter presents factual evidence and results for the eight tested research propositions to enlighten the research question of this dissertation: *what* factors affect pre-1920 PLM use in Idaho in 2015? The chapter begins with an overview of the pre-1920 PLM dataset and how PLM lands were used throughout the State of Idaho in 2015. Next, logistic regression results are reported to address the key jurisdictional, mineral and surface estate factors affecting Residential PLMs. Finally, empirical data and descriptive statistics are presented to evaluate jurisdictional, mineral estate, and surface estate factors affecting each of the four prominent PLM land uses studied in this research: active mining, residential, reclamation, and neglect.

PLM Dataset and Land Use Overview

In 1920 there were 1,908 PLMs in Idaho. As a result of PLM ownership consolidation and, in a few instances, government re-acquisition of previously patented lode mine properties, the 2015 dataset of pre-1920 PLMs decreased to 1,679 assessor records located in 28 of Idaho's 44 counties. These 1,679 assessment records are on county tax rolls and each year assessment officials throughout Idaho assign land use category codes to real property, including patented lode mines. The assigned codes, as previously detailed in Appendix E, range from 1 to 81 and identify property use for the tax assessment year. Table 1.9, below, summarizes the main secondary category code groupings or land uses for the PLM dataset in tax year 2015. For each land use, the

Table 1.9 Uses of Pre-1920 Patented Lode Mines in Idaho in 2015 [36]

Land Use Category [a]	Number of Assessor Records (% of Total)	Assessed Valuation [b] (% of Total)	Acres (% of Total)
Prominent Land Use Categories			
Active Mining [c]	5 (0.3%)	$311,958 (0.9%)	1,238 (2.0%)
Residential [d]	399 (23.7%)	$31,920,940 (92.7%)	4,505 (7.3%)
Reclaimed	10 (0.6%)	$16,843 (.01%)	801 (1.3%)
Neglected (Mineral Only)	1,002 (59.7%)	$409,454 (1.2%)	43,398 (70.4%)
Other Land Use Categories			
Agricultural, Grazing, Forestry	175 (10.4%)	$1,061,655 (3.1%)	6,722 (10.9%)
Commercial, Industrial	33 (2.0%)	$725,972 (2.1%)	1,747 (2.9%)
Government	55 (3.3%)	$0 (0%)	3,223 (5.2%)
TOTAL [e]	1,679 (100%)	$34,446,822 (100%)	61,634 (100%)
[a] In instances where multiple codes exist for a PLM, the code with the highest valuation was used to determine PLM land use category placement.			
[b] Where applicable, values include land and real property improvements.			
[c] Active mine data were derived from the IGS (2016). Valuation figures are for land and improvements, according to respective Assessor's department records. According to the Idaho Tax Commission, none of the five active mines listed reported having net profits (category 66) for Tax Year 2015 (G. Houde, personal communication, February 13, 2017). Affected active mining acreages were derived from Shoshone, Custer and Ada County parcel data. Acres are estimated to include only a subset of Hecla's and US Silver and Gold's land holdings of PLMs since this measure is specific to active mining operations.			

[36] The figures in Table 1.9 derive from a combination of Idaho Department of Lands (2016), Idaho Geological Survey (2016) and county assessment records.

[d] The 399 Residential PLMs on pre-1920 PLMs include instances where multiple residences and/or backcountry cabins resulted from PLM subdivision. Specifically, 147 of the original 1,908 pre-1920 PLMs are characterized as residential and 33 of the 147 residential PLMs have been subdivided creating 252 additional residential lots.
[e] The original BLM accession records indicate 1,908 lode mines were patented in Idaho prior to 1920, encompassing 64,189 acres. In 2015 the methodology of this research accounted for 61,634 acres of the originally patented land (or 96.0%).

number of acres and properties, as well as assessed valuations are provided. Percent totals are also shown.

Active mining, residential, reclaimed, and neglected PLMs are the prominent land uses studied in this dissertation. Of the 1,679 assessor records, 5 are actively mined, 399 are residential, 10 are reclaimed, and 1,002 are neglected. Aggregated, these four use categories total 1,416 of the 1,679 PLM records in 2015 or 84% of the observations. In this research, PLMs are considered as neglected when valued only for minerals and not for surface estate features of the land.[37] Reclaimed PLMs are identified by the IDL (2016) and assessed, thereafter, by local county assessment departments consistent with Idaho Code §63-2801. Other PLM land uses shown in the table include government (exempt); commercial, industrial; and agricultural, grazing, timber.

Table 1.9 shows that 59.7% of PLMs in 2015 were designated as Neglected (Mineral Only) and 0.6% were designated as Reclaimed in the county assessment records throughout Idaho. The Neglected (Mineral Only) and Reclaimed land use categories in 2015 had assessed valuations of $409,454 and $16,843, respectively. In 2015 Neglected PLMs encompassed 43,398 acres (70.4%). Reclaimed PLMs totaled 801 acres and

[37] This definition is in accordance with Rules 130 and 510 of Idaho Administrative Procedures Act, which identifies primary and secondary land uses, as well as Idaho Code §63-2801. Neglected PLMs are mineral patent properties where none of the “surface ground, or … part thereof” is used for anything other than mining purposes.

affected 10 properties. The data show that the highest assessed valuation, totaling $31,920,940 (92.7%), was for the residentially valued land use category, despite a land base of 7.3% of the total PLM acreage.

Table 1.9 also shows the results for three other land use categories that correspond to 5.2% of PLM valuations and 15.7% of the PLM assessment records in tax year 2015. These secondary category codes include: agricultural, forestry and grazing uses affecting 175 properties (10.4%) and 6,722 acres; commercial and industrial uses affecting 33 properties (2.0%) and 1,747 acres; and a total of 55 PLMs that reverted to government ownership, removing 3,233 acres from county assessment rolls. Although agricultural/forestry/grazing, commercial/industrial, and government are relevant land uses affecting PLMs, the four forces impacting the integrity of historic mining landscapes, as previously referenced in the National Park Service's *National Register Bulletin on Historic Mining Properties,* are active mining, gentrification/residential, neglect, and reclamation (Noble and Spude, 1997). These four factors correspond with the four prominent PLM land uses analyzed in this research.

Logit Regression Results

This section presents logit regression results for the eight tested Residential PLM research propositions. These results help to address the main thesis of this dissertation by analyzing the key jurisdictional, surface and mineral estate factors that determine how PLMs are used. Evaluated, using the statistics of logit regression, are factors postulated to either increase or decrease the likelihood of gentrification and the residential use of PLMs. The four surface estate factors evaluated using logit regression are PLM distances from seasonal roads, all-season roads, municipalities, and defined amenity feature (e.g., lakes, rivers, and national forest inholdings). The two county-level jurisdictional factors are months to entitle and median property tax factors. Also evaluated are one mineral estate factor, economic significance of the composite commodity index score, and the control factor, county population density per square mile $(mi)^2$.

The eight Residential PLM research propositions are specific to the dependent variable of residential land use. Specifically, the logistic regression model was used to determine the magnitude of effect the following explanatory variable categories had on the residential classification of pre-1920s PLMs in Idaho in tax year 2015: (1) mineral estate, (2) surface estate, (3) jurisdictional, and (4) control variable. The purpose of the analysis was to determine which factors contributed to the residential classification of pre-1920s PLMs in tax year 2015 and investigate the implications of these factors. In the initial selection of variables, the following fell under the four main categories outlined in the research methodology: (1) mineral index score; (2) distance to incorporated city, distance to all-season road, distance to seasonal road, distance to amenity; (3) land use permit entitlement timeframe (months to entitle) and median property tax rate; and (4) county population density per mile squared.

In order to discern which variables should be included in the model and examine for colinearity, a correlation analysis was performed. From the analysis it was noted that the mineral index score could be a problematic variable in the model due to a number of missing entries. By default, logistic regression using Statistical Package for the Social Sciences (SPSS) software does a “list wise deletion” of missing data values for any variable in the model, which results in the entire case being excluded from the analysis

(UCLA, 2016). As this would possibly bias the data, as well as drop the sample size down to 294 records, two initial regression models were run.

The first initial regression model tested included the mineral index score independent variable. Two hundred ninety-four records were analyzed and the test results proved insignificant for the mineral estate composite index score, as noted in the following Table 1.10. No correlation was found between the economic commodity

Table 1.10 Mineral Index Score Logistic Regression Model Results

Symmetric Measures					
		Value	Asymp. Std. Error [a]	Approx T [b]	Approx. Sig.
Interval by Interval	Pearson's R	-.040	.044	-.688	.492 [c]
Ordinal by Ordinal	Spearman Correlation	-.016	.056	-.268	.789 [c]
N of Valid Cases		294			
a. Not assuming the null hypothesis					
b. Using the asymptotic standard error assuming the null hypothesis					
c. Based on normal approximation					

index score and Residential PLMs in Idaho in 2015. For the tested mineral index score proposition, the results show a significance value of 0.789, which is larger than the established confidence interval threshold of .05 or 95%. Based on the findings made with the first regression model tested on the 294 records that included the mineral index score independent variable, a second regression analysis was conducted without the mineral index score variable.[38]

The second and primary regression model tested for which results are next presented excluded the mineral index score independent variable. Table 1.11, below, shows the logit regression results for the remaining seven Residential PLM research propositions tested using the operationalized variable data collected on all of Idaho's pre-1920 PLMs in 2015. Based on the PLM land use overview data in Table 1.9, the hope with the logistic results is that the research propositions will prove significant in explaining the 399 Residential PLMs in Idaho in 2015, including the 33 instances where 147 residential PLMs were subdivided creating an additional 252 Residential PLMs for a total of 399 in 2015.[39] Table 1.11, below, shows the logit regression model summary and variables in the equation.

[38] Results for the mineral index score proposition reflect testing of the model with 294 records. Additional model output and analysis of the mineral index data is provided in Appendix H.

[39] Details of the 33 instances of residential subdivision of PLMs in the various counties throughout Idaho are provided in Appendix I.

Table 1.11 Logistic Regression Model Summary and Equation Variables for Tested Research

MOD EL SUMMARY	- 2 Log Likelihood 1 788.153	Cox & Snell R Square .112		Nagelkerke R Square .183					
VAR IABLES IN EQUATION	B	.E.	W ald	f	ig.	E xp(B)	9 5% C.I. for EXP(B L ower	9 5% C.I. for EXP(B) H igher
D istance to Incorporate d City (≤ 5 mi, y=1, n=0)	- .023	160	. 021		885	. 977	. 714	1 .337
D istance to All-Season Road (≤ 5 mi, y=1, n=0)	- .966	161	3 5.872		000	. 380	. 277	. 522
D istance to Seasonal Road (≤ 0.25 mi, y=1, n=0)	- .747	193	1 4.966		000	. 474	. 325	. 692
D istance to Amenity (≤ 5 mi, y=1, n=0)	- .290	122	5 .613		018	. 748	. 589	. 951
M onths to Entitle (1 to 5, Easy to Hard)	- .152	071	4 .542		033	. 859	. 747	. 988
M edian Property Tax Rate	- .880	141	3 9.169		000	. 415	. 315	. 546
C ounty Population Density Per Sq. Mile	. 006	002	1 0.024		002	1 .006	1 .002	1 .009
C onstant	1 .233	284	1 8.852		000	3 .432		

Based upon the two model R Square summaries (Pseudo R Squares) presented in Table 1.11, the fit of the model is weak-moderate, with approximately 11.2%-18.3% of PLMs classified as residential being explained by the model. Specifically, six of the independent variables are statistically significant, including three-of-the-four surface estate independent variables (distance to an amenity, distance to an all season road, distance to a seasonal road), both geographical jurisdictional variables of land use permit entitlement timeframes (months to entitle) and median property tax rate, as well as the control variable of county population density per square mile $(mi)^2$. Not significant were the mineral index score variable and the surface estate distance to an incorporated city variable.

As noted in Table 1.11, the distance a PLM is to an incorporated city is not significant with a p-value of 0.885, which is larger than the established confidence interval threshold of .05 or 95%. In the case of the mineral estate economic significance of the composite commodity index score variable, the results of this output are given in detail in Appendix H. As depicted, the index score variable set forth in Proposition 7 has a significance value of 0.789, which is larger than the established confidence interval threshold of .05 or 95%. For both the mineral index score proposition and the surface estate proximity to a municipality proposition, no relationship between Residential PLM use and mineral index score or distance to a municipality was found.

The logistic regression model, as set forth in Table 1.11, shows a weak-moderate relationship between six-of-the-eight independent variables and Residential PLM use. Found, for instance, is as the county jurisdictional factors of months to entitle and median property tax rates increase, the likelihood of Residential PLM use decrease by 14.1% and

58.5%, respectively. The logit model results identified a negative relationship between months to entitle and Residential PLMs, as well as between median property tax rates and Residential PLMs. In contrast, a positive relationship exists between the control variable population density per square mile $(mi)^2$ and Residential PLMs, as well as for the three statistically significant surface estate variables, including the distance a Residential PLM is from an all-season road, seasonal road, and defined amenity feature.

In descending order of importance, the empirics for the six statistically significant research propositions set forth in Table 1.11 indicate that proximity to an all-season road (62%) and median property tax rate (58.5%) produce the highest factor in the residential classification of PLMs, followed by seasonal road (52.6%), amenity features (25.2%), entitlement timeframe (14.1%), and county population density (0.6%). Consistent with the rules for regression, each of the regression coefficients is interpreted as its effect on the dependent variable (Residential PLMs), while the effects of all of the other independent variables included in the model are controlled (Berman and Wang, 2012).

The odds factors for each of the logit regression coefficients are outlined, by research proposition, in greater detail below.

<u>Surface Estate</u>

Proposition 1: As the distance to an all-season road increases, the odds of Residential PLMs in tax year 2015 decrease. At a confidence level of 95%, the results of Proposition 1 show that as the distance to an all-season road increases to greater than five miles (> 5 miles), the odds of Residential PLMs in tax year 2015 decreases by 62%. And, conversely, as the distance to an all-season road decrease to less than or equal to five miles (≤ 5 miles), the probability of a Residential PLM increases by 62%. In general

terms, instances of Residential PLM land use increase significantly when all-season roads are nearby at less than or equal to five miles (≤ 5 miles).

Proposition 2: As the distance to a seasonal road increases, the odds of Residential PLMs in tax year 2015 decrease. At a confidence level of 95%, the results of Proposition 2 show that as the distance to a seasonal road increases to greater than one-quarter mile (> 0.25 mile), the odds of a Residential PLM use in tax year 2015 decreases by 52.6%. In other words, Residential PLMs are 52.6% less likely as the distance from a seasonal road extends beyond one-quarter mile. As the distance to a seasonal road decreases to less than or equal to one-quarter mile (≤ 0.25 mile), the likelihood of a Residential PLM increases by 52.6%. Again, in general terms, instances of Residential PLM land use increase significantly when seasonal roads are nearby at less than or equal to one-quarter mile (≤ 0.25 mile).

Proposition 3: As the distance to a municipality increases, the odds of Residential PLMs in tax year 2015 decrease. With a value of 0.885, which is larger than the established confidence interval threshold of .05 or 95%, the results of Proposition 3 are statistically *insignificant*. The odds of Residential PLMs decreasing in tax year 2015 as the distance to a municipality increases to greater than five miles (> 5 miles) is not supported by the data. No statistically significant findings are made for this proposition. No relationship exists between how far a Residential PLM is in terms of distance from a municipality.

Proposition 4: As the distance to an amenity feature increases, the odds of Residential PLMs in tax year 2015 decrease. At a confidence level of 95%, the results of Proposition 4 show that as the distance to a natural amenity increases to greater than five miles (> 5 miles), the odds of a PLM being categorized as residential decreases by 25.2%. And, conversely, as the distance to an amenity feature decreases to less than or equal to five miles (≤ 5 miles), the probability of a Residential PLM increases by 25.2%. As the distance to an amenity feature decreases to less than or equal to five miles (≤ 5 miles), the likelihood of a Residential PLM increases by 25.2%. Again, in general terms, instances of Residential PLM land use increase significantly when amenity features are nearby at less than or equal to five miles (≤ 5 miles).

Jurisdictional

Proposition 5: As months to entitle increase, the odds of Residential PLMs in tax year 2015 increase. At a confidence level of 95%, the results of Proposition 5 indicate for every six-week increase in land use permit entitlement timeframes, the odds of a PLM being categorized as residential is lower by 14.1%. In other words, for each of the five unit changes of less than six weeks (< 6 weeks), six to eleven weeks (6-11 weeks), twelve to eighteen weeks (12-18 weeks), nineteen to twenty-three weeks (19-23 weeks), and twenty-four weeks or greater (≥ 24 weeks), as the county entitlement timeframe increases, the probability of Residential PLMs decreases by 14.1%. A one-unit increase in the independent variable (entitlement timeframe), theoretically results in a 14.1% decrease in Residential PLMs, Thus, for every additional six-week county land use entitlement timeframe increase, the odds of PLM being residential decrease by 14.1%.

Proposition 6: As the median property tax in a county increases, the odds of Residential PLMs in tax year 2015 increase. At a confidence level of 95%, the results of Proposition 6 show that as the median property tax rate increases, the odds of a PLM being categorized as residential decreases by 58.5%. Simply stated, measurable differences exist in Residential PLM classifications between each of the four quartiles of median property tax rates depicted for the 28 counties analyzed in Idaho for this dissertation. As a proxy for real estate values, this measure indicates that for every unit increase in median property tax rate (from 1.0 to 4.0), the probability of Residential PLMs decrease by 58.5%. The odds of a Residential PLM use decrease by 58.5% for each unit increase in median property tax rate.

<u>Mineral Estate</u>

Proposition 7: As the economic significance of the composite commodity index score increases, the number of Residential PLMs in tax year 2015 decreases. The results of Proposition 7 proved statistically insignificant. As set forth previously in Table 1.10, the results showed a significance value of 0.789 for Proposition 7, which is larger than the established confidence interval threshold of .05 or 95%. Consequently, the results of Proposition 7 are statistically insignificant and no statistically significant findings regarding the relationship of Residential PLMs and mineral index scores were found.

<u>Control</u>

Proposition 8: As the county population density per square mile $(mi)^2$ *increases, the odds of Residential PLMs in tax year 2015 increase.* At a confidence level of 95%, the results of Proposition 8 indicate as the county population density increases, the odds of a PLM being categorized as residential is greater by 0.6 %.

Based on the empirics and logit test results, the 399 observed instances of Residential PLM use as previously depicted in Table 1.9 are significantly impacted by at least six of the study variables. In descending order of importance, the logit results for the propositions indicate that proximity to an all-season road (62%) and median property tax rates (58.5%) produce the highest factor in the residential classification of PLMs, followed by seasonal road distances (52.6%), distances to amenity features (25.2%), county entitlement timeframes (14.1%) and lastly county population density (0.6%). Due to the odds of the predictor variables, it appears that the proximity to roadway infrastructure is important to Residential PLMs. Furthermore, Residential PLMs seem to occur more frequently in lower (1^{st} or 2^{nd} quartile) median property tax rate jurisdictions or, based on the proxy, in areas with lower real estate values. See Appendix J for a printout of the statistical results of the Logit Regression Outputs.[40]

Descriptive Statistics Results

In this section, the three sets of jurisdictional, mineral estate, and surface estate factors affecting the four prominent PLM uses identified in this research are evaluated using descriptive statistics. Specifically, this section analyzes how each of the four prominent PLM land uses of active mining, residential, reclamation, and neglect is individually impacted by jurisdictional, mineral estate, and surface estate factors throughout Idaho in 2015. This effort fits with the recommendations of scholars, such as BenDor *et.al.* (2011), whom aptly observed, the quantification of site-specific factors improves public and private evaluations of redevelopment projects.

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[40] The weak-moderate fit of the model suggests that at least one additional factor is contributing to the classification of Residential PLMs. In order to account for this additional factor, the logit regression model was coded into the data and re-run using a new "subdivided mine" variable *not* included in the methodology set forth in Chapter 5. As such, this write-up and analysis are presented as a separate Appendix L and *not* included in the discussion of results that follows in Chapter 7.

When redeveloping Brownfields or derelict properties, such as PLMs, communities and landowners alike analyze site-specific factors. In this regard, the jurisdictional characteristics of the county within which the PLM is located, including entitlement timeframes and median property tax rates, are evaluated for each of the four prominent land uses. Also analyzed for each of the four prominent land uses is the mineral estate of a PLM, including composite commodity index scores as a possible indicator of economic significance and land use. Finally, surface estate factors, including PLM distances from seasonal or all-season roads, municipalities, and amenity features, are analyzed for each of the four prominent land uses.

Land Use #1: Active Mining PLMs

Five active mining operations existed in Idaho in 2015 on pre-1920 PLMs. The use and values of these Active Mining PLMs are reflected in the records of the IGS (2016) and Ada, Custer, and Shoshone County assessment records. In particular, the empirical data show that active mining occurred on five PLMs (0.3%) and affected approximately 1,238 acres (1.9%). None of the five Active Mining PLMs had net profits in 2015 and assessed valuations totaled $311,958 (0.9%). Indicatively, these active mining land use category measures showed that statewide uses of pre-1920 PLMs in Idaho in 2015 were 2% or less: 2.0% as a measure of acres affected, 0.9% in valuation, and 0.3% in affected properties.

As set forth in the literature and methodologically in the research design of this dissertation, Active Mining PLMs are affected by jurisdictional, mineral estate, and surface estate factors. In particular, data specific to three-of-the-six independent variables appear to impact Active Mining PLM land uses. These three factors are the jurisdictional months to entitle, mineral estate economic significance of the composite commodity index score, and surface estate distance to an all-season road measure.

Jurisdictional Factors

The empirical evidence for the five Active Mining PLMs shows there are two silver mines and one gold mine clustered in the Silver Valley area of Shoshone County with the remaining two gold mines located in Ada and Custer Counties. As previously shown in Table 1.7, the estimated entitlement timeframes for Ada County are between six and eleven weeks (6-11 weeks) and less than six weeks (< 6 weeks) in Custer and Shoshone Counties. And, although these entitlement timeframes are not specific to active mining land use permitting, the fact that all the Active Mining PLMs are in jurisdictions inclined toward economic liberalism as indicated by the 11 weeks or less (≤ 11 weeks) entitlement timeframe is an association, although not necessarily a correlation, impacting PLM owner and investor decision-making. Thus, it may be relevant that each of the Active Mining PLMs is located in one of the more facilitative county entitlement timeframe jurisdictions at 11 weeks or less (≤ 11 weeks).

Mineral Estate Factors

Besides jurisdictional entitlement measures, the data suggest that the characteristics of the mineral estate are also relevant to Active Mining PLMs. The results are not definitive, however. Table 1.12, below, was developed to better understand the distribution of mineral index scores for Active Mining PLMs. Table 1.12 shows the distribution of mineral index scores for the three Active Mining PLMs for which mineral data from the USGS mineral resource data system were available. No Mineral Index Score was available for either of the active mines in Ada or Custer Counties.

Table 1.12 Distribution of Mineral Index Scores and Land Uses on Pre-1920 PLMs in Idaho in 2015

Mineral Index Score	Primary Com-modity	Deposit Inform-ation	Number of pre-1920 PLMs	Residen tial Use	Active Mining[a] (PLM Name)	Neglec t-ed	Re-claimed	Other Land Use
Data for Mineral Index Score Categories 0.91 – 4.55 not shown								
5.46	Silver	Primary / World Class / Large	18		1 (Lucky Friday)	25	10	
6.6	Gold	Primary / Small	77	7		45	1	17
8.8	Gold	Second ary / Large	11	3	1 (Galena)	7		
11	Gold	Primary / Large	8			8		
13.2	Gold	Primary / World Class Large	5		5 (Golden Chest)			

As operationalized, the composite commodity index score shows a wide distribution of mineral index scores, ranging from a low score of 0.91 for tertiary, small, silver deposits to a high score of 13.2 for world class, large, gold deposits. As shown in Table 1.12, no mineral index scores for any of the Active Mining PLMs occurred for medium or small gold and/or silver deposits with an index score between 0.91 through 4.55. Rather, only world class or large sized deposits, as reflected in the USGS (2016) data and shown in Table 1.12, were identified by the IGS (2016) as Active Mining PLMs.

For the two active gold mines on pre-1920 PLMs in 2015 for which mineral resource data were available, a mineral index score of 8.8 or higher was given. This included one record associated with the Galena Mine and five records associated with the Golden Chest Mine. Unfortunately, no records for the other two gold mines on pre-1920 PLMs in 2015 were available. In the matter of world class, large, primarily silver and/or gold commodity mineral deposits, the highest possible mineral index score for silver is achieved at 5.46. The world class active Lucky Friday Mine in Shoshone County is in this category.

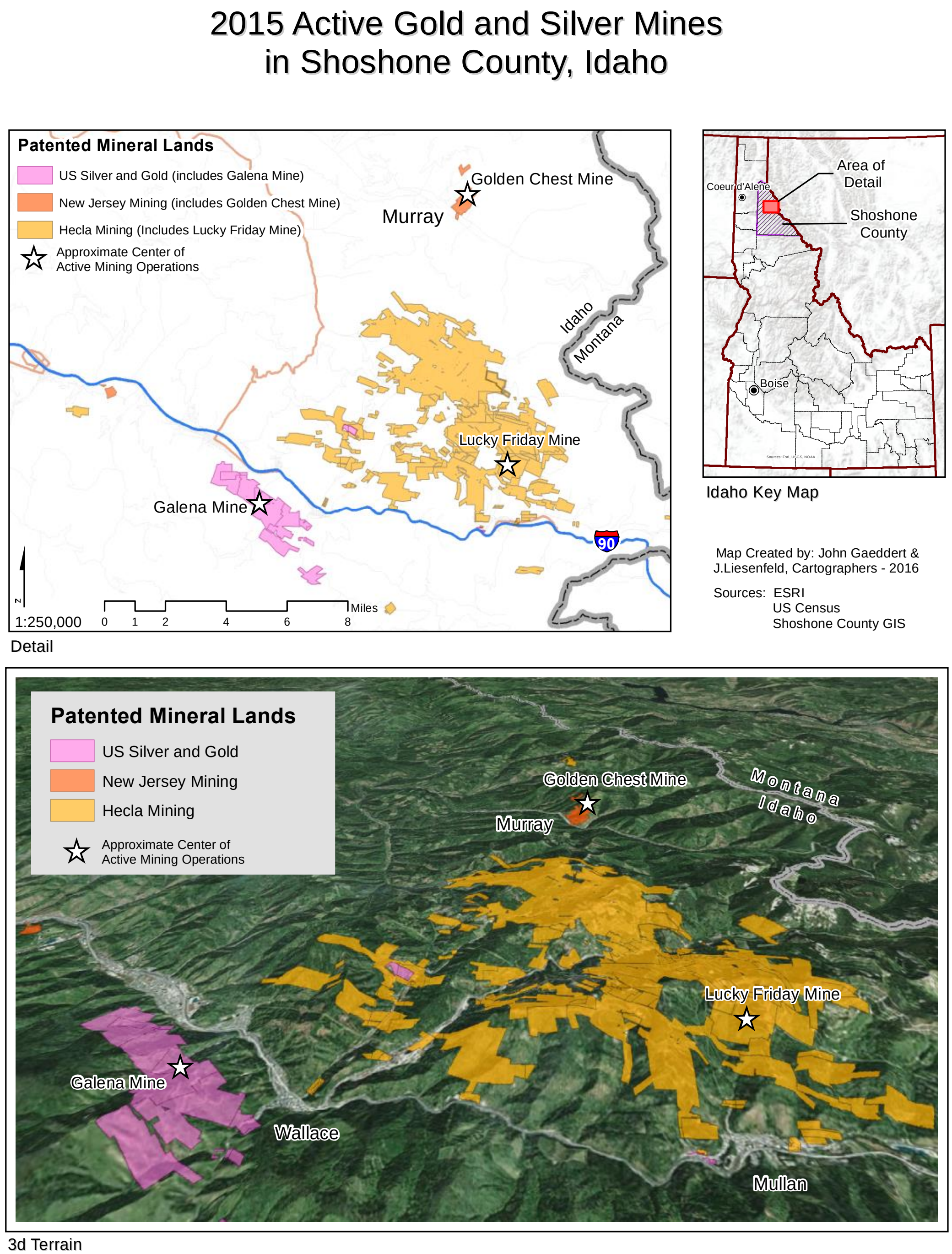
Based on a limited sample size, each of the three Active Mining PLMs for which USGS (2016) data are available have mineral index scores in the upper half of the index at 5.46 or greater. This finding generally supports the notion that Active Mining PLMs will not occur if valuable minerals in sufficient quantities are not present. This fits with the perspective of rational economic decision-making in that the mineral estate characteristic of a PLM matter. However, the small sample size of the data limits such a generalized conclusion. Further complicating the results are the number of PLM assessment records with equally high commodity index scores that are not Active Mining PLMs.[41]

Surface Estate Factors

In addition to jurisdictional entitlement and mineral estate economic significance of the composite commodity index score measures, the data suggest that surface estate characteristics are relevant to Active Mining PLMs. Explicitly, each of the five Active Mining PLMs are within five miles (< 5 miles) from an all-season road. This is clearly

[41] See Appendix H for a full distribution of mineral index score data, including findings by land use for the 294 available mineral resource records analyzed from the USGS mineral resource data system.

shown on the following map, which depicts the three Active Mining PLMs in Shoshone County, including the Lucky Friday, Galena, and Golden Chest.



Map 5. 2015 Active Gold and Silver Mines in Shoshone County

Map 5 illustrates the patented mineral land holdings of Idaho's three largest gold and silver mines in Shoshone County. These mines sit atop century-old PLMs and give credence to an observation by Francaviglia (1991) that it is often time, rather than space, that can separate various mining operations. As depicted, Hecla Mining operates the Lucky Friday Mine just north of Mullan, Idaho on what used to be the Gold Hunter. New Jersey Mining operates the Golden Chest Mine near Murray. And, US Silver and Gold operates the Galena Mine west of Wallace. All three of these Active Mining PLMs in Shoshone County are within five miles (< 5 miles) from an all-season road and also within 10 miles of each other with the Golden Chest Mine the furthest from Interstate 90. Although not shown, both Active Mining PLMs in Ada and Custer Counties are also within five miles (< 5 miles) of an all-season road with the Active Mining PLM in Ada County located within 10 miles of Interstate 84. No interstate exists in Custer County.

The data suggests three factors affect Active Mining PLMs in Idaho in 2015. These include surface estate all-season road availability, county jurisdictional months to entitle findings, and the economic significance of the composite commodity index score of the mineral estate. Specifically, each of the Active Mining PLMs are: within five miles (< 5 miles) from an all-season road; in one of the more facilitative county entitlement timeframe jurisdictions at 11 weeks or less (≤ 11 weeks); and, where data exists, have mineral estates and commodity index scores near the top of the index at 5.46 or greater.

The number of Active Mining PLMs in Idaho is logically impacted by proximity to all-season roads, the characteristics of the mineral estate, and a community land use ethos, as measured by the facilitative nature of a county's entitlement timeframe. Whether the relationship of each of these factors is causal for Active Mining PLM land uses is far from certain, as other non-mining land uses also occur on PLMs that are close to all season-roads, have high composite commodity index scores, and are in county jurisdictions that are more facilitative.

Land Use #2: Residential PLMs

Three hundred and ninety-nine (399) Residential PLMs existed in Idaho in 2015. The use and values of these Residential PLMs are reflected in the records of county assessment offices throughout Idaho. As previously noted in Table 1.9, these 399 Residential PLMs encompass a land area of 4,505 acres (7.3%) and have a total assessment valuation of $31,920,940 (92.7%). Table 1.13, below, re-characterizes the Residential PLM data by featuring the four counties with the foremost number of Residential PLMs in Idaho in 2015. Combined, the residential valuations of Blaine, Bonner, Idaho and Shoshone counties total just over $29 million ($29,151,942) or 91.3% of the nearly $32 million ($31,920,940) in residential improvements on pre-1920 PLMs statewide.

Jurisdictional Factors

Table 1.13 depicts, by county, the number and value of residentially classified PLMs. The table presents the county land and improvement assessment data in real and median average terms. Included in Table 1.13 is the median property tax quartile for the county, as well as the median value of residential land and improvements on pre-1920 PLMs in 2015.

Table 1.13 Median Property Tax Rate and Residential PLMs in Idaho in 2015

County	Number of Residential Use Assessment Records	Number of Homes	Assessed Residential Land Only (Median Lot Value)	Assessed Residential Improvements Only Valuation (Median Improvement Value)	Combined Land and Improvement Assessed Valuation (Median)	Median Property Tax Quartile (Table 1.6 Value)
Blaine	14	12	$3,436,328 (108,571)	$5,694,958 ($211,523)	$9,131,286 ($320,094)	4th (4.0)
Bonner	17	5	$1,887,319 ($99,900)	$381,633 ($73,873)	$2,268,952 ($173,673)	3rd (2.19)
Shoshone	130	124	$2,420,348 ($14,830)	$7,404,093 ($47,000)	$9,824,441 ($61,830)	3rd (2.11)
Idaho	179	62	$4,697,902 ($20,920)	$3,225,811 ($38,010)	$8,922,713 ($58,930)	1st (1.41)

Table 1.13 lists the quartile ranking of the four counties in Idaho where the vast majority of pre-1920 PLMs were valued for residential purposes in 2015. The list showed that Idaho County was in the first quartile of median property taxes in Idaho and had the greatest number of residential use assessment records on PLMs at 179. Land values on these 179 properties totaled $4,697,902 and had a median average of $20,920 in 2015. Improvements on approximately one-third of the PLMs (62-of-the-179 residential use

assessment records) had a median average of $38,010 and a combined land and improvement median value of $58,930.

The median value of land and improvements on PLMs in Idaho County was below the estimated value of Shoshone County, which was in the 3rd quartile of median property tax by county in Idaho in 2015. As shown in Table 1.13, lot values in Shoshone County were the lowest of the four counties with an assessed median lot value of $14,830. In Shoshone County the median home value on a PLM in 2015 was $47,000 and the combined lot and home median was $61,830. In 2015 in Shoshone County 124-of-the-130 residentially classified PLMs had residences.

Unlike Shoshone County, not all of the four counties shown in Table 1.13 had residences on the majority of the assessment records with residential land classification. For instance, in Bonner County and Idaho County approximately one-third of the residentially assessed PLMs in 2015 had residences.[42] Five-of-the-17 residentially valued Bonner County pre-1920 PLMs had residences, while 12 lots did not have residences. In Idaho County 62-of-the-179 residentially classified pre-1920 PLM lots had residences, leaving 117 lots without residences.

The estimated median value for residential land and improvements for the four counties listed in Table 1.13 follow the expected median property tax quartile ranking of

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[42] Idaho County used three combinations of residential lot and residential improvements categorizations in tax year 2015. These notations were: 10 and 31, 12 and 34, and, 18 and 40. Of these the "other rural land" (category 18) and "improvements to category 18" (category 40) were distinctive from any other jurisdiction. A residential land use determination, based in part on valuations comparable to other residential lands and improvements, was made from the noted assessor descriptions provided.

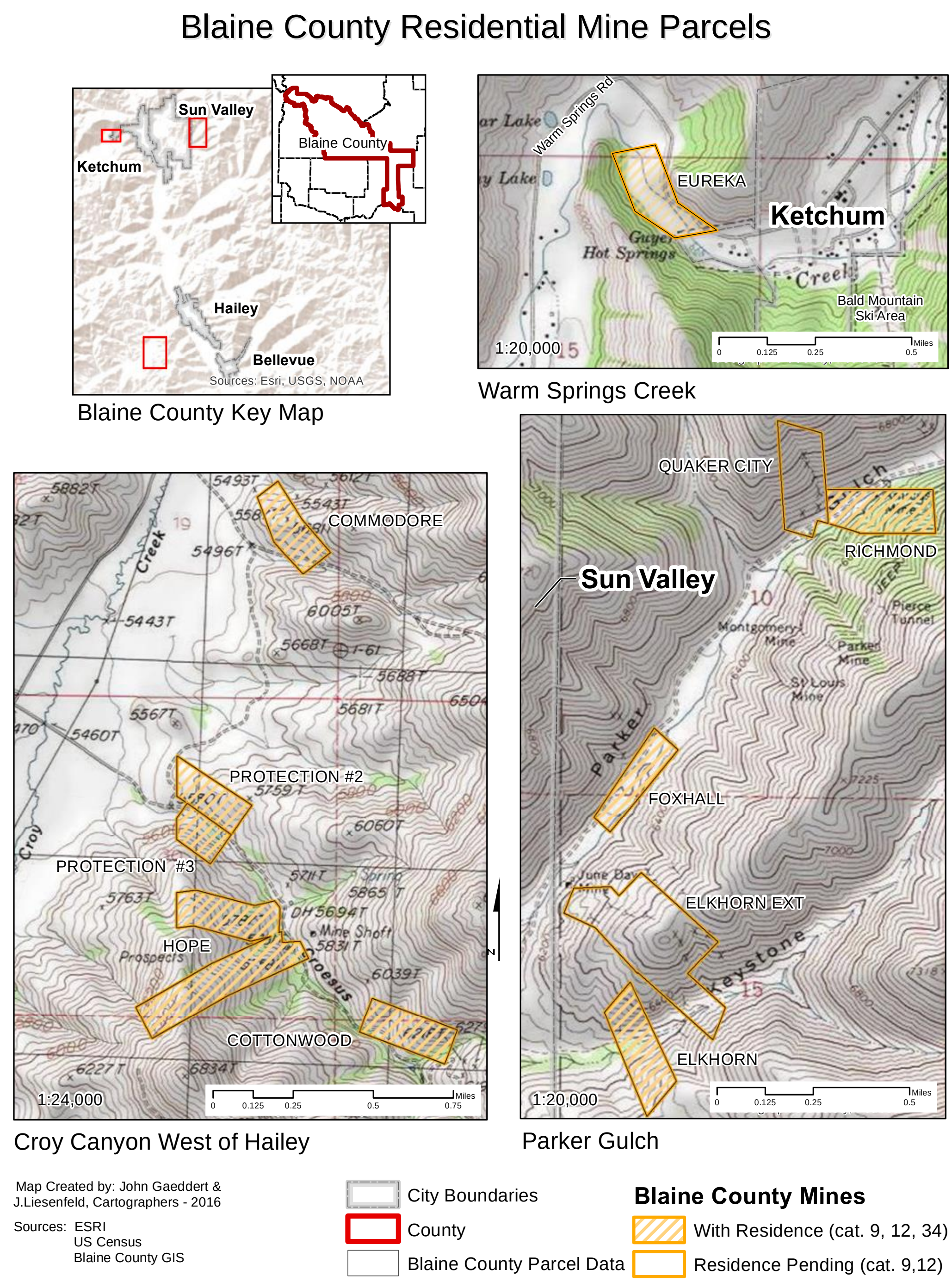
real estate values for Blaine, Bonner, Idaho, and Shoshone counties. The relative real estate values by quartile step upward from Idaho County (1^{st} quartile) to Shoshone County and Bonner County (3^{rd} quartile) to Blaine County (4^{th} quartile). The corresponding median valuations increased as well, from $58,930 in Idaho County to $61,830 in Shoshone County to $173,673 in Bonner County to $320,094 in Blaine County.

The relative real estate values, as evidenced by the data in Table 1.13, confirms that measurable differences exist in Residential PLM classifications between each of the four quartiles of median property tax rates. As a proxy for real estate values, an increase in median property tax rates results in a decrease in Residential PLM use. The data shows that median property tax rate increases, from first (1^{st}) quartile counties like Idaho County to third (3^{rd}) and fourth (4^{th}) quartile counties like Bonner and Blaine Counties, result in decreases in Residential PLMs. Instances of Residential PLMs decrease as median property tax rates increase.

Surface Estate Factors

Residential PLMs are affected by surface estate factors, including distance to all season roads, seasonal roads, and amenities. However, Residential PLMs are not affected by the surface estate variable of distance to a municipality. To help communicate these findings, Map 6 was developed. In particular, Map 6 illustrates that Residential PLMs can in some cases be less than or equal to five miles (≤ 5 miles) to an incorporated city and, at other times, be greater than five miles (> 5 miles) away. However, each of the observed Residential PLMs in Blaine County, as shown on Map 6, is close to an all-season road.

A key map exists in the upper left corner of Map 6 with reference to three insets. The key map shows three areas of Residential PLMs: one adjacent and less than or equal to five miles ($\leq$ 5 miles) from the City of Sun Valley, one adjacent and less than or equal to five miles ($\leq$ 5 miles) from the City of Ketchum, and one greater than five miles ($>$ 5 miles) west of the City of Hailey. The insets feature Residential PLMs in three side canyons at various distances from the cities of Ketchum, Hailey, and Sun Valley.



Map 6. Blaine County Residential Mine Parcels

The first of the insets shows the Eureka Mine in the Warm Springs Creek drainage due west of Ketchum. Noted details from Map 6 about the Eureka Mine include:

the Residential PLM is less than or equal to five miles (≤ 5 miles) from amenity features, Ketchum city limits, and an all-season road.

The second inset features the Cottonwood, Commodore, Hope, Protection #2, and Protection #3 Mines in Croy Canyon, which is located greater than five miles (> 5 miles) west of the City of Hailey. Noted details about each mine include: all five PLMs are classified as residential and feature residences, each mine is less than or equal to five miles (≤ 5 miles) from an all-season road, and each mine is located greater than five miles (> 5 miles) from the City of Hailey.

The third inset features five residentially classified pre-1920 PLMs in the Parker Gulch area less than or equal to five miles (≤ 5 miles) to the east of the Sun Valley City Limits. The Elkhorn, Foxhall and Richmond PLMs each have residences, while the Quaker City and Elkhorn Extension have residences pending. All five PLMs are less than or equal to five miles (≤ 5 miles) from the City of Sun Valley, are easily access by paved all-season roads, and include flat terrain below an elevation of 6,400 feet or less in both Keystone and Parker Gulches for the existing or possible future residences.

The above Blaine County example underscores the importance of all-season road access to Residential PLM use. It also shows how Residential PLMs are sometimes in close proximity to incorporated cities and other times not. To help confirm the logit regression proposition finding that no relationship exists between Residential PLMs and incorporated areas, Table 1.14, below, was developed.

Table 1.14 lists, by county, the mine name and patent year of all the Residential PLMs in Idaho in 2015 that were greater than five miles (> 5 miles) from an incorporated city.[43] The results include 72 improved Residential PLMs of which 31 discrete (non-subdivided) pre-1920 PLMs were observed in 2015.[44] Also presented in Table 1.14 are the approximate distances of each improved Residential PLM to the surface estate factors of distance to an amenity and distance to the nearest municipality. An asterisk (*) is provided next to each of the improved Residential PLM with a mineral index score.

Table 1.14 Residential PLMs on Pre-1920 Patented Lode Mines in Idaho in 2015

County	Mine Name (Patent Year)	Nearest City (Distance to Nearest City)	Assessed Residential Improvement Value	Amenity Type (Name)
Ada	Delhi (1903)	Boise (8 Miles)	$189,500	Inholding (Boise NF)
Adams	River Queen (1899)	New Meadows (23 Miles)	$9,377	Inholding (Payette NF, Snake River)
Blaine	Pilgrim * (1890)	Ketchum (24 Miles)	$6,545	Inholding (Alturas Lake)
Blaine	Sunbeam (1890)	Ketchum (24 Miles)	$16,708	Inholding (Alturas Lake)
Boise	Confederate (1907)	Horseshoe Bend (8 Miles)	$25,118	Inholding (Boise NF)

[43] Another filter applied to the data presented in Table 1.14 was that the improved Residential PLM value be less than $250,000 so as to exclude the Residential PLMs west of Hailey that were previously analyzed with Map 6.

[44] The remaining 41 Residential PLMs with improvements were not discrete for pre-1920 PLM analysis, but represent a 2nd, 3rd … *n*-1 cabin on a remotely located, subdivided patented lode mine, including the Delhi, Mayflower, Circle R, Black Sam, and Key West Mines as set forth in greater detail in Appendix I.

County	Mine Name (Patent Year)	Nearest City (Distance to Nearest City)	Assessed Residential Improvement Value	Amenity Type (Name)
Boise	Golden Fleece * (1902)	Idaho City (7 Miles)	$16,703	Inholding (Boise NF)
Boise	Mayflower (1902)	Horseshoe Bend (9 Miles)	$6,601	Inholding (Boise NF)
Boise	Sunset (1910)	Placerville (8 Miles)	$53,400	Inholding (Boise NF)
Bonner	Circle R (1905)	Clark Fork (9 Miles)	$101,100	Inholding (Kaniksu NF, L Pend Oreille)
Bonner	Bay City (1912)	Sandpoint (7 Miles)	$29,900	Inholding (Kaniksu NF, Lake Pend Oreille)
Camas	Sarah (1902)	Fairfield (18 Miles)	$30,600	Inholding (Sawtooth NF)
Elmore	Burnt Pilot (1898)	Mountain Home (48 Miles)	$18,270	Inholding (Sawtooth NF)
Idaho	Asmeralda (1901)	Riggins (14 Miles)	$54,400	Inholding (Nez Perce NF)
Idaho	Black Sam (1915)	Grangeville (32 Miles)	$124,123	Inholding (Nez Perce NF)
Idaho	Buffalo Ext (1904)	Grangeville (30 Miles)	$147,706	Inholding (Nez Perce NF, Hunter Lake)

County	Mine Name (Patent Year)	Nearest City (Distance to Nearest City)	Assessed Residential Improvement Value	Amenity Type (Name)
Idaho	Buffalo Horn (1904)	Riggins (35 Miles)	$73,302	Inholding (Nez Perce NF)
Idaho	Colonel (1908)	Riggins (37 Miles)	$139,874	Inholding (Nez Perce NF)
Idaho	Concorde * (1901)	Riggins (34 Miles)	$13,255	Inholding (Nez Perce NF)
Idaho	Hattie B (1902)	Riggins (33 Miles)	$39,825	Inholding (Nez Perce NF)
Idaho	Key West (1912)	Grangeville (35 Miles)	$204,500	Inholding (Nez Perce NF)
Idaho	Marmack (1902)	Riggins (27 Miles)	$48,466	Inholding (Nez Perce NF)
Idaho	Mystery (1902)	Riggins (17 Miles)	$76,974	Inholding (Nez Perce NF)
Idaho	Ninety Nine (1905)	Riggins (37 Miles)	$10,930	Inholding (Nez Perce NF)
Idaho	Northern Star * (1906)	Riggins (47 Miles)	$100,243	Inholding (Nez Perce NF)
Idaho	Orofino * (1903)	Riggins (35 Miles)	$48,466	Inholding (Nez Perce NF)

County	Mine Name (Patent Year)	Nearest City (Distance to Nearest City)	Assessed Residential Improvement Value	Amenity Type (Name)
Idaho	Poorman (1909)	Grangeville (37 Miles)	$33,221	Inholding (Nez Perce NF)
Idaho	Queen of the West (1899)	Riggins (22 Miles)	$18,511	Inholding (Nez Perce NF)
Idaho	St. Louis (1901)	Riggins (35 Miles)	$35,785	Inholding (Nez Perce NF)
Latah	Gold Bug * (1909)	Potlach (8 Miles)	$18,842	Northern Boundary (Saint Joe NF)
Lemhi	Black Eagle * (1912)	Salmon (29 Miles)	$8,634	Inholding (Salmon-Challis NF)
Lemhi	South America (1896)	Salmon (33 Miles)	$20,492	Inholding (Salmon-Challis NF)

* A mineral index score is available for each of these seven improved Residential PLMs.

Table 1.14 confirms the lack of a relationship between Residential PLMs and distance to a municipality. Noted, for instance, is that the closest city to the Black Eagle Residential PLM is Salmon, Idaho at a distance of 29 miles. Approximate distances for each of these Residential PLMs to the nearest municipal service area range from seven miles for the Golden Fleece and Bay City Residential PLMs to 48 miles for the Burnt Residential PLM in Elmore County.

The observed results in Table 1.14 confirm the significance of amenity features to Residential PLMs. As shown, all but one of the 31 Residential PLMs was an in-holding surrounded by forest service land and, in six cases, were located near significant water features in the state, including Lake Pend Oreille, Alturas Lake, and the Snake River. The empirical data supports a finding that amenity features less than or equal to five miles (≤ 5 miles) increases Residential PLM land uses.

Mineral Estate Factors

Table 1.14 also shows which improved Residential PLMs had an associated USGS mineral resource data system record and assignable mineral index score. As previously noted in the logit results and noted in Appendix H, analysis of the 294 mineral index score records found no relationship between mineral index scores and Residential PLM use. Two hundred and seventy-one of the 294 records of PLM use were for non-Residential PLMs, while 23 Residential PLM records were found. The findings were insignificant. Yet, a second analysis of a subset of the 23 Residential PLM records indicates that, quite possibly, Residential PLMs may be affected by mineral estate factors.

In an inverse manner from Active Mining PLMs, the supposition is that Residential PLM uses increase as the economic significance of the composite commodity index score decrease. From the perspective of rational economic decision-making, a significant residential investment on a PLM with a valuable mineral estate is contrarian, except for security or workforce purposes. Fortunately, economic information from the USGS on seven of the PLMs where Residential PLMs with improvements occurred are available for analysis, including the Black Eagle Mine in Lemhi County, the Golden

Fleece Mine in Boise County, the Gold Bug Mine in Latah County, the Pilgrim Mine in Blaine County, and the Concorde, Northern Star, and Orofino Mines in Idaho County.

Table 1.15, below, in ascending order of significance, depicts the mineral index score of the seven PLMs for which mineral index scores from the USGS database were attainable on improved Residential PLMs. Featured in Table 1.15 are the mine name, mineral index score, primary commodity, nature of the workings, tunnel length, and tunnel depth information, as available.

Table 1.15 Mineral Index Score for Seven Residential PLMs in 2015[45]

Mine Name	County	Mineral Index Score	Primary Commodity	Mine Working	Overall Length in Meters (M)	Overall Depth in Meters (M)
Black Eagle	Lemhi	2.73	Silver	Surface / Underground	106.7M	
Northern Star	Idaho	2.73	Silver	Surface / Underground	167.6M	
Orofino	Idaho	3.64	Silver	Surface / Underground	403.9M	19.8M
Concorde	Idaho	4.4	Gold	Underground	484.6M	24.4M
Gold Bug	Latah	4.4	Gold	Underground	304.8M	91.4M
Pilgrim	Blaine	6.6	Gold	Underground		
Golden Fleece	Boise	6.6	Gold	Underground	1,981M	76.2M

Table 1.15 shows the relative ranking, by mineral index score, for each of the seven mines where MRDS data was available for Residential PLMs. As depicted, both the Black Eagle Mine in Lemhi County and the Northern Star Mine in Idaho County were ranked the lowest for economic viability with silver as the primary commodity and a mineral index score of 2.73. Both mines were less than 170 meters in length and worked

[45] Information in Table 1.13 is derived from the USGS Mineral Resource Data System (2016).

both from the surface and underground. The Orofino Mine also mainly produced silver and was worked from the surface and underground, including a tunnel length of 403.86 meters and an overall depth of 19.81 meters. The Orofino Mine has a mineral index score of 3.64, which is a higher ranking than the Black Eagle and North Star Mines, but a lower ranking than the four gold mines shown in Table 1.15.

Four of the mines depicted in Table 1.15 were assessed with gold as the primary commodity. These mines, based on the commodity price weighting set forth in Chapter 5, received mineral index scores of 4.4 or greater. In the case of the Concorde Mine in Idaho County, it featured underground workings 484.63 meters in length and extended to at an overall depth of 24.38 meters. Again, as reported in the USGS (2016) MRDS, the Gold Bug Mine in Latah County was worked to a depth of 91.4 meters and featured an adit to help drain the mine. The Golden Fleece Mine in Boise County featured the greatest overall length of any of the mines noted in Table 1.15 at 1,981.2 meters in length.

To add context to the mineral index scores developed for the seven Residential PLMs with improvements, Table 1.16, below, was developed. Table 1.16 merges key jurisdictional and surface estate data with the available mineral estate index score for the Black Eagle, Concorde, Gold Bug, Golden Fleece, Northern Star, Orofino, and Pilgrim Mines. Depicted, by mine name and the corresponding low to high mineral index score ranking, Table 1.16 looks at actual Residential PLM improvement values compared to the county median improvement values and the mineral index score.

Table 1.16 Merged Dataset for Seven Pre-1920 PLMs with Residential PLM Improvements

Mine Name (County)	Residential Improvement Assessment Value (Median for County)	Residential Improvement Assessment Value (Actual for Cabin)	Mineral Index Score (Primary Commodity)
Black Eagle (Lemhi County)	$14,563	$8,634	2.73 (Silver)
Northern Star (Idaho County)	$38,010	$100,243	2.73 (Silver)
Orofino (Idaho County)	$38,010	$48,466	3.64 (Silver)
Concorde (Idaho County)	$38,010	$13,255	4.4 (Gold)
Gold Bug (Latah County)	$18,842	$18,842	4.4 (Gold)
Pilgrim (Blaine County)	$211,253	$6,545	6.6 (Gold)
Golden Fleece (Boise County)	$25,118	$16,703	6.6 (Gold)

The mineral index score data for the seven Residential PLMs noted in Table 1.16 share a logical but empirically observed inverse relationship with the Residential PLM improvement valuations. The relationship is two-fold: first, for each of the gold mineral index scores, actual improvement values are less than or equal to the median; and, second, for each of the silver mineral index scores, actual improvement values exceed the median in the majority of cases. The inflection in mineral index scores occurs between 3.64 and silver (on the lower end) and 4.4 and gold (on the upper end).

On the upper end, as set forth in Table 1.16, as the mineral index score increased to 4.4 and 6.6 for the Concorde, Gold Bug, Pilgrim, and Golden Fleece PLMs, actual improvement values were equal or less than the county median. This delta was the greatest with the Pilgrim Mine, which had $6,545 in actual residential improvements compared to a median county residential improvement value of $211,253. Actual improvements at the Concorde Mine were also well below the county median with $13,255 in actual residential improvements versus the county median of $38,010.

On the lower end, as set forth in Table 1.16, as the mineral index score decreased to 3.64 and 2.73, actual Residential PLM improvements increased versus the county median. This holds for two-of-the-three cases, including the Orofino Mine, which had actual residential assessments equal to $48,466 compared to the median of $38,010. The actual improvement assessment for the Northern Star Mine at $100,243 was also higher than the county median at $38,010. The actual residential improvements at the Black Eagle Mine in Lemhi County, however, were $8,634 compared to the county median value of $14,563.

Based on a limited sample size, it appears that actual improvement values on a Residential PLM will be less than or equal to the median improvement value of other residential improvements in a given county if a valuable mineral is present. This was evident in each of the four instances where gold mineral index score values of 4.4 or greater were present; and, in two of three instances where silver mineral index values of 2.73 or greater were present. Thus, the mineral estate characteristics of a PLM arguably affect the value of Residential PLM improvements made in a given county. However, the small sample size of the data limits a generalized conclusion and the relationship of mineral index scores to Residential PLMs remains largely indistinct.

Land Use #3: Reclaimed PLMs

The Idaho Department of Lands (IDL) coordinates the State of Idaho's abandoned mine land (AML) program, including reclamations on PLMs. As reported by the IDL (2016), nearly 50 AML reclamation projects have been completed in Idaho since program inception in the 1990s, including projects on 10 different pre-1920 PLMs as depicted in Table 1.9. Specifically, the 10 pre-1920 PLMs that have had reclamation activities performed in conjunction with the IDL include: four mines in Blaine County (Chili Fraction, Triumph, Luire, and Silver King); two mines each in Custer County (Beardsley and Riverview) and Lemhi County (Ima and the Copper Queen); and, one mine each in Idaho County (Twin Mine) and Shoshone County (Viola). Included in the IDL's list of reclamation projects were activities ranging from the installation of bat gates, to the closing of shafts, and the installation of adit plugs. Other activities included tailings remediation, assessments, and monitoring, inspections, and surveys.

Mineral Estate Factors

The data suggest that only the characteristics of the mineral estate affect Reclaimed PLM land uses. Jurisdictional and the other surface estate measures operationalized were not relevant from a descriptive statistics standpoint. That Reclaimed PLMs are affected by mineral estate characteristics factors is logical, as reclamation activities on a PLM are only necessary if mining previously occurred. This fits with the definition of the IDL's AML program.

The IDL (2016) records show that one-half of its AML projects had USGS mineral resource data system records. Although a small sampling, this is a higher ratio than any other land uses other than Active Mining PLMs. The mineral index scores affiliated with the 10 pre-1920 PLMs included: a score of 0.91 for the Riverview PLM in Custer County, a mineral index score of 3.64 for the Ima Group in Lemhi County, a score of 4.4 for the Copper Queen in Lemhi County, a score of 5.4 for the 1892 patented Triumph Mine, and a score of 6.6 for 1902 Twin Mine in Idaho County.

USGS mineral resource data records indicate past mining activity. As instances of mineral index scores increase, the number of Reclaimed PLMs also increase on a relative basis to other PLM use. The economic significance of the composite commodity index score does not, however, necessarily result in an increase in the number of Reclaimed PLMs.

Land Use #4: Neglected PLMs

Neglected PLMs, as classified by county assessment offices across Idaho consistent with §63-2801 in 2015, are patented private lands devoid of any surface or mineral estate use. Specifically, in accordance with Idaho Code §63-2801, Neglected PLMs are mineral patent properties where none of the "surface ground, or … part thereof" is used for anything other than mining purposes. Agriculturally classified PLMs are not in this classification. Grazing and forested PLMs are excluded from this classification, as are PLMs re-acquired by government, as well as those lands classified as residential, industrial or commercial. Also excluded from this classification for analysis purposes are the five Active Mining PLMs affecting 1,238 acres and the 10 Reclaimed PLMs affecting 801 acres.

The data suggests that the jurisdictional factors of months to entitle and median property tax rate influenced instances of PLM neglect in 2015. Surface estate factors did not affect Neglected PLM use. The distance to numerous Neglected PLMs in 2015 were located both greater than five miles (> 5 miles) and less than or equal to five miles (≤ 5 miles) from an amenity feature and/or an all-season road. Similarly, instances of Neglected PLMs spanned the array of mineral index score values, as noted in Appendix H. Differing jurisdictional factors, however, affected instances of PLM neglect in Idaho in 2015.

Table 1.17, below, identifies the distribution of the 1,002 Neglected PLMs in Idaho in 2015. Summarized, by county, are: the number of mineral only (secondary category code 9) assessment records, acres, assessed valuations, and valuation for each assessed acre.

Table 1.17 County Statistics on the Mineral Only Use of Pre-1920 Patented Lode Mines in Idaho in 2015

County	Number of Assessment Records	Acres	Assessed Valuation ($)	Amount Assessed an Acre ($/Acre)
Ada	2	23	$115	$5/Acre
Adams	51	1,666	$8,282	$5/Acre
Bannock	2	202	$1,010	$5/Acre
Blaine	137	4,757	$23,785	$5/Acre
Boise	18	825	$4,500	$5/Acre
Bonner	15	602	$2,953	$5/Acre
Bonneville	6	197	$4,934	$25/Acre
Boundary	16	461	$2,304	$5/Acre
Butte	10	415	$10,384	$25/Acre
Camas	46	1,145	$28,617	$25/Acre

County	Number of Assessment Records	Acres	Assessed Valuation ($)	Amount Assessed an Acre ($/Acre)
Caribou	3	57	$284	$5/Acre
Cassia	2	110	$548	$5/Acre
Clark	2	408	$3,240	$25/Acre
Clearwater	3	79	$393	$5/Acre
Custer	86	1,985	$48,612	$25/Acre
Elmore	29	486	$2,434	$5/Acre
Gem	31	1,273	$6,361	$5/Acre
Latah	1	15	$75	$5/Acre
Lemhi	107	5,679	$144,720	$25/Acre
Owyhee	123	2,437	$12,185	$5/Acre
Shoshone	293	19,961	$100,589	$5/Acre
Valley	14	474	$2,374	$5/Acre
Washington	5	151	$755	$5/Acre
TOTAL	1,002	43,398	$409,454	$9/Acre

As shown in Table 1.17, in 2015 there were 23 counties throughout Idaho where category 9 mineral assessment valuations occurred on pre-1920 PLMs.[46] In particular, there were 1,002 cases of mineral only or Neglected PLM assessments where no surface valuations were assigned. These 1,002 assessment records, as shown in Table 1.17, affected 43,398 acres and resulted in a combined $409,454 (or $9/acre) in assessed

[46] The five counties with pre-1920 PLMs that did not have any assessment records classified exclusively with category 9 mineral assessment valuations were Bear Lake, Franklin, Kootenai, and Power Counties, which each had four or fewer early patents, as well as Idaho County, which had 128 PLMs.

valuations on Neglected PLMs in 2015, which inappropriately exceeds the maximum value of five dollars an acre ($5/acre) permissible pursuant to §63-2801. The six counties in 2015 with assessment valuations in excess of established statutory limits at $25/acre were Bonneville, Butte, Camas, Clark, Custer, and Lemhi counties.

Jurisdictional Factors

The data suggests that anomalous Neglected PLM assessment practices occurred in six counties in Idaho and most frequently in counties with the lowest (1st quartile) median property tax rates.[47] In particular, the four 1st quartile counties of Butte, Clark, Custer, and Lemhi counties and the two the 3rd and 4th quartile counties of Custer and Bonneville, respectively, assessed PLMs at $25/acre.

Differing jurisdictional entitlement timeframes factors also had a measurable effect on the 1,002 observed instances of Neglected PLMs in Idaho in 2015. As reflected in the data, Neglected PLMs are in a facilitative or more facilitative county jurisdictions at 11 weeks or less (≤ 11 weeks) in 604 instances; in a neutral entitlement timeframe county at twelve to eighteen weeks (12-18 weeks) in 106 cases; and, in a more obstructive or obstructive county jurisdictions at greater than nineteen weeks (> 19 weeks) 292 times. When these raw data are normalized, by dividing the number of cases by the original population census of 1,908 pre-1920 PLMs for each jurisdictions grouping

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[47] Idaho County, which is also in the 1st quartile of median property tax rates, also had anomalous Neglected PLM data. In particular, none of the 128 original pre-1920 PLMs in Idaho County were assessed as mineral only with a five dollars an acre ($5/acre) valuation. Notably, Idaho County's 128 PLMs consisted of 73 non-prominent PLM uses (government, etcetera) and 54 Residential PLMs with 14 of these PLMs having been subdivided (creating between 2 and 33 lots) for a total assessment record inventory of 179 lots in which 62 had residential improvements.

of months to entitle data, a trend line results. As months to entitle increase, Neglected PLMs increase from 49% in more facilitative county jurisdictions at ≤ 11 weeks, to 56% in neutral entitlement timeframe counties at 12-18 weeks, to 61% in more obstructive jurisdictions at greater than 19 weeks (> 19 weeks).[48]

Summary of Results

In this chapter evidence and empirical results were presented to analyze what factors affected PLM use in Idaho in 2015. The results, leading up to this concluding section, were given in three parts. In part one, a statewide overview of pre-1920 PLM land use in Idaho in 2015 was provided. Data on the four prominent PLM land uses of active mining, residential, reclamation, and neglect as analyzed in this dissertation were provided. Also summarized were other tax year 2015 land use categories, including for purposes of this research the non-prominent land uses of agriculture/grazing/forestry, commercial/industrial, and re-acquired government PLMs. Summary data included county assessment records by land use for the PLM dataset. Within each land use, the number of acres and properties, as well as assessed valuations were provided. Percent totals were also shown.

In part two, results of the quantitative research propositions, using logistic regression, were presented for Residential PLMs. Reported, at a 95 % confidence interval, was a weak to moderate best fit of tested variables to the regression model. The

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[48] In an attempt to understand the trend line of higher Neglected PLMs associated with more obstructive counties, analysis *not* included in the methodology set forth in Chapter 5 was conducted on a Neglected PLM that remains neglected as a result of a failed residential subdivision attempt on a grouping of PLMs in Blaine County. This write-up and analysis is presented for reference purposes in Appendix K.

model identified two statistically significant negative relationships. One relationship was between months to entitle and Residential PLMs and, the second statistically significant relationship was between median property tax rates and Residential PLMs. In contrast, a statistically significant positive relationship was found between Residential PLMs and the control variable, as well as between Residential PLMs and the three surface estate variables of distance to an all-season road, a seasonal road, and an identified amenity feature. Generally, as postulated, instances of Residential PLM use were found to increase significantly when the distance to (1) an all-season road is less than or equal to five miles (≤ 5 miles), (2) an amenity features is less than or equal to five miles (≤ 5 miles), and (3) a seasonal road is less than or equal to five miles (≤ 5 miles). A full analysis of the logistic regression summary test statistics was provided.

In part three, descriptive statistics were utilized to analyze the effect of jurisdictional, surface estate, and mineral estate factors on each of the four prominent PLM land uses. With the exception of Neglected PLMs, the findings noted below are based on a limited number of samples and limited empirical data. Notwithstanding, notable findings, by land use, include:

- Neglected PLMs: As months to entitle increase, Neglected PLMs increase from 49% in more facilitative county jurisdictions at ≤ 11 weeks, to 56% in neutral entitlement timeframe counties at 12-18 weeks, to 61% in more obstructive jurisdictions at > 19 weeks.
- Reclaimed PLMs: A positive relationship exists between instances of mineral index scores and the number of Reclaimed PLMs. Unfortunately, the economic significance of the composite commodity index score results could not be

correlated with an increase in the number of Reclaimed PLMs, in part, because the reclamation of historic mines in most cases in Idaho is voluntary.

- Residential PLMs: As the gold mineral index score increases to 4.4 or greater, the Residential PLM improvements made in a given county decrease to below the county median.
- Active Mining PLMs: common determinants of Active Mining PLMs include high mineral index scores, facilitative entitlement timeframes, and a distance of less than or equal to five miles ($\leq$ 5 miles) to an all-season road.

In summary, the results of Chapter 6 indicate that not less than six of the jurisdictional, mineral estate, and surface estate factors quantitatively analyzed in this dissertation affected one or more of the four prominent PLM land uses. With the logit results, six of the propositions tested proved statistically significant at a 95% confidence level as affecting Residential PLM use. Using descriptive statistics, data were cited indicating that both Active Mining PLMs and Neglected PLMs might be affected by community values, as measured using entitlement timeframes. In a similar manner, inferences that PLM uses were impacted by rational decision-making were made using correlations drawn from the research. For instance, it is economically rational to have both Active Mining PLMs and Residential PLMs closer to all-season roads.

In the following Chapter 7, Discussion of Results, the significance of the study results is examined through the lens of rational choice and community values. In particular, Chapter 7 evaluates the ways in which the study results inform federal, state and local policies vis-a-vis factors affecting PLM use. Analyzed and discussed, for example, is whether PLM disuse or neglect may be the result of the dis-incentive of negligible, if any, tax responsibility caused by Idaho Code §63-2801.

CHAPTER SEVEN: DISCUSSION OF RESULTS

This chapter discusses the significance of the study results. It does so by analyzing the logit regression and descriptive statistical findings for each of the prominent PLM land uses in the context of three public policies, which are nested by degrees, one within the other, in a federalist manner. Discussed and evaluated, using the lens of rational choice and community values, are Idaho's mineral taxation statute (Idaho Code §63-2801) and the resulting county assessment valuation practices that approximately 150 years later continue to be impacted by the lack of a mineral notice provision in the 1872 Mining Act. An additional local public policy analyzed is the impact facilitative, neutral, and obstructive county land use entitlement timeframes have on pre-1920 PLM use in Idaho in 2015.

To organize the results discussion and the ways in which this research informs federal, state and local policies vis-a-vis factors affecting PLM use, this chapter is divided into four sections. The first section analyzes the Active Mining PLM results and, among other factors, describes the possible role community values, as measured using entitlement timeframes, have on this land use. The second section evaluates the statistically significant factors affecting Residential PLMs, as postulated and observed in the results. In particular, section two posits answers to the research question and related policy sub-question, such as, *what consequence does not having a mineral disclosure requirement in the 1872 Mining Act have on 21st century patented lode mine use?*

The third section focuses on Neglected PLMs, including the affect Idaho's mineral taxation policy (Idaho Code §63-2801) had on nearly six-of-every-ten PLMs being inactive or abandoned in 2015 and *irregular* mineral only (category 9) assessment valuation practices in one-of-every-four counties with pre-1920 PLMs. Provided is an interpretation of the empirical evidence using existing theory and knowledge that strongly suggest that Idaho's mineral taxation policy contributes to PLM neglect, freeriding, and anomalous assessment practices primarily in Idaho counties with the lowest median property tax rates. The fourth and final section of this chapter evaluates the limitations of this study and its validity, reliability, and suggestions to improve results.

Analysis of Active Mining PLMs

Both a rational choice and community values framework can be used to describe the presence of active mining in facilitative jurisdictions and the absence of active mining in obstructive ones. As Stone (2012) observed in the *polis* model, the focus is on what the community wants, its objectives and passions. Bannock, Blaine, Bonneville, Boundary, and Lemhi Counties have the least facilitative entitlement timeframes in Idaho, which arguably contributes to the absence of Active Mining PLMs in these jurisdictions. Dissimilarly, policies in the counties of Ada, Custer, and Shoshone are more facilitative and economically liberal, which possibly contributes to the presence of Active Mining PLMs.

Active Mining PLMs are an expected outcome where development policies encourage investment and renewed mining is not expected in communities where policies discourage such investment. Of course, this explanation is not altogether satisfactory; nor statistically significant either; yet, includes empirical data points that require discussion and a framework for the analysis.

As set forth in the Active Mining PLM results, 0.3% of the records and approximately 2% of the acreage of pre-1920 PLMs in Idaho in 2015 were used for active mining. Noted were active gold and silver mines on pre-1920 PLMs in three counties, including three mines in Shoshone County, and one mine each in Custer County and Ada County. Of the five active gold and silver mines in Idaho in 2015, all five of the mines were in jurisdictions where the county land use entitlement timeframes were facilitative. In the case of Ada County, entitlement timeframes were characterized as more facilitative at 6 -12 weeks and, in the case of Custer and Shoshone County as facilitative at ≤ 6 weeks.

In both the rational choice and *polis* narrative, jurisdictional factors like long entitlement and obstructive local policy regimes, where land use permits typically extend beyond 24 weeks and are often characterized by litigation, would be viewed as a critical piece of the puzzle for characterizing the lack of any Active Mining PLMs. The economic dis-incentive of complying with numerous rules, as promulgated by the community, in both the community and rational choice narratives discourage mining. Conversely, counties with facilitative policies and entitlement timeframes, such as Shoshone and Custer counties, might be viewed in both frameworks as key to there being Active Mining PLMs.

The framework of rational choice and the theory of incentives recognize that people respond to situations with strategic behaviors to maximize personal welfare. As Professor Bartlett (2010) highlighted, people respond to incentives. This worldview suggests that, *ceteris paribus*, PLM owners are more likely to actively mine a PLM in a facilitative county, like Custer or Shoshone County, than in a less facilitative county, like Blaine or Bannock County. While these facts were true in 2015, the data also shows that none of the other facilitative jurisdictions in Idaho with pre-1920 PLMs, proximate all-season roads, and high mineral index scores, such as Camas, Idaho and Valley Counties had active mining in 2015.

Beyond the antidotal, the additional data collected with this study challenges the notion that more facilitative counties, like Shoshone County, had active mining while less facilitative counties, like Blaine County, did not have active mining due to either a simple incentive-based rational choice framed analysis or the passions and preferences of the *polis*. A small sampling of lower mineral index scores in Blaine County, ranging from 1.83 to 5.46 for the Triumph Mine, as shown in Appendix H, appear to also support a narrative of less active mining in less facilitative counties. Stated differently, in the matter of active mining, PLM use may be strongly influenced by community requirements, as expressed in the facilitative, neutral, or obstructive nature of local entitlement timeframes, but insufficient statistical evidence exists to support this claim.

The answer as to which factors are dictating the lack of PLM mining activity on pre-1920 PLMs in Idaho in 2015 is unresolved. The reason for little mining activity could be that the pre-1920 PLMs were tunnel lode mines, which today are viewed as far more expensive than large low-concentrate open pit operations, as noted in the previous analysis of the Atlanta Gold PLM redevelopment proposal in Elmore County that Boise City objected to. This may be the reason that the old mines are being put to other uses, neglected, or possibly just being held in reserve until the PLM might become profitable again. One other reason could be that most of the old mines are simply played out with not enough ore left to justify reopening the mine, leading to abandonment and neglect as discussed later in this chapter.

Analysis of Residential PLMs

This section evaluates the statistically significant factors affecting residential PLMs as postulated and as reflected in the residential land use patterns on PLMs observed in the descriptive statistics. In particular, this section uses the collected empirical evidence on residential PLMs throughout Idaho to posit answers to the research question and two related sub-questions, including: *what* consequence does not have a mineral disclosure requirement in the 1872 Mining Act have on 21st century patented lode mine use? And, *what* surface estate or jurisdictional features lead to gentrification of patented lode mines? Advanced are explanations for each of these questions. Also forwarded are explanations for why certain jurisdictional and surface estate factors significantly determined residential PLM use in Idaho in 2015 and how this knowledge informs public policy.

Six factors, including each of the measured jurisdictional and surface estate variables, can be used to help predict residential PLM use. At a 95% confidence interval the regression analyses showed in 2015 in Idaho that residential PLM use *decreased* with every unit increases in median property tax rates (by 58.5%), as well as when the PLM was: greater than five miles (> 5 miles) from an all-season road (by 62%); greater than one-quarter mile (> 0.25 mile) from a season road (by 52.6%); and, greater than five miles (> 5 miles) from an amenity (by 25.2%). Each of the surface estate (roadway and amenity distance) statistical findings was positively correlated with residential PLM use, while median property tax rate was negatively correlated. Importantly, the regression analysis findings were consistent with the Residential PLM with improvements analysis.

As a public policy tool, the regression and descriptive statistics analyses results are demonstrative. For example, county level decisions are regularly made that affect many of the measured research variables affecting PLMs. These relate to median property tax rates, land use entitlement timeframes, roadway improvements, and (to a degree) the distance a PLM is from an incorporated city. For example, a jurisdiction intent on reducing property taxes can refer to the regression results and expect resident PLM use to increase. Such an assumption would be grounded in a tax year 2015 analysis of pre-1920 PLMs in Idaho where residential PLM land use increased by 58.5% for each unit decrease in median property tax rate.

Similarly, the model predicts that a county that wanted to increase residential PLM use could do so, *ceteris paribus,* by making their entitlement timeframes more facilitative. As set forth in the regression model, every six weeks decrease in land use permit entitlement timeframe corresponds with an anticipated increase of 14.1% in Residential PLMs. Or, in a community concerned with the impacts of land subdivision, the regression results set forth in Appendix L predict for every six-week increase in land use entitlement timeframes, subdivided residential PLMs decrease by 49.3%.

In Idaho the residential use of a PLM is greatly influenced by local entitlement timeframes. This is contextually accurate because the Idaho Land Use Planning Act has relegated the majority of land use decisions in unincorporated areas to county government. As the primary regulatory body of private property, county entitlement timeframes matter. The residential use of a pre-1920 PLM is greatly influenced by the facilitative or obstructive characteristics of local government.

Interestingly, the importance of the facilitative or obstructive characteristics of local government to Residential PLMs generally contrasts with Active Mining PLMs because with mining there are layers of federal and state rules that influence active mining on a PLM well-beyond local land use matters. Local conditions matter, but in a less determinate manner with active mining than with residential uses on PLMs. This mirrors the maxim that individual behaviors are strategic. As Ostrom (1990) observed, “Individuals trying to cope with problems in field settings, go back and forth across levels as a key strategy. When doing analysis at any one level, the analyst must keep the variables of a deeper level fixed for the purpose of analysis. Otherwise, the structure of the problem … unravels” (p. 54).

The structure of the problem for discerning the key factors affecting Residential PLM use, are local and contextual. These include local surface estate conditions and jurisdictional matters as borne out in this research. Quantitatively, as empirically observed, are instances where the likelihood of a PLM being categorized as residential *decreases* by 62% and 52.6%, respectively, when a PLM is greater than five miles (> 5 miles) from an all-season road and amenity. Further, the odds of a PLM being categorized as residential is lower by 58.5% and 14.1%, respectively, for each unit increase in median property tax rate and for every six-week increase in land use entitlement timeframes.

The descriptive statistics analysis helps validate the regression findings and give answers to the structure of the problem using practical, readily measurable, study variables. Various combinations of situational variables explain PLM land use and, as a consequence, these factors help explain the strategic behaviors of PLM owners. The results indicate that there are at least five general principles that cause the residential use of pre-1920 PLMs in Idaho in 2015. One, as a PLM gets closer to a seasonal road, all-season road, or an amenity it is more likely to be residential. Two, there are decidedly more residential PLMs farther from incorporated cities than postulated. Three, residential PLMs decrease as entitlement timeframes increase and become more obstructive. Four, instances of residential PLMs do not increase with increases in real estate values. Five, mineral index score data is limited for each of the residential PLMs.

The aforementioned five combinations of situational factors provide context for the generated statistical results. From a policy standpoint, one contextual issue is the limited mineral resource data. Notably, with only three USGS MRDS records for 3-of-the-33 instances of PLM subdivision, which are summarized in Appendix I for the Marshall, Polaris, and Mayflower subdivisions, it is difficult to dispel concerns that the statute was not abused and that lands were not patented for non-mineral purposes.[49]

A second issue from a policy standpoint is whether either set of surface estate or jurisdictional features observed on residential PLMs facilitate a process of community change related to gentrification. As Alexander (2001) noted, "land use planning and development control … can be significant in their effects in enabling and constraining development" (p. 68). The analysis of entitlement timeframe data, for instance, was

[49] For a parallel analysis into the consequence of not having a mineral disclosure requirement in the 1872 Mining Act involving two *post*-1920 patented *placer* mines in Clearwater County, Idaho, see Appendix M.

particularly insightful for understanding how rational choice and community values affect PLM use.

Bannock, Blaine, Bonneville, Boundary, and Lemhi Counties feature a land use ethic and community values, as quantified in this research using entitlement timeframes, tilted much more strongly toward the preservation and conservation of lands than toward principles of economic liberalism. As such, long entitlement timeframes prove useful at describing and, to a degree, encapsulating a given county's community values. In these five counties, long entitlement timeframes capture a community intent on land conservation and preservation. This viewpoint begins to align the research of Foster *et al.* (2003), who found that legacy land use practices are on-going and non-sustainable, with increasingly preservationist land use ethics identified with counties having non-facilitative entitlement timeframes.

Jurisdictional factors and non-facilitative entitlement timeframes limit residential PLM use by protecting property markets and by constraining development, which advantages wealthier people moving to a place. As statistically demonstrated, an increase in median property tax rates decrease Residential PLM use as do increases in land use permit entitlement timeframes. When this occurs, new and wealthier people moving to a place are advantaged and conditions of gentrification increase.

Analysis of Neglected PLMs

This section focuses on PLM neglect and the impact Idaho's mineral taxation policy (Idaho Code §63-2801) had on the inactivity of nearly six-of-every-ten PLMs in 2015 and irregular mineral only (category 9) assessment valuation practices in one-of-every-four counties with pre-1920 PLMs. Provided is an interpretation of the empirical evidence using existing theory and knowledge that strongly suggest that Idaho's mineral taxation policy contributes to PLM neglect, freeriding, and anomalous assessment practices in Idaho counties with the lowest median property tax rates.

Idaho's mineral taxation policy prohibits the valuations of PLMs based on any speculative value of the mineral deposit. A statement of purpose was not included in Idaho's mineral taxation statute when originally adopted in 1903, however, the 1993 Idaho Attorney General Opinion clearly noted that mineral patents are not to be valued based on speculative values but *net output*. The statute's prohibition of speculative valuations and establishment of a five dollars an acre ($5/acre) maximum valuation of mineral lode property when not used for other than mining purposes is a *prima facie* nod to frontier democracy and the encouragement of mining by individual prospectors and miners. Quite possibly, prohibiting speculative valuations by county assessment offices was also an acknowledgment of the many inherent challenges to the profitable extraction of minerals from the ground.

Likely unanticipated in 1903 when Idaho's mineral taxation statute was first enacted was that --over a century later in 2015-- not one of Idaho's 1,908 pre-1920 PLMs would show *net profits* nor that nearly six-of-every-ten PLMs would be inactive. As the framework of rational choice recognizes, people tend to respond to incentives with strategic behaviors. One of the strategic behaviors built into Idaho's mineral taxation statute (Idaho Code §63-2801) is an incentive to do nothing with PLMs, as there is virtually no cost or opportunity lost by inactivity. Properties with an assessed valuation of a maximum five dollars an acre ($5/acre) will, in many cases, only generate a small annual tax obligation that may not even be economical for county assessment offices to collect.

The provisions of Idaho Code §63-2801 that sets forth minimum valuations and the option for assessors to waive PLM tax payments dis-incentivizes the active use of PLMs. Knowing that people respond to incentives and dis-incentives with strategic, self-interested welfare maximizing behaviors, amendments to Idaho's mineral taxation statute deserves attention. For instance, an incentive of land use inactivity with a classification of property (PLMs, in this case), statutorily, is inherent in §63-2801 and opposite other approaches taken by the Idaho legislature.

The Idaho legislature typically encourages active use of property as the basis for tax breaks or to avoid speculative land assessments. For instance, only homeowners *actively* living in their primary residence are eligible for exemptions that lower the taxable value of home improvements. Similarly, Idaho's agricultural taxation policy requires a farm or ranch to be *actively* used via grazing or another defined agricultural purpose as a prerequisite of not being taxed at a speculative market value. For mineral lode patents, on the other hand, as stipulated in Idaho Code §63-2801, *inactivity* is rewarded.

Idaho Code §63-2801 rewards PLM inactivity with five dollars an acre ($5/acre) maximum assessment valuation provided none of the "surface ground, or … part thereof" is used for anything other than mining purposes. The result is that an idle or long inactive PLM from a property assessment standpoint is treated the same as an active mining use. Both pay little, if any, property taxes as allowed by statute. Why actively mine a PLM if buying and holding a mineral patent poses negligible risk and minimal, if any, property taxes compared to the uncertainty, payoff and risk of investing and developing a working mine? The answer is not clear. Yet, it is clear that PLMs are not being actively mined as evidenced by Map 3.

The results of this research strongly suggest that Idaho's taxation policy quite is helping to foster conditions of neglect and abandonment of pre-1920 PLMs. This is supported by the empirical data, which shows that 59.7% of all the pre-1920 PLMs, as measured from 2015 assessment records, were for properties that were neither actively mined nor used for any other purpose than a mineral only category 9 classification. In real terms, there were 43,398 acres (or 70.4%) of pre-1920 PLM land that in 2015 received a favorable tax status for being inactive, idle, abandoned and neglected. xxx

Granting a favorable tax status for an inactive, idle, abandoned or neglected land use is opposite other taxation strategies used in Idaho. The most notable contrasting taxation policy, as noted previously, is Idaho's agricultural use statute that in concept starts out similar to Idaho's mineral taxation policy by limiting an agricultural property from being assessed based on its speculative, non-agricultural value. The caveat, which is where the two statutes deviate greatly, is that in order to not have a farm or ranch given a speculative valuation, the farm or ranch has to actually be actively used for agricultural purposes, such as grazing and farming. This is not the case with Idaho Code §63-2801.

Idaho's mineral taxation provisions do not require active mining in order for a PLM owner to benefit from a statute that in the spirit of the 1872 Mining Act actually discouraged idle or inactive PLM use. As Leshy (1987) highlighted, "The framers of the Mining Law were as serious as the miners themselves about the idea that mining claims should not be held for speculative purposes, and that once a mineral deposit was discovered and the claim located, it should be developed promptly or abandoned." (p. 109).

Responding to a situation where a typical 20.66-acre mine has a maximum assessed value of $103 and, correspondingly, a property tax responsibility of less than one-tenth of this amount in any given tax year depending on the jurisdictional mil levy rate, PLM disuse and abandonment results. In some instances, it is arguable a Neglected PLM is the result of a PLM owner gaming the system, such as if the PLM owner has no intent whatsoever to use a PLM for active mining. In each case of PLM neglect, there are no opportunity costs with doing nothing with the property.

The opportunity cost of a PLM owner neglecting a 20.66 acre PLM is negligible to the owner. There is little if any tax consequence. There is no risk as with a mining enterprise. Consequently, Idaho Code §63-2801 has arguably created a freeriding and gaming of the system scenario where a given class of property owners is deriving the benefits of, for example, a road being built and maintained near the PLM without paying any real tax remuneration to cover the cost of services. In such a scenario, the PLM owner has a common interest in benefits with their non-PLM owner neighbor, but not the cost.

An unintended influence of the increased freeriding by PLM owners resulting from Idaho Code §63-2801 are increased patterns of anomalous assessments in one-quarter of the counties where pre-1920 PLMs exist in Idaho. Factual evidence shows that seven Idaho counties assigned assessed valuations on pre-1920 PLMs in excess of the stipulated five dollars an acre ($5/acre) maximum. Six of these counties applied a "factor of five" to valuations in direct contradiction to the statute and Idaho Attorney General

Opinion No. 93-13. Of note, is that four-of-the six counties (Butte, Clark, Custer and Lehmi) are in counties with the lowest property values in Idaho, which underscores the degree of subsidy and freeriding occurring.

The seventh county where the unintended influence of freeriding by PLM owners resulting from Idaho Code §63-2801 caused an anomalous pattern of increased assessments occurred in Idaho County. In Idaho County, which is also in the first (1^{st}) and lowest quartile of median property tax rates, none of its original 126 pre-1920 PLMs was assessed in 2015 at five dollars an acre ($5/acre) or as mineral only (category 9). This is in contrast with Idaho's statewide average, where 59.7% of the pre-1920 PLMs in 2015 were assessed as mineral only. While not definitive, it appears with the proliferation of improved Residential PLMs (see Table 1.13) that even PLMs without residential improvements were assessed an average land valuation of $20,920 versus the much lower category 9 valuations.

The assessment practices conducted in Idaho County, as well as Bonneville, Butte, Camas, Clark, Custer, and Lemhi counties, introduces the perspective on how working rules do not always resemble formal law. As Ostrom (1990) observed, "working rules … may include *de facto* as well as *de jure* rules" (p. 55). In Idaho in 2015, the valuation given to PLMs in one-quarter of the cases followed *de facto* practices not in compliance with actual *de jure* laws.

Each county in Idaho aims to provide fair and consistent assessment valuations. Yet, as the Idaho Association of Counties (2015) aptly observed, while each county aims to provide fair and consistent assessment valuations, there can be differences in available resources and personnel experience in each county that can lead to varying results. This division of talent and resources may explain why six counties *inadvertently* assessed PLMs in non-compliance with the attorney general's opinion and statute. It may also explain why the majority of counties assigned five dollars an acre ($5/acre) valuations to 59.7% of the inventory of pre-1920 PLMs in the jurisdiction in 2015, while Idaho County alone had none of the 126 original PLMs designated as a mineral category 9.

When Idaho Code §63-2801 was last amended in 1987, the assumption was that mines had been divided such that assessment should be optional. By explanation, the statement of purpose provided by the Revenue and Taxation Committee (1987) in the proposed amendment to Idaho Code §63-2801 noted, "some mineral rights have been divided to the point that it does not cover county expenses to assess and tax many small tracts" and, furthermore, the "fiscal impact [was] none" (p. 554). Nearly 30 years later, however, the data suggests that PLM ownership consolidation, as noted on Maps 5 and 7 and Table 1.9, has occurred.

Consistent with the Idaho Revenue and Taxation's 1987 finding, it is not surprising that small PLM tracts do not cover county expenses. For instance, the assessed value of a 20.66 acre PLM is $103 and has a taxable value that is a mere fraction of this figure based on the respective mil levy rate of the jurisdiction. In these instances, covering county tax collection expenses is difficult. However, it is surprising that a property purchased for a proposed residential subdivision at a reported $6,000,000, like the 848-acre Triumph, North Star, and Independence grouping of PLMs, would continue to be valued solely for PLM purposes or $4,240 (848 acres x $5/acre = $4,240) simply because of the PLMs historic mining activity.

Inconsistent with the Idaho Revenue and Taxation's 1987 finding, the fiscal impact of Idaho Code §63-2801 is tangible and real. As Idaho Association of Counties (2015) noted, each jurisdiction aims to provide fair and consistent real estate, land, and improvement valuations. Yet, adjusting a proposed residential real estate transaction downward from a reported $6,000,000 valuation to $4,240 for assessment purposes solely on the basis of a historic PLM use is fiscally relevant to jurisdictions. Of similar relevance is that one-quarter of the counties studied had assessment practices that appear inconsistent with Idaho Code §63-2801 and the opinion of the Idaho Attorney General.

Idaho Code §63-2801 has led to assessment inequities in at least seven Idaho counties. Further, factors relevant in 1988 when this statute was last amended have changed, including increased PLM ownership consolidation and findings that the statute has had no fiscal impacts. More accurate information is now available and the previous unintended consequences of the statute, including increased instances of PLM neglect, assessment inequities, freeriding, and few instances of active mining on PLMs dictate a revisiting of PLM mineral taxation. Land legislation in the West is frequently based on inadequate or inaccurate information (Stegner, 1954).

Revision of Idaho Code §63-2801 thirty years after it was last amended is needed to redress inadequacies and unintended consequences of the legislation. Based on the empirical evidence and the construct of "active use" adopted in Idaho's agricultural taxation policy and with homeowner exemptions, a strong case exists to amend Idaho Code §63-2801. As written, Idaho's mineral taxation policy contributes to PLM neglect, freeriding, and anomalous assessment practices in Idaho counties with the lowest median property tax rates.

If the goal is less land speculation, freeriding, gaming of the system, and neglect of PLMs, then possibly higher assessed valuations for *inactive* PLMs as a form of coercion, as Olson (1965) invoked, could be used to achieve this common group interest. Stated differently, incentivizing an inactive land use with preferential tax treatment is, statutorily, opposite other approaches taken by the Idaho legislature. Idaho Code §63-2801 should be revisited with updated data to address issues of neglect, freeriding, and the assessment inequities it causes Idaho counties in the 21st century on PLMs.

Study Limitations

A discussion of the validity and reliability of the research plan, as well as suggestions to improve results, follows.

Validity

This dissertation studied tax year 2015 use of pre-1920 patented lode mines in Idaho. Conceptually, the use of secondary category codes to determine land use of each PLM is a linear, easily managed exercise. The logic set forth in Idaho's mineral taxation laws clearly established that the original price paid to the federal government of five dollars an acre ($5/acre) for a lode patent applied unless a PLM was used for other than mining purposes. Thus, the land use dependent variable, as applied to the pre-1920 PLM in Idaho unit of analysis, has face validity. Researchers can rightfully trust that the assessment offices of each county are measuring the actual use occurring on a PLM in a given tax year. The state codes assigned to a patented lode mine identify what is occurring in the field. Similarly, the secondary category codes measure the current use for which PLMs are being used.

Besides face validity, this study has internal validity and strong directional predictor variables. Understanding PLM land use requires understanding jurisdictional and mineral estate factors. The independent variables appropriately specify the key factors that determine the land use of PLMs. For instance, if a PLM is used for mining purposes, then it is important that the mineral estate be specified in the model. Conversely, if a PLM is not used for mining purposes and is abandoned, information regarding the relative poorness of the mineral estate or jurisdictional factors, such as length of time measured in months to entitle property, are important to understanding why mining is not occurring and the PLM is abandoned.

Internal validity, model specificity and understanding PLM land use also required understanding locational and surface estate factors. This was accommodated in the analysis. For example, when the designated secondary category codes used by the various assessor’s offices showed that a PLM was used for residential purposes, following the work of Syms (1999), McCarthy (2002), and BenDor *et. al.* (2011) the relevant jurisdictional and surface estate factors were quantified. Two locational factors that were quantified included the distance a PLM was to a municipality and to available roads. To address real estate values, a proxy measure of median property tax rate by county was chosen. The logic was that outliers, such as immensely expensive homes where high net worth individuals build second homes, would pull valuations and, thus, median and not mean property taxes were used. In these instances, counties such as Ada, Blaine, and Kootenai, are in the upper quartile, while counties with lower assessed valuations are in the lower quartile.

From an explanatory standpoint and to address matters of internal validity, the three sets of jurisdictional, mineral and surface estate variables were purposely chosen to provide an appropriate mix of units, diversity (economic, social, environment), and suitable proxies to measure what the study sets out to measure. An item given serious attention in the research design was the nature of the study instrumentation (study results being impacted by the instrument used to collect data). Notably, finding objective and accurate mineral assay results for a given PLM, let alone the number of observations (*n*) in this research, proved difficult. This is not surprising since mining companies have always maintained "secrecy about the magnitude of their reserves in the ground … [despite] reliable reserve and resource estimates being increasingly needed for use in making policy decisions" (Leshy, 1987, p. 51).

Consistent with the observations of Leshy (1987), this study was subject to unavoidable probabilistic risk with instrumentation, as knowing the significance of the mineral estate under a PLM was difficult for a variety of reasons, including challenges attaining assay information. This has been controlled for by using information from the USGS, which is widely respected for its professional approach and objectivity. Use of the USGS mineral resource data system provided the best available data. However, to the extent USGS economic indicator data was missing or there were imperfections in data quality (nonsampling error), the potential for bias existed.

Additional steps taken to avoid selection bias included studying mining in different jurisdictions with different regulatory thickness but with comparable deposits. To compare deposits a relative, ordinal mineral estate index was developed. Development of this index aimed to improve validity by both (1) accounting for the significant delta between the real and adjusted values of gold and silver over the past century since patenting and (2) notating the primary, secondary, or tertiary nature of the commodity and its size. Adding the distance of PLMs to roads and municipalities was another objective measure that aimed to help avoid bias. Two additional measures taken to improve study results were the use of median tax rate by county figures, as well as county population density per square mile $(mi)^2$. Controlling for population density helped normalize the data across jurisdictions.

Determining why a patented lode mine from the early-20th or late-19th century was used –and, thus, assessed by taxing authorities—as non-active mining, mineral, rural residential, an operating mine, or a host of other possible combinations of use nearly 100 years after its ore body was originally discovered, located, worked for five years or more, and then patented can potentially be explained by any number of independent factors. These factors as well as possible rival propositions were anticipated by including multiple and diverse independent variables in the research design. Despite all these safeguards in the research design, mining is commonly referred to as a cyclical industry subject to supply and demand and competition on an international stage. Thus, the absence of mineral development on a PLM may be due to conditions unaccounted for in this analysis. To the extent practicable, it is hoped this risk has been minimized by the selection of key variables and appropriate measurable factors and parameters.

To assure strong external validity and to rid the study of as much bias as possible, a significantly large study population of PLMs with controls was used. A possible threat to external validity was an intervening event, such as a property assessment rule change, however no such action occurred. Another threat to validity was how results were interpreted and generalized. To avoid ecological fallacy and drawing conclusions and inferences beyond the studied unit of analysis (pre-1920 PLM use in Idaho in 2015), posited theories and speculation in the analysis and implications of the results were adequately prefaced.

Reliability

This research plan integrated the key scientific safeguards of a suitably large study population and data census. Its reliability is underscored by the publication of results, disclosure of study limits, and presentation of anomalous findings and other research shortcomings.

Suggestions to Improve Results

The decision-making process cited in the literature on brownfield redevelopment proved equally relevant to PLMs in at least three ways. In the brownfield literature, Syms (1999) cited the importance of roads, transportation networks, and location to brownfield developments. In like manner, Residential PLM use increased significantly when PLMs were located near all season roads, seasonal roads, and amenities. Tam and Byer's (2002) research on brownfields showed that uncertainties, like complicating regulatory requirements, decrease investment. Similarly, obstructive entitlement timeframes decreased Residential PLM use and, arguably, increased instances of Neglected PLMs. De Sousa's (2000) research found both brownfield and greenfield residential redevelopments to be equally cost-effective. Although not comparative, the proclivity of Residential PLMs, including 33 instances of subdivided PLMs, suggests residential PLM redevelopment to be equally cost-effective, particularly in more facilitative jurisdictions. Like brownfields, PLM redevelopment can be difficult for investors because it involves more than purely economic factors, including connecting redevelopment to broader community goals.

To improve data quality and ease of analysis, the foremost methodological suggestion would be to assign latitudinal and longitudinal descriptions to each of the units of observation. This would abet data gathering, alignment of databases, and allow for enhancements in each of the geographic jurisdictional measurements. Another suggestion to improve results would be to refine the mineral index scoring methodology as updates from the USGS become available. Finally, a full canvassing of PLM ownership, possibly through a targeted telephone survey, might help account for variables not specified in the model, but affect PLM land use.

CHAPTER EIGHT: CONCLUSIONS

Tensions surround the disappearance of historic mining landscapes in the West and the use of historic patented lode mines in the 21^{st} century. Like the artisanal breweries that disappeared throughout the nation when alcohol prohibition laws were enacted in the early 20^{th} century, small-scale timber mining practices on PLMs have faded from use. Lode mining in the 21^{st} century, when it occurs, uses industrial modern techniques, such as deep mines like Hecla's Lucky Friday or an open pit technique like New Jersey Mining's Golden Chest Mine. In the overall context of an industry that is nationally disenfranchised, where less than 0.3% of the pre-1920 PLMs assessment records in Idaho in 2015 showed active mining, any identified tension between small-scale mining operations and multi-national mining corporations is secondary.

More significant tensions regarding the use of pre-1920 patented lode mines in the 21^{st} century are the changes in public perceptions and policies regarding mining and PLMs over the past 150 years. During the first 50 years of the 1872 Mining Act, industrious miners thrived in the freewheeling milieu that westward expansion offered. During this period in Idaho, for instance, an average of 40 gold and silver lode mines were patented each year. By contrast, a century later in 2015, only five of Idaho's 1,908 former active gold and silver patented lode mines were active and instances of PLM reclamation and, particularly, gentrification and neglect have risen significantly.

Despite increasing instances of neglect and the gentrification of patented lode mines in the Mining States of the West, an enduring zeitgeist of economic liberalism and a minimum role for government persists. This worldview informs policy issues, from Idaho's valuation of mines for taxation provisions to –approximately 150 years later-- the nation's lack of disclosure requirements for mineral patent lands. This worldview advocates human initiative, self-reliance, and a reduced role for the administrative state; yet, is confronted by an increased reliance on imports of strategic minerals, like gold and silver (Morse and Glover, 2000), and decreased instances of active mining as documented in this research in Idaho in 2015. Competing environmental decision-making values exist regarding PLM use. If active mining is the goal, then bringing public attention to the issue is warranted. Again, as observed previously, a policy of doing nothing is a nonpolicy of tacit acquiescence.

The implication of tacit acquiescence for the Idaho legislature upon review of the empirical data related to pre-1920 PLM use in 2015, is two-fold. First, the data suggests that Idaho's valuation of mines for taxation provisions yielded no net profits for the limited number of active gold and silver mines on pre-1920 PLMs in the state and, further, resulted in six-out-of-every-ten PLMs being abandoned or neglected. Second, seven county jurisdictions had anomalous assessment practices from the rest of the state that appeared aimed at achieving a higher assessment valuation for PLMs in order to reduce freeriding and achieve parity with comparable properties. Underscoring the practical and equitable significance of this discovery is that these anomalous assessment practices occurred predominantly in counties with the lowest median property tax rates (1st quartile) and, by proxy, the lowest real estate values in Idaho.

As Idaho and possibly the other Mining States in the West confront increased neglect and freeriding on generous economic liberalism, tax, and extractive industry policies, tacit acquiescence looks more and more like a nonpolicy. Yes, Idaho has a mineral taxation policy. No, Idaho's mineral taxation did not work in tax year 2015 at fostering net profits on active gold and silver mining operations statewide, nor negate freeriding and neglect. Successful institutions, as Ostrom (1990) in her Nobel-prize winning work in economics highlighted, enable "individuals to achieve productive outcomes in situations where temptations to freeride and shirk are ever present" (p. 14). Idaho's mining industry lacks these productive outcomes. As this analysis of 1,908 pre-1920 patented lode mine land use records confirm, institutional success at promoting active mining in Idaho in 2015 on pre-1920 PLMs was limited and negligible if the various industry and government reports about the extensive mineral wealth of the State of Idaho are even partially correct.

Legislative opportunities to recast Idaho's mineral taxation policy such that neglected and abandoned mines cannot benefit from strategies contrary to the central tenants of frontier democracy, early mining districts, and the 1872 Mining Act have been proposed. As Leshy (1987) highlighted, "The framers of the Mining Law were as serious as the miners themselves about the idea that mining claims should not be held for speculative purposes" (p. 109) and, thus, held a common aversion to the monopoly of minerals (p. 170). The Idaho legislature need not look far when approaching the task of modifying Idaho Code §63-2801 as the "active use" provisions enacted in homeowner exemption and agricultural use legislative provisions have helped the state maintain a balance between good stewardship and economic benefit for decades.

Suggestions for Future Research

The choice of theoretical framework for this research was significant. Rational choice and the community *polis* model reflect competing frameworks. Though the *polis* model was not fully tested, it readily could be analyzed in depth to better understand PLM outcomes. A lack of active mining in a county is not, statistically, the result of a conservation land ethic resulting from a community's propensity to slow development as expressed in more obstructive land entitlement timeframes. PLM gentrification is, however, the result of development-oriented entitlement timeframes that encourage the use of PLMs for residential purposes. Speculatively, it is rational for owners to neglect PLMs because the state's mineral taxation provisions provide no incentive to do anything different with the land or its subsurface resources.

Future research on patented lode mines could apply the Institutional Analysis and Development (IAD) theory of Ostrom and her "insistence on respecting and even privileging local institutions" (Bermeo *et al.*, 2010 p. 572). In this regard, the research could look not just at outcomes, but delve much further into local institutional processes. Similarly, this research could be pursued with a totally different weighting between national and local influence, as finding this balance is, as Raymond (2002) found, a persistent public policy and environmental issue.

A different theoretical path could be investigated with this research topic, including an in depth analysis of Idaho's mineral taxation policy and how "individuals who have the resources ... to make the best case to external officers are … likely to gain rules which advantage them the most" (Ostrom, 1990, p. 213). In this manner, a study on local privilege and mining property tax records dating from the 1980s, by county, could have been the focus. Rent-seeking or capture theory and its normative critique of political behavior would have re-framed the analysis, methodology, and yielded a different road map for inquiry.

In the spirit of the evolutionary aspects of collective action, as noted by Ostrom, this research could also have benefitted from a deeper look at the role of "distributional" coalitions. As Olson (1965) contended, distributional coalitions slow down a society's ability to reallocate resource during times of change. This line of inquiry could be ripe for empirical investigation given the lack of active mining in Idaho, as evidenced by Map 3, and observations regarding the hard rock mining industries "penchant for … accumulating vast reserves and holding them idle for decades" (Leshy, 1987, p. 156).

As Olson (1965) in the *Logic of Collective Action* noted, public policy researchers want to apply theories that are generalizable and work. Researchers want theories that go beyond specialized instances and cases. Desired are theories that work when rational individuals are committed to a course of action. One course of action that is available and before public policy researchers, like no other time in history, is the opportunity to use big data and cutting edge technology for empirical purposes in implementation theory.

Improved merging of data sets from the novel research approached applied in this dissertation is another suggestion for future research. Ideally, expanded USGS mineral data could be added with pinpoint latitudinal and longitudinal GIS mapping that integrates state and federal AML data. The unit of analysis could stay the same or expanded vertically by years or horizontally by expanding to other Western Mining States. Future research could also address placer mines with their distinctive locational features and mining past, as well as claims patented after the Mineral Leasing Act of

1920 was enacted. Yet another option ripe for inquiry is a comparative case study of PLM gentrification.

Finally, a number of disparate but topically significant PLM use related questions with a public policy dimension have arisen during the process of conducting this research that suggest future research opportunities, including:

- What is the future of timber mining? Like the resurgence in artisanal breweries, is there a future for small-scale timber mines?
- Aside from the issue of ore body depletion, is it possible to practice sustainable mining, where negative externalities are avoided? What would it look like? And, what training programs or apprenticeship opportunities exist?
- In what ways does the United States increased reliance on imports of strategic minerals export pollution?
- Can artisanal mining be done safely and incubate companies that complement even the most gentrified local economies, where mining is locally controlled versus sent overseas?
- What global contextual factors (foreign mineral dependence, trade imbalance, jobs, climate) might lead to a re-weighting or new rational calculus of the rules, regulations, and public policies governing mining in the West?
- Are the mineral taxation statutes of the other Western Mining States similar to Idaho? And, from an innovation and diffusion theoretical perspective, how did each get adopted?

Mining has global dimensions. Topical is American self-reliance, global relationships, and the efficiency and importance of the administrative state. A dozen agencies can readily touch proposals for active mining as health, air, water, safety and numerous factors affecting the health of a population are impacted by active mining operations. As observed in the late-20th century, but relevant to future 21st century research, is the ongoing disequilibrium of mining landscapes. As Francaviglia (1991) observed, “The creators of mining landscapes have provided us settings that are difficult to view with neutrality, for these landscapes appeal and repel simultaneously.” Mining and the factors that affect pre-1920 PLMs use in Idaho in 2015, as well as the West in the 21st century, feature a repellant beauty that will continue to be a dense topic to analyze, but important to address in public policy in future research.

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APPENDIX A

Select List of Mining Glossary Terms and Mine Names in Idaho

This appendix consists of two parts. The first part features a select glossary of mining terms. Far from exhaustive, the terms presented are mostly an introduction to the colorful language and distinguishing processes of the mining industry in the early-20th century and, for contextual purposes, are organized around the sub-topics: above ground features, business of mining, mine workings, and ore dressing.[50] Each of the listed terms are taken from either the Cornish Mining World Heritage *Mining Glossary* (2016) or Noble and Spude (1997). The second part of this appendix features some of the intriguing and imaginative mine names contemporaneously chosen by the late-19th and early-20th century lode miner in Idaho.

Mining Glossary Terms

Unless otherwise noted, the following definitions are taken from the Cornish Mining World Heritage (2016) *Mining Glossary*.

<u>Above Ground Features</u>

ORE DUMPS - Are a pile of waste material, usually from a mine … [and] contain primary waste (where this could not be disposed of underground) or waste from various stages in the dressing process.

FINGER DUMP - A linear dump of waste material from a mine or quarry; flat-topped to allow material to be barrowed or trammed along it and often equipped with a temporary tramway track.

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[50] Some of the glossary terms fit under multiple headings, such as tailings that are both an above ground feature and a byproduct of the ore dressing process. For simplicity, however, such terms will not be repeated but placed under the heading most central to this research.

HEAD FRAME - Are the tall construction set over a winding shaft [that] carried the sheave wheels over which the winding ropes ran. Head frames usually contained ore bins or ore chutes to allow the broken rock in the skips or kibbles to be tipped into trams at surface.

MAGAZINE – A small strongly built store containing explosives (gunpowder or dynamite). Magazines were often circular, sometimes with additional enclosing walls to contain the blast of an accidental explosion.

OPEN-CAST - An excavation where the mineral lode or lodes are opened to the surface and exploited directly – similar to stone quarrying.

OVERBURDEN - The topsoil and subsoil removed in the process of opening or extending a quarry … or mine.

PORTAL - The entrance to an adit beyond its lobby [that is] often timbered or stone vaulted.

TAILINGS - The gangue and other refuse material resulting from washing, concentrating, or treating ground ore that is discharged from a mill (Noble & Spude, 1997, p. 30).

TRAMWAY – An established system of roads, rails, or cables over which ore is moved from the mine to the mill (Noble and Spude, 1997, p. 30).

<u>Business of Mining</u>

ASSAY HOUSE – The mine laboratory, where samples of ore were analyzed for their mineral content.

CONSOLS - A shortened form of the term ‘consolidated’, used where a number of mines were brought together and worked under a common management.

LODE - A linear area of mineralization underground. Known in other parts of Britain as a vein or seam. Generally vertical or near-vertical, and often extending for considerable distances along its strike.

ORE - A mineral or mixture of minerals [that] could be worked for sale … [and] mined at a profit.

PROSPECTING PIT - A small pit dug in search of minerals.

SETT - The legal boundary within which a mine could extract minerals.

TRIBUTE - A system of payment in which groups of miners bid against each other for contracts to work sections of the mine for a percentage of the value of the ore raised from that area.

TUTWORK - A system of payment where groups of miners contracted to work on a "payment by results" system at previously-agreed rates, usually for shaft sinking or driving levels.

Mine Workings

ADIT - A horizontal passage driven from the surface for working or unwatering a mine (Noble & Spude, 1997, p. 29).

BRATTICING - Timber partition work in a mine, for instance the lagging boards [that] lined the upper section of a shaft where it ran through soft ground.

CAPSTAN - A manually or steam-operated winding drum, usually installed on a mine to raise pit work from the shaft for maintenance or repair.

COFFIN - The narrow excavation resulting from stoping on a lode being carried to or from surface on part or all of a lode.

DRIVE or HEADING - A tunnel excavated on the line of a lode as the first stage of the development of a stope.

HORSE WHIM - Similar to a capstan, but in this case power supplied by a horse walking around a circular platform was applied to an overhead winding drum. Frequently used for winding from small shafts on Cornish mines, especially during exploratory work and shaft sinking. The smaller under-gear whims found in some 19th century farms were rarely used on mines.

KIBBLE - A large, strongly-constructed, egg-shaped iron container used for ore and rock haulage in earlier shafts. Superseded by skips.

LAGGING BOARDS - The timber planks lining the upper part of a shaft, or where it ran through soft ground.

LINTEL - The horizontal timber or stone support above an opening in a wall or structure.

LOBBY - The excavated cutting running up to an adit portal.

SHAFT - A vertical or near-vertical tunnel sunk to give access to the extractive areas of a mine.

SKIP – An elongated iron or steel container equipped with small wheels or brackets running on the shaft guides (buntings) and used for rock and ore haulage in later mines.

STOPE - Excavated area produced during the extraction of ore-bearing rock. Often narrow, deep and elongated, reflecting the former position of the lode. … An opening in the underground workings of a mine from which ore is mined. The width and height of the stope are determined by the size of the ore body.

TIMBERING - The operation of setting timber supports in a mine. "Timbering consists of putting poles on the four sides of a shaft … as a lining to keep rock and dirt from caving in on the workers below, in putting poles on the sides and roofs of tunnels for the same purpose, in lining mill holes so that ore will go down readily" (Costigan, 1908, p. 104).

Ore Dressing

BLOWING-HOUSE - An early form of smelting furnace, small in scale and using charcoal as a fuel.

COBBING - Part of the ore dressing process. The breaking off of waste from ore fragments using special long-headed hammers.

CRUSHING - Part of the ore dressing process. Ore was crushed, either by hand or using a mechanical crusher to break it up.

DRESSING FLOORS - An (often extensive) area at the surface of a mine where the various processes of concentration of ore took place. These consisted of crushing or stamping to attain a uniform size range; sizing (particularly on later mines); separation of waste rock; concentration (generally mechanically and hydraulically on tin mines, manually on copper mines); the removal of contaminant minerals (by calcination, flotation, magnetic separation); and finally drying and bagging for transportation to the smelter.

FLOTATION - The separation of minerals from each other and from waste matter by inducing (through the use of reagents) relative differences in their abilities to float in a liquid medium (Noble & Spude, 1997, p. 30).

JIG/JIGGING BOX - A large mechanically or hand-operated sieve set in a tank of water, used to separate ore by waste. Sometimes constructed in groups within jigging houses.

STAMPS - A mechanical device for crushing ore-bearing rock to a fine sand. Heavy vertically-mounted beams (or later iron rods) carrying cast or forged iron heads were lifted and dropped onto the prepared ore beneath them by a series of cams mounted on a rotating drum. This was usually driven by a water-wheel or rotative steam engine.

Mining Names

This section features some of the mine names contemporaneously chosen by the late-19th and early-20th century lode miner in Idaho. This additional analysis of the names ascribed to the 1,908 lode mines patented in Idaho prior to 1920 aims to add a brief ethnographic dimension of the possible challenges (Nyctalops), ancestry (Great Scott), religion (Caliph of Bagdad, Mormon Girl), prejudices (Black Sam, Jap), Indian relationships (Big Medicine, Calumet), music (Massenet, Wolftone), and musings (Cat Hop) of the underground miner. As Levitt and Dubner (2005) expressed in *Freakonomics: A rogue economist explores the hidden side of everything*, names can be informative about the race, social standing, and even the politics of the giver. For the underground laboring miner in Idaho, both before and after statehood was granted in 1890, mine names reflect something of the person and the times.

Names and Places

Names and places featured strongly in the names given to mines throughout Idaho.

Popular city mine names that appeared multiple times included: Alexandria, Allegheny, Ashland, Atlanta, Baltimore, Bay City, Boise, Boston, Brooklyn, Chicago, Cleveland, Columbia, Cumberland, Denver, Gettysburg, Illinois, Iowa, London, Manhattan, Montgomery, Montreal, Ontario, Richmond, San Francisco, San Jose, Spokane, St. Lawrence, St. Louis, St. Paul, Vienna, Virginia, Waco, Walla Walla, and Wallace.

Less popular city mine names included: Albion, Cardiff, Champlain, Concorde, Delhi, Des Moines, Dubuque, Dresden, Durango, Florence, Gladstone, Glamorgan, Glasgow, Helena, Jerusalem, Johannesburg, Ketchum, Malta, Manchester, Mendota, Milwaukee, Moscow, Nashville, Newburg, Oakland, Paducah, Philadelphia, Pittsburg, Port Arthur, Portland, Providence, Quebec, Roanoke, Sand Point, San Quentin, Seattle, Sinaloa, Sonora, St. Joe, St. Lawrence, Stanley, Tacoma, Toledo, Topeka, Utica, Vicksburg, and Victoria.

Popular state mine names that appeared multiple times included: Alabama, Alaska, Arizona, Arkansas, Atlanta, Bay State, California, Colorado, Idaho, Illinois, Iowa, Missouri, Montana, New York, Ohio, and Oregon.

Less popular state mine names included: Empire State, Granite State, Jersey, Kentucky, Louisiana, Maine, Minnesota, Mississippi, Pennsylvania, Tennessee, Texas, Utah, Vermont, Washington, Wisconsin, and Wyoming.

Various ethnic mine names and countries included: Aberdonian, Argentine, Basque, Caledonia, Danish, Germania, Great Scott, Jap, Occident, and Saxon; and, Cuba, Greenland, Malta, Mexico, Pan American, and Phillipines. The provinces of Nova Scotia and Quebec were also referenced.

Popular first names of PLMs that appeared multiple times in more than one Idaho county included: Ada, Alice, Anna, Alexander, Daisy, Edna, Ella, Emily, Emma, George, Ima, Isabella, Josie, Lulu, Maggie, Mary, Maud, Max, Minnie, Nellie, Nettie, Rosa, Rose, and Roy.

Less popular first names of PLMs included: Bertha, Berthie, Bessie, Bodie, Caroline, Carrie, Chas, Clara, Clyde, Cora, Diana, Dorothy, Drew, Edmund, Erie, Etta, Eunice, Evelyn, Fannie, Felix, Frankie, Gertie, Gertrude, Gladys, Gloria, Goffre, Gus, Guy, Haidee, Hanna, Hannan, Hatta, Henrietta, Hollie, Ida, Jeff, Jessie, Josephine, Juliet, Kate, Katie, Kittie, Laurence, Lee, Leland, Lena, Leonard, Leonara, Lola, Louisa, Lucy, Mable, Margaret, Nora, Norma, Norman, Rachel, Ritchie, Rosie, Ruby, Russell, Ruth, Sam Allen, Sancho, Sarah, Scott, Susie, Tom, Wilbert, Winona, Yolande, and Zena.

Profession or surname PLM names included: Baker, Barouk, Beardsley, Bishop, Burgomeister, Carlisle, Clark, Crocker, De Long, Dewey, Domski, Donovan, Friedman, Hancock, Harrison, Howe, il Medico, Jackson, Maid of Erin, McClelan, McGinty, McKinley, McCleen, McClelland, Pasha, Phillips, Shelby, Sheridan, Sherman, Sutherland, Williams, Wilson, and Wilson.

Women first and last mine names included: Ellen Stilts, Fanny Grem, Ida Elmore, Ida Harland, Ida Rhea, Kate Fry, Katie Burnett, Laura Benson, Laura Jackson, Mabel May, Mary Norem, Minnie Healey, Molly Bawn, Molly Picher, and Phoebe Grace.

Mythical or ancient Greece and Persian mine names included: Ajax, Appollo, Aratus, Astaroth, Atlas, Hercules, Hermes, Minerva, Xenophon, and Xerxes.

Historic European figure mine names included: Augusta V, Napoleon Bonaparte, Rob Roy, and Wellington.

American History Mine Names

Historic American military figure mine names included: General Armstrong, General Custer, General Grant, General Hancock, General Petit, George Washington, Major Musgrove, and Robert E. Lee.

Military title mine names included: Admiral, Colonel, Commander, Commodore, Veteran, and Volunteer.

American revolution and civil war mine names included: Bunker Hill, Confederate Lode, Confederate Star, Dixie, Monitor, Tippiecanoe, True Blue, Union, and Union Jack, Yankee Boy, Yankee Doodle, Yankee Fork, and Yankee Girl.

Notable figures in American history mine names included: Boone, Captain Clark, Columbus, Garfield, Grover Cleveland, Hancock, Henry Ward Beecher, Kit Karson, Lincoln, Stonewall Jackson, James Blaine, Jay Gould, Jefferson, William Sulzer, and W. J. Bryan.

American independence and government mine names included: America, Commonwealth, Congress, Constitution, Continental, Fourth of July, Independence, Jingo, Liberty Bell, Senate, Senator, and U.S.

Political mine names included: Democrat, Free Coinage, Free Gold, Free Trade, and Gold Standard.

Railroad mine names included: Burlington, Grand Central, Great Eastern, Great Northern, Narrow Gauge, and South Central.

Commercial mine names included: Advalorem, Bottom Dollar, Cash, Commerce, Enterprise, Exchequer, Grub Stake, High Tariff, International, Interstate, Paymaster, Premium, Revenue, Surplus, Trade Dollar, and Wall Street.

Gambling mine names included: Black Jack, Keno, Kitty, Sixteen to One, and Twenty One.

Frontier mine names included: Clear Grit, Dusty Bill, Jackass, Rambler, Ranger, Rattler, Rolling Stone, Rough and Ready, Rustler, Stetson, and Trapper.

Animal, Mineral, Plant Mine Names

Plant mine names include: Bamboo, Buttercup, Camas, Canola, Chestnut, Cottonwood, Cypress, Hemlock, Hickory, Locust, Mahogany, Pine Tree, Rose Fern, and White Fir.

A*nimal mine names* included: Alligator, Anaconda, Badger, Beaver, Black Bear, Bengal Tiger, Big Bug, Big Lynx, Billy Goat, Black Hawk, Blue Jay, Brown Bear, Bucking Pinto, Buffalo, Bull Frog, Dove, Elk, Fish Hawk, Humming Bird, Fox, Gray Eagle, Greyhound, Grizzly Bear, Grouse, Hornet, Jackass, Lark, Leopard, Lion, Lynx, Osito, Oso, Palmetto, Panther, Pheasant, Rattler, Rattlesnake, Reindeer, Salamander, Speckled Trout, Spider, Spotted Tail, Swan, Tiger, Turkey Buzzard, Whale, White Bird, White Coppe, Wiggletail, Wolverine, Yellow Bird, Yellow Jacket, and Yellow Kitty.

Mineral terms mine names included: Almaden, Ambergris, Apex, Argent, Ameralda, Azurite, Black Garnet, Bullion, Carbon, Carbon Hill, Carbonate, Carbonate Hill, Clipper Bullion, Crystal, Cuprum, Diamond, Diamond Hitch, Diamond Prince, Galena, Gem, Gladstone, Gold, Hawk, EyeIron, Mercury, Muscovite Mica, Pearl, Quartz Star, Silver, Smoky Bullion, Sterling, Sulphide, and Sulphurets.

Copper mine names included: Copper, Copper Bullion, Copper Coin, Dahlonega Copper, Grey Copper, Hecla Copper, Copper Key, Copper King, Copper Mountain, Copper Peacock, and Copper Queen.

Gold mine names included: Gold Bug, Gold Coin, Gold Copper, Gold Dust, Gold Flint, Gold Hill, Gold Hunter, Gold Leaf, Gold Nugget, Gold Ridge, Gold Standard, as well as Golden Age, Golden Bar, Golden Bricks, Calf, Chest, Eagle, Golden Fleece, Golden King, Golden Rod, Golden Sink, Oro Fino, and Oro Fino Wedge.

Iron mine names included: Iron Queen, Iron Silver, Ironclad, Ironsides, and Ironstone.

Silver mine names included: Koren Silver, Silver Bell, Silver Brick, Silver Casket, Silver Chief, Silver Coin, Silver Copper, Silver Dollar, Silver Fortune, Silver King, Silver Lead, Silver Moon, Silver Mountain, Silver Queen, Silver Spray, Silver Star, Silver Tide, Silver Tip, Silver View, Silver Wedge, and Silver Wreath.

Wealth and Hopes

Wealth, discoveries, and hopes mine names included: Bonanza King, Bright Hopes, Cape Nome, Champion, Chance, Checkmate, Cinderella, Climax, Comstock, Croesus, Eldorado, Eureka, Exchequer, First Chance, Fortune, Golconda, Good Hope, Guarantee, Hidden Treasure, High Five, Hope, Hot Stuff, Hunch, Imperial, Jumbo, Leviathan, Likely Lode, Mammoth, Matchless, Misers Dream, Mother Lode, Paymaster, Peerless, Struck It, Success, Treasure Trove, Treasure Vault, and Triumph.

Lucky and not so lucky mine names included: Cloverleaf, Dreadnaught, Lucky Ben, Lucky Boy, Lucky Frank, Lucky Jim, Lucky Number, Lucky Strike, and Shamrock; and, Joujou, OK, Small Hopes, Sold Again, Sucker, and Zero.

Miscellaneous mine names included: Chili and Corn Beef; Mystery and Surprise

Midnight Jumper, Pirate, and Smuggler; Wheelbarrow and Torpedo; Hoogly; Burning Moscow, Burning Pilot, and Burnt Firs; New Era, Got Em Now, and

Hardscramble; Belcher and Derby; Homestake, Monument, and Paragon; Timber King, Timber Line, and Timber Queen; Lost Dog, Lost Lake, Lost Packer; and, Old Bible Back, Old Cabin, Old Chunk, Old Sam, Old Telegraph, and Old Veteran.

Mining character PLM names included: Bon Ton, Crackerjack, Farmer Jones. Friend, Goofy Jack, Hobo, Joe Dandy, Johnny Come Lately, Merrimac, Merry Mack, Never Sweat, and Wanderer.

Variants on Common Themes

C*olorful mine names* included: Black Bart, Black Bear, Black Bird, Black Carbonate, Black Champion, Black Cinder, Black Cloud, Black Crook, Black Cub, Black Eagle, Black Garnet, Black Hawk, Black Horse, Black Sam, Black Star, and Black Tail; Blue Bell, Blue Bird, Blue Bucket, Blue Jacket, Blue Jay, and Blue Ribbon; Red Bird, Red Cloud, Red Cross, Red Dragon, Red Elephant, Red Jacket, Red Star, Red Warrior, and Red Wing; and, White Bird, White Cloud, White Fir, White Monument, and White Coppe.

Days of the week and month mine names included: Monday, Friday, Saturday, and Sunday; and, December, July, June, Mayflower, May Leaf, and May Queen, September.

Numbers and time of day mine names included: Gamma, New Era, Nineteen Hundred, Ninety Nine, Ninety Six, No 1 Quartz, No 6, and Omega; and, Daily, Early Bird, Evening, Evening Star, Midnight, Morning, Moonlight, Noonday, Sunrise, and Sunset.

Mountain and hill mine names included: Alta, Everest, Green Mountain, Green Hill, Mountain Boy, Mountain Goat, Mountain Grouse, Mountain Quail, Mountain Rose, Mountain Spring, Mountain View, Mount Lincoln, Sawtooth, Sierra Nevada, Vesuvias, and Yosemite.

Snow and winter mine names included: Arctic, Snow Bird, Snow Cap, Snow Clad, Snow Cap, Snow Cloud, Snow Drift, Snow Fly, Snow Shoe, Snow Storm, Snow Slide, Toboggan, and Winter.

Water mine names included: Atlantic, Baltic, Belle Marsh, Chesapeake, Christel Lake, Cold Spring, Dew Drop, Euphrates, Ganges, Halfway Creek, Niagra, Pacific, Rhine, Stillwater, Tenbrook, and Valley Creek.

Celestial and star mine names included: Comet, Dipper, Eastern Star, Eclipse, Evening Star, Mountain Star, Northern Star, North Star, Pluto, Polaris, Rising Star, Saturn, Southern Cross, Star of Hope, and Venus.

Literary and music mine names included: Charles Dickens, Faerie Queene, Ivanhoe, and Old Bible Back; and, Massenet, Whistler, and Wolftone.

Endearment mine names included: Baby, Daddy, Darling, Forgetmenaught, Gentle Annie, Junior, Little Bert, Little Chap, Little Fellow, Little Frankie, Madre Doro, and Wise Boy.

Sun mine names included: Sunbeam, Sundog, Sundown, Sun Flower, Sunlight, Sunnyside, Sunrise, Sunset, Sunset Peaks, and Sunny South.

Beauty and height mine names included Alpine, Away Up, Belleview, Buena Vista, Fair View, Grand View, Lookout, Panorama, Point Lookout, Summit, Tip Top, and Veta Grande.

Indian mine names included: Band, Bannock, Big Indian, Big Medicine, Calumet, Chief, Chief of the Hill, Chieftan, Indian Quartz, Indian Queen, Modoc, Mohawk, Sitting Bull, and Wigwam.

Religious mine names included: Caliph of Bagdad, Calumet, Champlain, Easter, Faithful, Kismet, Passover, Puritan, and Quaker.

Points of the compass mine names included: East Eldorado, East Hecla, East Side, and Eastern Star; North Alaska, North America, North Empire, North Extension, North Franklin, North Pacific, North Peacock, North Star, Northwestern, Northern Light, and Northern Star; South Central, South Chariot, South Extension, South Oro Fino, South Peacock, South Pluto, South Poorman, South Salem, South Vienna, Southern Beauty, and Southern Cross; and, West Chloride, West Fork, West Laurel, West Shore, West Tahoma, West View, West Wide, Western Adventure and Western Star.

Royalty mine names included: Blarney Stone, Crown Point, Crown Prince, Prince of Wales, Queen Bess, Queen of the Hills, Queen of the West, Iron Queen, River Queen, Timber Queen, Bonanza King, Golden King, Silver King, and Timber King.

APPENDIX B

1872 Mining Act

An Act to Promote the Development of the Mining Resources of the United States.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That all valuable mineral deposits in lands belonging to the United States, both surveyed and un-surveyed, are hereby declared to be free and open to exploration and purchase, and the lands in which they are found to occupation and purchase, by citizens of the United States and those who have declared their intention to become such, under regulations prescribed by law, and according to the local customs or rules of miners, in the several mining-districts, so far as the same are applicable and not inconsistent with the laws of the United States.

SEC. 2. That mining-claims upon veins or lodes of quartz or other rock in place bearing gold, silver, cinnabar, lead, tin, copper, or other valuable deposits heretofore located, shall be governed as to length along the vein or lode by the customs, regulations, and laws in force at the date of their location. A mining-claim located after the passage of this act, whether located by one or more persons, may equal, but shall not exceed, one thousand and five hundred feet in length along the vein or lode; but no location of a mining-claim shall be made until the discovery of the vein or lode within the limits of the claim located. No claim shall extend more than three hundred feet on each side of the middle of the vein at the surface, nor shall any claim be limited by any mining regulation to less than twenty-five feet on each side of the middle of the vein at the surface, except where adverse rights existing at the passage of this act shall render such limitation necessary. The end-lines of each claim shall be parallel to each other.

SEC. 3. That the locators of all mining locations heretofore made, or which shall hereafter be made, on any mineral vein, lode, or ledge, situated on the public domain, their heirs and assigns, where no adverse claim exists at the passage of this act, so long as they comply with the laws of the United States, and with State, territorial, and local regulations not in conflict with said laws of the United States governing their possessory title, shall have the exclusive right of possession and enjoyment of all the surface included within the lines of their locations, and of all veins, lodes, and ledges throughout their entire depth, the top or apex of which lies inside of such surface-lines extended downward vertically, although such veins, lodes, or ledges may so far depart from a perpendicular in their course downward as to extend outside the vertical side-lines of said surface locations: Provided, That their right of possession to such outside parts of said veins or ledges shall be confined to such portions thereof as lie between vertical planes drawn downward as aforesaid, through the end lines of their locations. so continued in their own direction that such planes will intersect such exterior parts of said veins or ledges: And provided further, that nothing in this section shall authorize the locator or possessor of a vein or lode which extends in its downward course beyond the vertical lines of his claim to enter upon the surface of a claim owned or possessed by another.

SEC. 4. That where a tunnel is run for the development of a vein or lode, or for the discovery of mines, the owners of such tunnel shall have the right of possession of all veins or lodes within three thousand feet from the face of such tunnel on the line thereof not previously known to exist; discovered in such tunnel, to the same extent as if discovered from the surface; and locations on the line of such tunnel of veins or lodes not appearing on the surface, made by other parties after the commencement of the tunnel, and while the same is being prosecuted with reasonable diligence, shall be invalid; but failure to prosecute the work on the tunnel for six months shall be considered as an abandonment of the right to all undiscovered veins on the line of said tunnel.

SEC. 5. That the miners of each mining district may make rules regulations not in conflict with the laws of the United States, or with the laws of the State or Territory in which the district is situated, governing the location, manner of recording, amount of work necessary to hold possession of a mining-claim, subject to the following requirements: The location must be distinctly marked on the ground so that its boundaries can be readily traced. All records of mining-claims hereafter made shall contain the name or names of the locators, the date of the location, and such a description of the claim or claims located by reference to some natural object or permanent monument as will identify the claim. On each claim located after the passage of this act, and until a patent shall have been issued therefor, not less than one hundred dollars' worth of labor shall be performed or improvements made during each year. On all claims located prior to the passage of this act, ten dollars' worth of labor shall be performed or improvements made each year for each one hundred feet in length along the vein until a patent shall have been issued therefore; but where such claims are held in common such expenditure may be made upon any one claim, and upon a failure to comply with these conditions, the claim or mine upon which such failure occurred shall be open to relocation in the same manner as if no location of the same had ever been made: Provided, That the original locators, their heirs, assigns, or legal representatives, have not resumed work upon the claim after such failure and before such location. Upon the failure of any one of several co-owners to contribute his proportion of the expenditures required by this act, the co-owners who have performed the labor or made the improvements may, at the expiration of the year, give such delinquent co-owner personal notice in writing or notice by publication in the newspaper published nearest the claim, for at least once a week for ninety days, and if at the expiration of ninety days after such notice in writing or by publication such delinquent should fail or refuse to contribute his proportion to comply with this act his interest in the claim shall become the property of his co-owners who have made the required expenditures.

SEC. 6. That a patent for any land claimed and located for valuable deposits may be obtained in the following manner: Any person, association, or corporation authorized to locate a claim under this act, having claimed and located a piece of land for such purposes, who has or have complied with the terms of this act, may file in the proper land-office an application for a patent, under oath, showing such compliance, together with a plat and field-notes of the claim or claims in common, made by or under the direction of the United States surveyor-general, showing accurately the boundaries of the claim or claims, which shall be distinctly marked by monuments on the ground. and shall post a copy of such plat, together with a notice of such application for a patent, in a conspicuous place on the land embraced in such plat previous to the filing of the application for a patent, and shall file an affidavit of at least two persons that such notice has been duly posted as aforesaid, and shall file a copy of said notice in such land-office, and shall thereupon be entitled to a patent for said land, in the manner following: The register of the land-office, upon the filing of such application, plat, fieid-notes, notices, and affidavits, shall publish a notice that such application has been made, for the period of sixty days, in a newspaper to be by him designated as published nearest to said claim;

and he shall also post such notice in his office for the same period. The claimant at the time of filing this application, or at any time thereafter, within the sixty days of publication, shall file with the register a certificate of the United States surveyor-general that five hundred dollars' worth of labor has been expended or improvements made upon the claim by himself or grantors; that the plat is correct, with such further description by such reference to natural objects or permanent monuments as shall identify the claim, and furnish an accurate description, to be incorporated in the patent. At the expiration of the sixty days of publication the claimant shall file his affidavit, showing that the plat and notice have been posted in a conspicuous place on the claim during said period of publication. If no adverse claim shall have been filed with the register and the receiver of the proper land-office at the expiration of the sixty days of publication, it shall be assumed that the applicant is entitled to a patent, upon the payment to the proper officer of five dollars per acre, and that no adverse claim exists and thereafter no objection from third parties to the issuance of a patent shall be heard, except it be shown that the applicant has failed to comply with this act.

SEC. 7. That where an adverse claim shall be filed during the period of publication, it shall be upon oath of the person or persons making the same, and shall show the nature, boundaries, and extent of such adverse is claim, and all proceedings, except the publication of notice and making and filing of the affidavit thereof, shall be stayed until the controversy shall have been settled or decided by a court of competent jurisdiction, or the adverse claim waived. It shall be the duty of the adverse claimant, within thirty days after filing his claim, to commence proceedings in a court of competent jurisdiction, to determine the question of the right of possession, and prosecute the same with reasonable diligence to final judgment; and a failure to do shall be a waiver of his adverse claim. After such judgment shall have been rendered, the party entitled to the possession of the claim, or any portion thereof may, without giving further notice, file a certified copy of the judgment-roll with the register of the land-office, together with the certificate of the surveyor-general that the requisite amount of labor has been expended, or improvements made thereon, and the description required in other cases, and shall pay to the receiver five dollars per acre for his claim, together with the proper fees, whereupon the whole proceedings and the judgment-roll shall be certified by the register to the commissioner of the general land office, and a patent shall issue thereon for the claim, or such portion thereof as the applicant shall appear, from the decision of the court, to rightly possess. If it shall appear from the decision of the court that several parties are entitled to separate, and different portions of the claim, each party may pay for his portion of the claim, with the proper fees, and file the certificate and description by the surveyor-general, whereupon the register shall certify the proceedings and judgment-roll to the commissioner of the general land office, as in the preceding case, and patents shall issue to the several parties according to their respective rights. Proof of citizenship under this act, or the acts of July twenty-sixth, eighteen hundred and sixty-six, and July ninth, eighteen hundred and seventy, in the case of an individual, may consist of his own affidavit thereof, and in case of an association of persons unincorporated, of the affidavit of their authorized agent, made on his own knowledge or upon information and belief, and in case of a corporation organized under the laws of the United States, or of any State or Territory of the United States, by the filing of a certified copy of their charter or certificate of incorporation; and nothing herein contained shall be construed to prevent the alienation of the title conveyed by a patent for a mining-claim to any person whatever.

SEC. 8. That the description of vein or lode claims, upon surveyed lands, shall designate the location of the claim with reference to the lines of the public surveys, but need not conform therewith; but where a patent shall be issued as aforesaid for claims upon un-surveyed lands, the surveyor-general, in extending the surveys, shall adjust the same to the boundaries of such patented claim, according to the plat or description thereof; but so as in no case to interfere with or change the location of any such patented claim.

SEC. 9. That sections one, two, three, four, and six of an act entitled “An act granting the right of way to ditch and canal owners over the public lands, and for other purposes,” approved July twenty-sixth, eighteen-hundred and sixty-six, are hereby repealed, but such repeal shall not affect existing rights. Applications for patents for mining-claims now pending may be prosecuted to a final decision in the general land office; but in such cases where adverse rights are not affected thereby, patents may issue in pursuance of the provisions of this act; and all patents for mining-claims heretofore issued under the act of July twenty-sixth, eighteen hundred and sixty-six, shall convey all the rights and privileges conferred by this act where no adverse rights exist at the time of the passage of this act.

SEC. 10. That the act entitled “An act to amend an act granting the right of way to ditch and canal owners over the public lands, and for other purposes,” approved July ninth, eighteen hundred and seventy, shall be and remain in full force, except as to the proceedings to obtain a patent, which shall be similar to the proceedings prescribed by sections six and seven of this act for obtaining patents to vein or lode claims; but where said placer-claims shall be upon surveyed lands, and conform to legal subdivisions, no further survey or plat shall be required, and all placer mining-claims hereafter located shall conform as near as practicable with the United States system of public land surveys and the rectangular subdivisions of such surveys, and no such location shall include more than twenty acres for each individual claimant, but where such claims cannot be conformed to legal subdivisions, survey and plat shall be made as on unsurveyed lands: Provided, That proceedings now pending may be prosecuted to their final determination under existing laws; but the provisions of this act, when not in conflict with existing laws, shall apply to such cases: And provided also, That where by the segregation of mineral land in any legal subdivision a quantity of agricultural land less than forty acres remains, said fractional portion of agricultural land may be entered by any party qualified by law, for homestead or pre-emption purposes.

SEC. 11. That where the same person, association, or corporation is in possession of a placer-claim, and also a vein or lode included within the boundaries thereof; application shall be made for a patent for the placer or lode claim, with the statement that it includes such vein or lode, and in such case (subject to the provisions of this act and the act entitled "An act to amend an act granting the right of way to ditch and canal owners over the public lands, and for other purposes," approved July eighteen hundred and seventy) a patent shall issue for the placer-claim, including such vein or lode, upon the payment of five dollars per acre for such vein or lode claim, and twenty-five feet of surface on each side thereof. The remainder of the placer-claim, or any placer-claim not embracing any vein or lode claim, shall be paid for at the rate of two dollars and fifty cents per acre, together with all costs of proceedings; and where a vein or lode, such as is described in the second section of this act, is known to exist within the boundaries of a placer-claim, all application for a patent for such placer-claim which does not include an application for the vein or lode claim shall be construed as a conclusive declaration that the claimant of the placer-claim has no right of possession but where the existence of a vein or lode in a placer-claim is not known, a patent for the placer-claim shall convey all valuable mineral and other deposits within the boundaries thereof.

SEC. 12. That the surveyor-general of the United States may appoint in each land district containing mineral lands as many competent surveyors as shall apply for appointment to survey mining-claims. The expenses of the survey of vein or lode claims, and the survey and subdivision of placer-claims into smaller quantities than one hundred and sixty acres, together with the cost of publication of notices, shall be paid by the applicants, and they shall be at liberty to obtain the same at the most reasonable rates, and they shall also be at liberty to employ any United States deputy surveyor to make the survey. The commissioner of the general land office shall also have power to establish the maximum charges for surveys and publication notices under this act; and in case of excessive charges for publication, he may designate any newspaper published in a land district where mines are situated for the publication of mining-notices in such district, and fix the rates to be charged by such paper; and, to the end that the commissioner may be fully informed on the subject, each applicant shall file with the register a sworn statement of all charges and fees paid by said applicant for publication and surveys, Applicant to together with all fees and money paid the register and the receiver of the land-office, which statement shall be transmitted, with the other papers in the case, to the commissioner of the general land office. The fees of the register and the receiver shall be five dollars each for filing and acting upon each application for patent or adverse claim filed, and they shall be allowed the amount fixed by law for reducing testimony to writing, when done in the land-office, such fees and allowances to be paid by the respective parties; and no other fees shall be charged by them in such cases. Nothing in this act shall be construed to enlarge or affect the rights of either party in regard to any property in controversy at the time of the passage of this act, or of the act entitled "An act granting the right of way to ditch and canal owners over the public lands, and for other purposes," approved July twenty-sixth, eighteen hundred and sixty-six, nor shall this act affect any right acquired under said act; and nothing in this act shall be construed to repeal, impair, or in any way affect the provisions of the act entitled "An act granting to A. Sutro the right of way, and other privileges to aid in the construction of a draining and exploring tunnel to the Comstock lode, in the State of Nevada," approved July twenty-fifth, eighteen hundred and sixty-six.

SEC. 13. That all affidavits required to be made under this act, or the act of which it is amendatory, may be verified before any officer authorized to administer oaths within the land-district where the claims may be situated, and all testimony and proofs may be taken before any such officer, and, when duly certified by the officer taking the same, shall have the same force and effect as if taken before the register and receiver of the land-office. In cases of contest as to the mineral or agricultural character of land, the testimony and proofs may be taken as herein provided on personal notice of at least ten days to the opposing party; or if said party cannot be found, then by publication of at least once a week for thirty days in a newspaper, to be designated by the register of the land-office as published nearest to the location of such land; and the register shall require proof that such notice has been given.

SEC. 14. That where two or more veins intersect or cross each other, priority of title shall govern, and such prior location shall be entitled to all ore or mineral contained within the space of intersection: Provided, however, That the subsequent location shall have the right of way through said space of intersection for the purposes of the convenient working of the said mine: And provided also, That where two or more veins unite, the oldest or prior location shall take the vein below the point of union, including all the space of intersection.

SEC. 15. That where non-mineral land not contiguous to the vein or lode is used or occupied by the proprietor of such vein or lode for mining or milling purposes, such non-adjacent surface ground may be embraced and included in an application for a patent for such vein or lode, and the same may be patented therewith, subject to the same preliminary requirements as to survey and notice as are applicable under this act to veins or lodes: Provided, That no location hereafter made of such non-adjacent land shall exceed five acres, and payment for the same must be made at the same rate as fixed by this act for the superficies of the lode. The owner of a quartz-mill or reduction-works, not owning a mine in connection therewith, may also receive a patent for his mill-site, as provided in this section.

SEC. 16. That all acts and parts of acts inconsistent herewith are hereby repealed: Provided, That nothing contained in this act shall be construed to impair, in any way, rights or interests in mining property acquired under existing laws.

APPROVED, May 10, 1872.

APPENDIX C

Patented Mineral Land Acreage and Net Market Value by County in 2015

The total net taxable value of patented mineral land in Idaho was $2,643,471 in 2015 and occurred on 115,279 acres,[51] resulting in an average net market value of $22.93 an acre. A breakdown of patented mineral land net market value and acreage in 2015, by county, is set forth below in Table 1.18.

Table 1.18 PLM Net Market Values and Acres by County in Idaho in 2015

County Name	Acres	Net Market Value
Ada	136	$25,500
Adams	3,310	$9,326
Bannock	209	$4,215
Bear Lake	3,529	$90,192
Benewah	1	$83
Bingham		
Blaine	7,118	$39,373
Boise	1,174	$5,875
Bonner	78	$391
Bonneville	372	$9,321
Boundary	480	$2,398
Butte	354	$16,816
Camas	1,066	$37,977
Canyon		
Caribou	3,902	$123,331
Cassia	1	$32,238
Clark	929	$23,220
Clearwater	18	$215
Custer	7,530	$192,758
Elmore	681	$3,403
Franklin		
Fremont		
Gem	1	$6,700
Gooding		
Idaho		
Jefferson		
Jerome	96	$20,275
Kootenai	270	$1,347
Latah	15	$428
Lemhi	13,006	$325,165
Lewis		

[51] The acreages summarized in this Appendix differ from the acreages summarized in Chapter 6 and the results reported for pre-1920 patented lode mines in Idaho. In particular, the pre-1920 PLMs are a subset of the 115,279 acres reported in this appendix, as mineral patents created after the Mineral Leasing Act of 1920 was enacted and placer mineral patents are excluded in the Chapter 6 summary statistics.

County Name	Acres	Net Market Value
Lincoln	318	$279,280
Madison	152	$792
Minidoka		
Nez Perce		
Oneida	59	$208,632
Owyhee	4,469	$149,152
Payette		
Power	30	$750
Shoshone	61,930	$308,405
Teton	7	$31,464
Twin Falls	348	$567,249
Valley	2,876	$111,489
Washington	814	$15,711
Total:	115,279	$2,643,471

APPENDIX D

Revenue and Taxation, Chapter 28, Taxation and Profits of Mines

63-2801. VALUATION OF MINES FOR TAXATION[52]. All mines and mining claims, both placer and rock in place, containing or bearing gold, silver, copper, lead, coal or other valuable mineral or metal deposits, after purchase thereof from the United States, shall be taxed at the price paid the United States therefor, unless the surface ground, or some part thereof, of said mine or mining claim is used for other than mining purposes, and has a separate and independent value for such other purposes, in which case said surface ground or any part thereof so used for other than mining purposes, shall be taxed at its value for such other purposes, and all machinery used in mining, and all property and surface improvements upon mines or mining claims, which have a value separate and independent of such mines or mining claims and the net annual proceeds of all mines and mining claims shall be taxed: provided, that nothing in this chapter contained must be construed so as to exempt from taxation improvements, buildings, erections, structures or machinery placed upon any mining claims, or used in connection therewith: provided that all mineral rights reserved to any grantor, except the United States or the state of Idaho, by the terms of any conveyance of lands other than lands acquired under the mining laws of the United States shall be assessed for taxation purposes at the rate of not less than five dollars ($5.00) per acre of the mineral rights so reserved, to be assessed against the recorded owner thereof. When, in the opinion of the county assessor, the value of reserved mineral rights does not warrant the expenditure to

[52] History: [(63-2801) 1903, p. 4, sec. 1, and last sentence of sec. 8; compiled and reen. R.C., sec. 1863; reen. C.L., sec. 1863; I.C.A., sec. 61-2301; am. 1937, ch. 70, sec. 1, p. 94; am. 1941, ch. 159, sec. 1, p. 317; am. 1988, ch. 212, sec. 1, p. 402.]

appraise and assess such value, such de minimis values need not be appraised or assessed, but the failure to assess such values does not constitute a failure to pay such taxes on the part of the owner, and does not constitute a delinquency on the part of the owner.

63-2802. NET PROFITS DEFINED[53]. The term "net profits," as employed in this chapter, means the amount of money received from the mining of said metals or minerals from said mine or mining claim, after the deduction of the actual expenditure of money and labor in and about extracting the metals and minerals from the mine or mining claim, and transporting the same to the mill, concentrator or reduction works, and the reduction thereof, and the conversion of the same into money, or its equivalent, and also the deduction of all moneys expended for necessary labor, machinery and supplies needed and used in the mining operations, for the improvements necessary in and about the mine or mining claim, for reducing ores, for the construction of the mills and reduction works used and operated in connection with the mine or mining claim, for transporting the ore, and for extracting the metals and minerals therefrom; but the money invested in the mine, or improvements made during any year except the year immediately preceding such statement, must not be included therein. Such expenditures do not include the salaries, or any portion thereof, of any person or officers not actually engaged in the working of the mine, or personally superintending the management thereof.

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[53] History: [(63-2802) 1903, p. 4, sec. 4; reen. R.C. and C.L., sec. 1864; C.S., sec. 3361; I.C.A., sec. 61-2302.]

APPENDIX E

Property Category Description by Code

As set forth in §63-509, Idaho Code, County assessors make use of a specified list of category descriptions and numbers to depict land values on the valuation assessments notices under §63-301 and §63-308, Idaho Code. These numbers and secondary category code descriptions are set forth below in Table 1.19.

Table 1.19 Idaho Property Category Code Descriptions

Number	Description
1	Irrigated Agricultural Land
2	Irrigated Grazing Land
3	Non-irrigated Agricultural Land
4	Meadow Land
5	Dry Grazing Land
6	Productivity Forest Land
7	Bare Forest Land
9	Patented Mineral Land
10	Home Site Land
11	Recreational Land
12	Rural Residential Tracts
13	Rural Commercial Tracts
14	Rural Industrial Tracts
15	Rural Residential Subdivision Land
16	Rural Commercial Subdivision Land
17	Rural Industrial Subdivision Land
18	Other Rural Land
19	Waste (Public Right-Of-Way, Roads, Ditches, Canals)
20	City Residential Lots or Acreages
21	City Commercial Lots or Acreages
22	City Industrial Lots or Acreages
25	Common Area Land and Improvements
26	Residential Condominium/Townhouse
27	Common Area Commercial/Industrial
30	Non-Residential Improvement on Category 20
31	Residential Improvement on Category 10
32	Non-Residential Improvement on Categories 01-12 and 15
33	Improvement on Category 11
34	Residential Improvement on Category 12
35	Commercial Improvement on Category 13

Number	Description
36	Industrial Improvement on Category 14
37	Residential Improvement on Category 15
38	Commercial Improvement on Category 16
39	Industrial Improvement on Category 17
40	Improvement on Category 18
41	Residential Improvement on Category 20
42	Commercial Improvement on Category 21
43	Industrial Improvement on Category 22
44	Taxable Improvements on Exempt Property (Same ownership)
45	Utility System Land and Improvements (Locally Assessed Utilities)
46	Manufactured Housing
47	Improvements to Manufactured Housing
48	Manufactured Housing Permanently Affixed to Real Property
49	Manufactured Housing Permanently Affixed to Leased Property
50	Residential Improvements on Leased Land
51	Commercial or Industrial Improvements on Leased Land
55	Boats or Aircraft
56	Construction Machinery, Tools and Equipment
57	Equities in Land/Improvements Purchased from the State
59	Furniture, Fixtures, Libraries, Art and Coin Collections
63	Logging Machinery, Tools and Equipment
64	Mining Machinery, Tools and Equipment
65	Manufactured Housing on Rented, Leased or Exempt Land
66	Net Profits of Mines
67	Assessed by State Tax Commission
68	Other Miscellaneous Machinery, Tools and Equipment
69	Recreational Vehicles
70	Reservations and Easements
71	Signs and Signboards
72	Tanks, Cylinders and Containers
81	Exempt Land/Improvements

APPENDIX F

Comparative Analysis of Gold and Silver Commodity Prices in Real Value Terms Between the Late-19th and Early-20th Centuries

A comparative analysis of the commodity prices of gold and silver over the last century, in real dollars, is informative. A review of historic commodity price data from commodity websites[54] show, for instance, between 1866 and 1920 the price of gold was remarkably stable, ranging between $20.65 and $20.72 per ounce (or, an average of approximately $20.68 per ounce). A century later, between 2006 and 2015, the annual cumulative price for an ounce of gold fluctuated in price quite a bit more with prices ranging between $603.46 and $1,668.98 or, an average of approximately $1,144.59 per ounce). The purchasing power of $1 in 1900 was equivalent to about $25 in 2015, meaning that $20.68 in 1900 would be worth about $517 in 2015. Thus, on average for the 10-year period ending 2015, the price of gold has exceeded inflation over the last century ($1,144.59 compared to $517), resulting in a net positive commodity price to inflation ratio of 2.2 for gold.

In contrast to gold, silver has experienced a net negative commodity price over the last century. From 1866 to 1920 the price of silver was far less stable with prices ranging between $1.766 and $0.487 per ounce (or, an average of approximately $0.881 per ounce). Between 2006 and 2015, the annual cumulative price for an ounce of silver ranged between $11.55 and $35.13 (or, an average of approximately $19.96 per ounce). The result, on average for the 10-year period ending 2015, is that the price of silver is less

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[54] Referenced commodity websites include: http://minerals.usgs.gov/ and www.kitco.com.

than inflation over the last century ($19.96 compared to $22.03), resulting in a net negative commodity price to inflation ratio of 0.91 for silver.

The net negative commodity price to inflation ratio of 0.91 for silver, compared to a net positive commodity price to inflation ratio of 2.2 for gold communicates a simple message. Commodity prices affect mining, either by discouraging active or renewed mining (as in the case of silver) or by encouraging it (as in the case of gold). Favorable market prices for gold have encouraged investment in new mines in the West (McClure and Schneider, 2001) with “swings in commodity prices, now in a downturn, leading to fluctuations of hiring and layoffs” (IDAWRA, 2016, p. 1). In Idaho and elsewhere in the West, gold production has been closely tied to price (USGS, 2004).

Hiring and growth in mining is dependent on the commodity price a mineral receives in the marketplace, but equally important is the richness of the mineral discovered. “On the basis of both the record of past discoveries and available information viewed through the lens of modern geologic principles, there is little doubt that the western United States and Alaska are the most likely places for new hard rock mineral discoveries” (Leshy, 1987, p. 53). Leshy’s position is affirmed by the Society for Mining, Metallurgy, and Exploration (2015), which reported, “The United States … has a significant amount of the world’s gold resources…. [with] Nevada producing the majority of the gold followed by Alaska … [and] the remaining gold deposits are in other western states” (p. 1). In fact, in Idaho the USGS mineral resource data system indicated that the three active mines in Shoshone County, Idaho, each feature “world class” deposits (USGS, 2016).

APPENDIX G

Assessment Data Methodology

The mining properties empirically studied in this research are patented lode mines. These are properties where fee simple title was conveyed to the patentee by the federal government consistent with the statutory provisions of Mineral Patent Lode Claims, as adopted on July 26, 1866 and the Acts subsequent amendment in 1872. As such, patented lode mines (PLMs) are private property and on the tax rolls of the various county assessment department throughout the State of Idaho. The Idaho State Tax Commission and the 28 County Assessor's Offices where PLMs are located were contacted. Spreadsheet and data requests for all patented lode mine properties was requested and received. Table 1.20, below, depicts applicable data fields analyzed in the study.

Table 1.20 Idaho Land Assessment Data Fields

Column	Name	Description
A	CNTYNBR	County Number
B	CNTYNAME	County Name
C	CPPKEY	Parcel Number
D	CPCT01	First Secondary category Code
E	CPCT02	Second Secondary category Code
F	CPCT03	Third Secondary category Code
G	CPCT04	Fourth Secondary category Code
Column	Name	Description
H	CPCT05	Fifth Secondary category Code
AH	CPQN01	First Secondary category Code Acreage
AI	CPQN02	Second Secondary category Code Acreage

AJ	CPQN03	Third Secondary category Code Acreage
AK	CPQN04	Fourth Secondary category Code Acreage
AL	CPQN05	Fifth Secondary category Code Acreage
AR	CPVL01	First Category Market Value
AS	CPVL02	Second Category Market Value
AT	CPVL03	Third Category Market Value
AU	CPVL04	Fourth Category Market Value
AV	CPVL05	Fifth Category Market Value
BB	CPLGL1	First Legal Description
BC	CPLGL2	Second Legal Description
BD	CPLGL3	Third Legal Description

Columns A-C provide a unique identifier for each patented lode mine in each of the 28 Idaho counties. Columns D-H reference the applicable secondary category code that the Assessor's Office assign for the property based on use and the statutory requirements of Idaho Code 63-2801. A list of applicable secondary category codes and the provisions of the Idaho Code 63-2801 are set forth in Appendix E. Columns AH-AL refer to the acreage by category with columns AR-AV showing the applicable market value of the property based on the assessed uses. Finally, columns BB-BD provide the legal description associated with the uniquely identified property.

APPENDIX H

Mineral Index Data

Appendix H shows the crosstab and initial regression model results of the mineral index score independent variable. Two hundred ninety-four PLM records were analyzed for the proposition, a*s the economic significance of the composite commodity index score increases, the number of Residential PLMs in tax year 2015 decreases.* The results, as set forth in Table 1.10, proved insignificant at correlating the economic significance of the composite commodity index score with Residential PLMs in Idaho in 2015. No relationship was uncovered between Residential PLM use and the economic significance of the composite commodity index score.

Figure 3, below, depicts the distribution of mineral index score for the 294 records by Residential and Non-Residential PLMs. Figure 5 shows that the vast

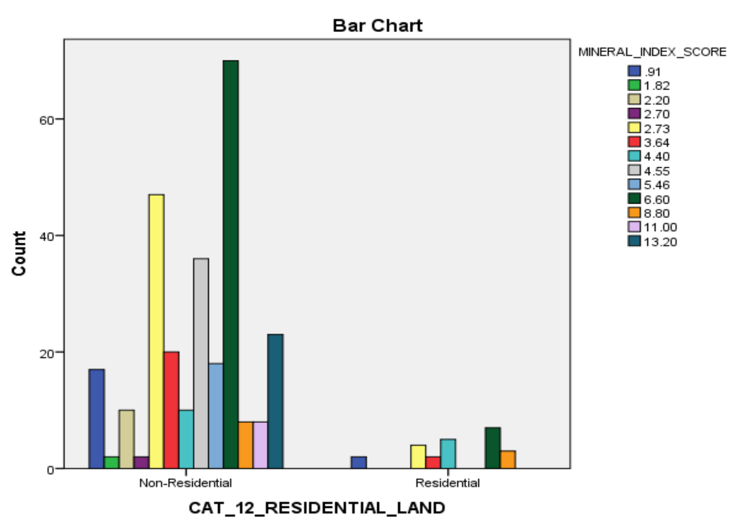


Figure 3. Distribution of Mineral Index Scores for Residential and Non-Residential PLMs

majority of PLM records were for non-Residential PLMs. Further, the majority of mineral index scores were for small gold deposits (77 PLM records with a mineral index score of 6.6), followed by small silver deposits (53 PLM records with a mineral index score of 2.73).

Table 1.21, below, was developed to better understand the distribution of mineral index scores for each of the four prominent PLM land uses. Table 1.21 shows the distribution of mineral index scores and land uses on pre-1920 PLMs in Idaho in 2015. Shown are the number of pre-1920 PLMs by index score, primary commodity, deposit information, and three categories of land use for the 294 available mineral resource records analyzed from the USGS mineral resource data system.

Table 1.21 Distribution of Mineral Index Scores and Land Uses on Pre-1920 PLMs in Idaho in 2015

Mineral Index Score	Primary Mineral	Deposit Info	Number of pre-1920 PLMs	Res. Use [a] (Sub-divided PLM Name)	Active Mining [b] (PLM Name)	Neglected	Re-claimed	Other Land Use
0.91	Silver	Tertiary / Small	19	2 (Marshall)		15	1	1
1.82	Silver	Secondary / Small	2			2		
2.2	Gold	Tertiary / Small	10			9		1
2.73	Silver	Primary / Small	53	4		47		2
3.64	Silver	Primary / Medium	22	2 (Polaris)			1	22
4.4	Gold	Primary / Small Occurrenc e	15	5		6	1	3
4.55	Silver	Primary / Large	36			35		1
5.46	Silver	Primary / World Class / Large	36		1 (Lucky Friday)	25	10 (Triump h)[c]	
6.6	Gold	Primary / Small	77	7 (Mayflower)		45	1	17
8.8	Gold	Secondary / Large	11	3	1 (Galena)	7		
11	Gold	Primary / Large	8			8		

Mineral Index Score	Primary Mineral	Deposit Info	Number of pre-1920 PLMs	Res. Use [a] (Sub-divided PLM Name)	Active Mining [b] (PLM Name)	Neglected	Re-claimed	Other Land Use
13.2	Gold	Primary / World Class Large	5		5 (Golden Chest)			
[a] Seven of the 23 Residential PLMs have improvements as noted in Chapter 6.								
[b] No Mineral Index Score was available for either of the active mines in Ada or Custer Counties.								
[c] Includes the failed subdivision attempt in Blaine County on the Triumph, North Star and Independence pre-1920 PLMs, as shown in Appendix K.								

As shown in Table 1.21, the majority of mineral index scores were awarded a score of 6.6, which featured small and primarily gold as the commodity. This category had 77 pre-1920 PLMs, seven of which were residential (including a -residential subdivision of the Mayflower Mine). For the two active gold mines on pre-1920 PLMs in 2015 for which mineral resource data was available, a mineral index score of 8.8 or higher was given. This included one record associated with the Galena Mine and 23 records associated with the Golden Chest Mine. Noteworthy was that residential uses were found on mineral index scores of ≤ 8.8. Unfortunately, no records for the other two gold mines on pre-1920 PLMs in 2015 were available.

In the matter of world class, large, primarily silver commodity mineral deposits, 5.46 was the highest possible mineral index score. Two groupings of pre-1920 PLMs fell into this category as noted in Table 1.22. One was the world class active Lucky Friday Mine in Shoshone County. The other group of pre-1920 PLMs included the Triumph, Independence, and North Star, which is located in Blaine County and featured a failed subdivision attempt as detailed in Appendix K.

The same noteworthy statement about gold can be said about silver: no residential PLM uses existed on the highest rated mineral index score for the commodity and residential uses only occur on smaller silver deposits with a mineral index score below 5.46. Given the attempt for residential PLM use on the Triumph, Independence, and North Star PLMs, as set forth in Appendix K, this distinction is less substantive. It does introduce to the narrative some of the statistically relevant jurisdictional differences between counties where world class commodity deposits are located.

APPENDIX I

Subdivided PLM Results

The subdivision[55] of pre-1920 patented lode mines has occurred in six Idaho counties, including Ada, Bannock, Boise, Bonner, Idaho, and Shoshone. In total, 33 subdivisions resulting in 285 lots were developed on pre-1920 PLMs in these six counties. Table 1.22, below, provides a complete list of pre-1920 PLMs in Idaho, by county and mine name, that have been subdivided. Also shown in Table 1.22 are the mine patent year, number of lots created, the total number of homes built to date in each subdivision, and entitlement timeframes.

Table 1.22 Subdivided Pre-1920 Patented Lode Mines in Idaho

County Mine Name by (Patent Year)	Total Number of Lots	Number of Homes	Entitlement Timeframe
Ada County			
Delhi Lode (1903)	2	1	6-11 Weeks
Bannock County			
Mountain Springs (1914)	2	1	19-23 Weeks
Boise County			
Mayflower Lode (1902)	2	2	12-18 Weeks
Confederate Lode (1907)	6	5	12-18 Weeks
Bonner County			
Circus R (1905)	5	3	12-18 Weeks
Idaho County			
Ajax (1902)	2	2	≤ Weeks 6
Baby (1904)	2	2	≤ Weeks 6
Black Sam Lode (1915)	3	2	≤ Weeks 6

[55] Subdivision definitions vary, but for purposes of this analysis, are understood to mean a division of a pre-1920 PLM into more than one lot. The mechanism for subdivision can be by formal plat, record of survey or other means, provided a separate parcel number is assigned and valued for the PLM by the applicable county assessment office.

Mine Name by County (Patent Year)	Total Number of Lots	Number of Homes	Entitlement Timeframe
Buffalo Chief (1909)	2	1	≤ Weeks 6
Colonel (1908)	6	4	≤ Weeks 6
Congress No. 1 (1915)	4	2	≤ Weeks 6
Crescent (1908)	3	3	≤ Weeks 6
Key West Lode	33	18	≤ Weeks 6
Northern Star (1906)	17	9	≤ Weeks 6
Queen of the West (1899)	18	4	≤ Weeks 6
Revenue Lode (1914)	10	2	≤ Weeks 6
Robert S Klapperich Lode (1914)	4	4	≤ Weeks 6
St. Louis Fraction (1901)	2	2	≤ Weeks 6
St. Paul (1904)	2	2	≤ Weeks 6
Shoshone County			
Alexandria (1909)	11	11	≤ Weeks 6
Bertha (1903)	10	8	≤ Weeks 6
Big Medicine	13	13	≤ Weeks 6
Defiance (1899)	25	25	≤ Weeks 6
Hampshire (1904)	5	5	≤ Weeks 6
London Globe (1906)	10	9	≤ Weeks 6
Marshall (1910)	19	19	≤ Weeks 6
Midnight #2 (1899)	25	24	≤ Weeks 6
Milton Group (1909)	4	3	≤ Weeks 6
Minnie Healey (1916)	19	18	≤ Weeks 6
Ore-or-no-go (1895)	4	4	≤ Weeks 6
Polaris (1893)	4	4	≤ Weeks 6
Radical (1914)	9	8	≤ Weeks 6
Tom (1914)	2	1	≤ Weeks 6

Land subdivision on pre-1920 PLMs occurred in 33 instances and in just six counties, as referenced in Table 1.22. The data shows that 28 of these 33 subdivisions, representing 268 of the 285 residential lots (or 94%), occurred in Idaho and Shoshone counties, where entitlement timeframes were the most facilitative at ≤ 6 weeks. One subdivision occurred in Bannock County with a 19-23 week entitlement timeframe with the remaining four subdivisions taking place in Ada and Boise Counties with entitlement timeframes of 6-11 and 12-18 weeks, respectively. No subdivisions occurred on a pre-1920 PLM with an entitlement timeframe of ≥ 24 weeks.

Another subdivision example that included the division of a pre-1920 PLM into one or more lots, but for non-residential purposes was in Kootenai County. Table 1.23, below, shows original patent information, as organized by BLM accession number, and the corresponding Kootenai County assessment identification in 2015. The example shows Kootenai County net taxable values adjusted for transfer of PLM ownership to the United States Forest Service (USFS). The subdivision example applies to BLM accession number 448049 and the 123.162 acres Tunnel Lode, which was patented in 1914.

Table 1.23 Kootenai County Example of Net Taxable Values Adjusted for Transfer of PLM Ownership to USFS (Category 81)

Original Patent Information (1872-1920)				Kootenai County Assessment Data (2015)			
BLM Accession Number	Patent Year	Mine Name	Original Patent Acreage	Assessor's Office Parcel Identification	County Assessment Acreage	Total Market Value	Net Taxable Value
289647	1912	Sunset Lode Claims	38.405	49N01E033200	38.5	$91,075*	$0
448049	1914	Tunnel Lode	123.162	50N02W118300& 50N02W125900	122.1	$334,314	$0
				50N02W114575	1.0	$6,088	$6,088**

567996	1917	St. Louis Lode	20.661	50N01E066100	20.6	$22,280*	$0
590401	1917	Copper Mountain Lode	41.69	50N01W249999	41.4	$47,093	$0
			223.918		223.6		
NOTES:							
* Valuation adjusted from larger acreage as percent of total calculated by assessor							
** Indicates private ownership, of 1.0 acre, as retained on county tax rolls							

As indicated in Table 1.23, all four pre-1920 PLMs in Kootenai County have a BLM accession number derived from BLM's general land office records. Patent issuance, in all four cases, occurred in the early 20th century, between 1912 and 1917. No data was retrieved indicating when the patent property moved back to public ownership from the patentee. In 2015, the Kootenai County assessment data indicated that property with a total market value of $494,762 ($91,075, $334,314, $22,280, and $47,093) had no net taxable value as the property was in public ownership. Retained on Kootenai County's tax roll was $6,088 in value, which corresponds with parcel number 50N02W114575 and the remnant privately retained 1.0-acre portion of the Tunnel Lode.

APPENDIX J

Logit Regression Outputs

Appendix J shows the logit regression outputs for the primary regression model tested. As noted, the logistic regression model was used to determine the magnitude of effect the explanatory variables had on the residential classification of pre-1920s PLMs in Idaho in tax year 2015. The purpose of the analysis was to determine which factors contributed to the residential classification of pre-1920s PLMs in tax year 2015 and investigate the implications of these factors. The following independent variables fell under the four main categories outlined in the research methodology: (1) mineral index score; (2) distance to incorporated city, distance to all-season road, distance to seasonal road, distance to amenity; (3) land use permit entitlement timeframe (months to entitle) and median property tax rate; and (4) county population density per mile squared.

For the reasons set forth in the preceding Appendix H, the output results presented below exclude the mineral index score independent variable. However, each of the other seven factors were tested, including distance to incorporated city, distance to all-season road, distance to seasonal road, distance to amenity, land use permit entitlement timeframe (months to entitle), median property tax rate, and county population density per mile squared. Logistic regression correlation outputs for each of these variables are presented in Table 1.24.

Table 1.24 Logistic Regression Correlation Output by Variable.

Distance to Incorporated City

Crosstab

			DISTANCE_TO_INCORP_CITY _LESSEQAUL_5MI_YES1_NO0		
			No	Yes	Total
CAT_12_RESIDENTIAL_LAND	Non-Residential	Count	1273	497	1770
		Expected Count	1226.2	543.8	1770.0
	Residential	Count	231	170	401
		Expected Count	277.8	123.2	401.0
Total		Count	1504	667	2171
		Expected Count	1504.0	667.0	2171.0

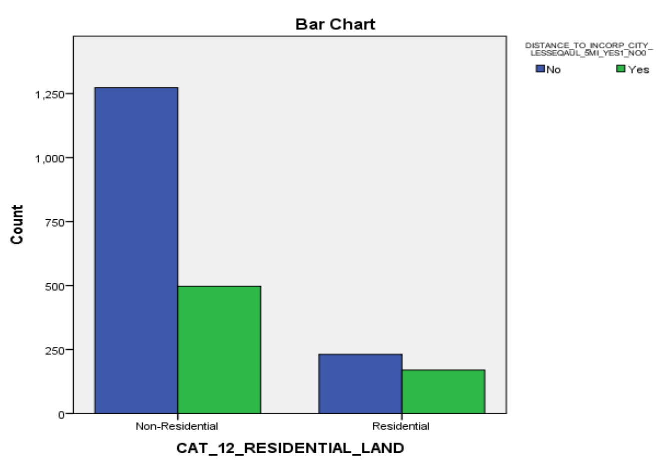
Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Interval by Interval	Pearson's R	.120	.023	5.649	.000[c]
Ordinal by Ordinal	Spearman Correlation	.120	.023	5.649	.000[c]
N of Valid Cases		2171			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.



Distance to All-Season Road

Symmetric Measures

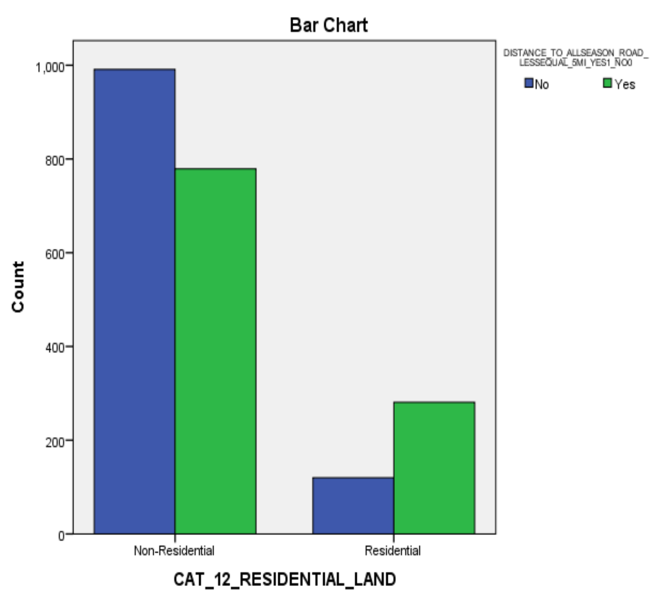
		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Interval by Interval	Pearson's R	.202	.020	9.623	.000[c]
Ordinal by Ordinal	Spearman Correlation	.202	.020	9.623	.000[c]
N of Valid Cases		2171			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Crosstab

			DISTANCE_TO_ALLSEASON_ROAD_LESSEQUAL_5MI_YES1_NO0		
			No	Yes	Total
CAT_12_RESIDENTIAL_LAND	Non-Residential	Count	991	779	1770
		Expected Count	905.8	864.2	1770.0
	Residential	Count	120	281	401
		Expected Count	205.2	195.8	401.0
Total		Count	1111	1060	2171
		Expected Count	1111.0	1060.0	2171.0



Distance to Seasonal Road

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Interval by Interval	Pearson's R	.189	.016	8.963	.000[c]
Ordinal by Ordinal	Spearman Correlation	.189	.016	8.963	.000[c]
N of Valid Cases		2171			

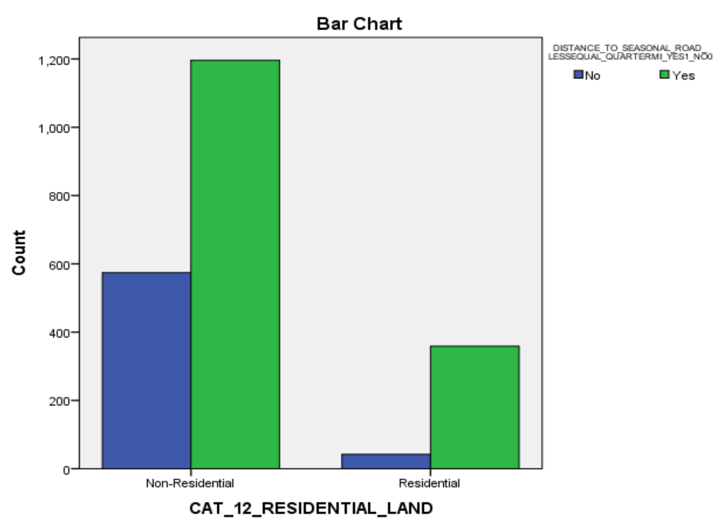
a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Crosstab

			DISTANCE_TO_SEASONAL_ROAD_LESSEQUAL_QUARTERMI_YES1_NO0 No	Yes	Total
CAT_12_RESIDENTIAL_LAND	Non-Residential	Count	574	1196	1770
		Expected Count	502.2	1267.8	1770.0
	Residential	Count	42	359	401
		Expected Count	113.8	287.2	401.0
Total		Count	616	1555	2171
		Expected Count	616.0	1555.0	2171.0



Distance to Amenity

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Interval by Interval	Pearson's R	.145	.022	6.800	.000[c]
Ordinal by Ordinal	Spearman Correlation	.145	.022	6.800	.000[c]
N of Valid Cases		2152			

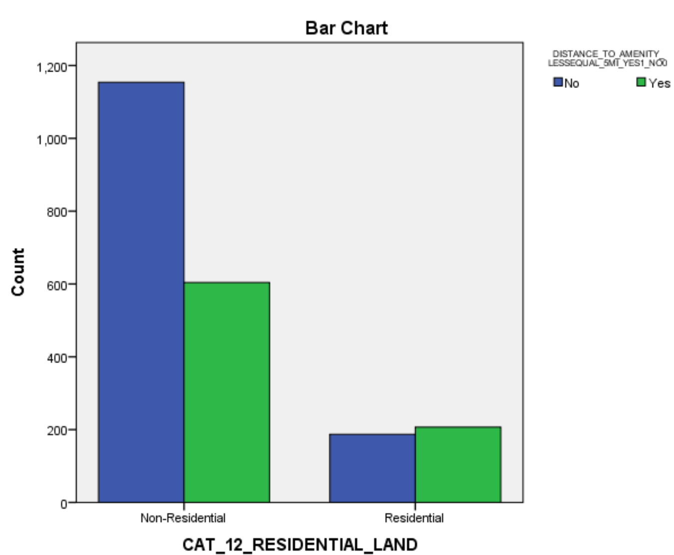
a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Crosstab

			DISTANCE_TO_AMENITY_LESSEQUAL_5MI_YES1_NO0		Total
			No	Yes	
CAT_12_RESIDENTIAL_LAND	Non-Residential	Count	1154	604	1758
		Expected Count	1095.5	662.5	1758.0
	Residential	Count	187	207	394
		Expected Count	245.5	148.5	394.0
Total		Count	1341	811	2152
		Expected Count	1341.0	811.0	2152.0



Months to Entitle

Crosstab

			MONTHS_TO_ENTITLE_1_TO_5_EASYTOHARD					
			0-6 weeks	7-12 weeks	13-18 weeks	19-24 weeks	24+ weeks	Total
CAT_12_RESIDENTIAL_LAND	Non-Residential	Count	989	128	176	128	349	1770
		Expected Count	1060.7	142.7	161.4	109.2	296.0	1770.0
	Residential	Count	312	47	22	6	14	401
		Expected Count	240.3	32.3	36.6	24.8	67.0	401.0
Total		Count	1301	175	198	134	363	2171
		Expected Count	1301.0	175.0	198.0	134.0	363.0	2171.0

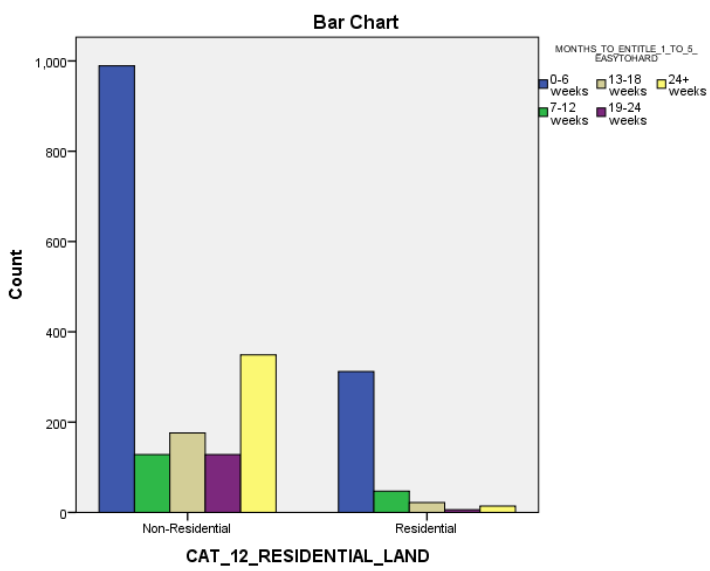
Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Interval by Interval	Pearson's R	-.215	.015	-10.277	.000[c]
Ordinal by Ordinal	Spearman Correlation	-.202	.017	-9.607	.000[c]
N of Valid Cases		2171			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.



Median Property Tax

Crosstab

			MEDIAN_PROPERTY_TAX																				Total
			1	1	1	1	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	4	
CAT_12_RESIDENTIAL_LAND	Non-Residential	Count	91	2	127	59	114	7	10	52	51	83	743	25	25	6	2	2	4	8	7	349	1767
		Expected Count	74.2	1.6	103.6	193.3	95.4	5.7	8.2	42.4	42.4	106.0	713.5	33.4	20.4	4.9	2.4	4.1	4.9	6.5	8.2	296.0	1767.0
	Residential	Count	0	0	0	178	3	0	0	0	1	47	132	16	0	0	1	3	2	0	3	14	400
		Expected Count	16.8	.4	23.4	43.7	21.6	1.3	1.8	9.6	9.6	24.0	161.5	7.6	4.6	1.1	.6	.9	1.1	1.5	1.8	67.0	400.0
Total		Count	91	2	127	237	117	7	10	52	52	130	875	41	25	6	3	5	6	8	10	363	2167
		Expected Count	91.0	2.0	127.0	237.0	117.0	7.0	10.0	52.0	52.0	130.0	875.0	41.0	25.0	6.0	3.0	5.0	6.0	8.0	10.0	363.0	2167.0

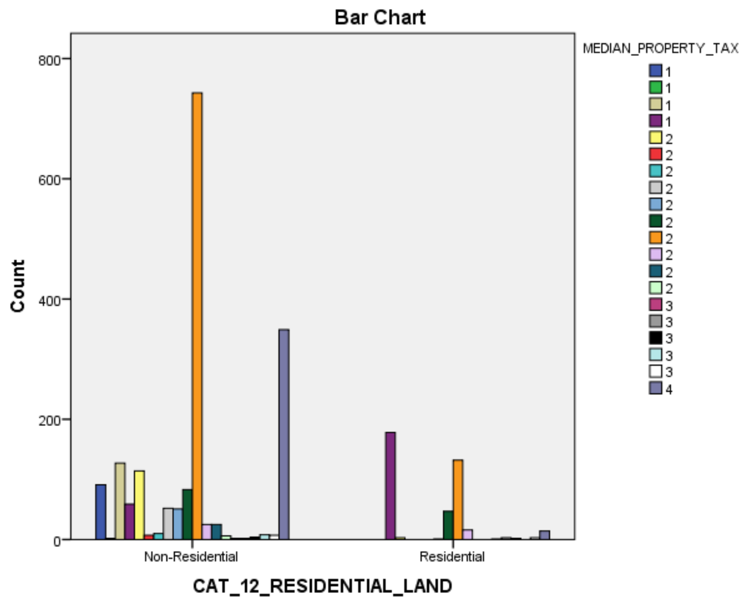
Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Interval by Interval	Pearson's R	-.188	.015	-8.922	.000[c]
Ordinal by Ordinal	Spearman Correlation	-.192	.019	-9.095	.000[c]
N of Valid Cases		2167			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.



County Population Density

Crosstab

			COUNTY_POP_DENSITY_PER_SQ_MI																									Total
			1	1	1	2	2	2	3	3	4	4	4	5	6	6	7	8	9	9	9	20	24	30	36	56	77	120	408	
CAT_12_RESIDENTIAL_ LAND	Non-Residential	Count	2	136	10	124	104	59	25	51	7	40	3	698	2	1	10	349	16	43	2	0	25	33	8	6	2	4	7	1767
		Expected Count	1.6	112.5	8.2	101.1	87.2	193.3	20.4	42.4	5.7	48.1	2.4	675.2	2.4	.8	8.2	296.0	13.0	57.1	1.6	.8	33.4	26.9	6.5	4.9	4.1	4.9	8.2	1767.0
	Residential	Count	0	2	0	0	3	178	0	1	0	19	0	130	1	0	0	14	0	27	0	1	16	0	0	0	3	2	3	400
		Expected Count	.4	25.5	1.8	22.9	19.8	43.7	4.6	9.6	1.3	10.9	.6	152.8	.6	.2	1.8	67.0	3.0	12.9	.4	.2	7.6	6.1	1.5	1.1	.9	1.1	1.8	400.0
Total		Count	2	138	10	124	107	237	25	52	7	59	3	828	3	1	10	363	16	70	2	1	41	33	8	6	5	6	10	2167
		Expected Count	2.0	138.0	10.0	124.0	107.0	237.0	25.0	52.0	7.0	59.0	3.0	828.0	3.0	1.0	10.0	363.0	16.0	70.0	2.0	1.0	41.0	33.0	8.0	6.0	5.0	6.0	10.0	2167.0

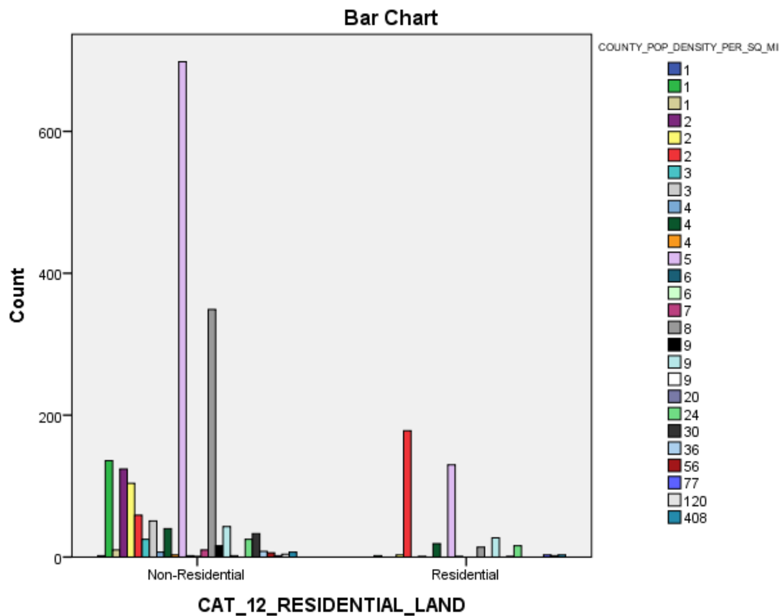
Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Interval by Interval	Pearson's R	.014	.026	.658	.511[c]
Ordinal by Ordinal	Spearman Correlation	-.082	.021	-3.846	.000[c]
N of Valid Cases		2167			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.



APPENDIX K

Attempted Subdivision of the Triumph Mine

In an attempt to understand the trend line of higher Neglected PLMs associated with more obstructive counties, analysis *not* included in the methodology set forth in Chapter 5 was conducted on a grouping of PLMs in Blaine County. Table 1.25, below, summarizes the tax year 2015 assessment records of a grouping of mines commonly referred to as the former Triumph, Independence, and North Star Mines in Blaine County. Featured in the table are five columns of data that, in general terms, are characteristic of the assessment records found in each jurisdiction for the 1,002 cases. Included are parcel identification numbers, pertinent legal descriptions, the assigned secondary category code, acres, and assessed valuations.

Table 1.25 Assessment Records for Portions of the Triumph, Independence and North Star Mines in Blaine County, Idaho (2015)

Parcel Number	Legal Description	Secondary Category Code	Acres	2015 Assessed Valuation
RP1M0000001760	Morning Star, Eclipse, Wednesday, Thursday, Dipper, Baby Ethel	9	94.015	$477
RP1M000000176A	Malta, Chicago, Midland, Union	9	114.570	$570
RP1M0000001770	West Shore, Eula, Silver Bullion #2, Independence, Little Giant,	9	206.638	$1,033
RP1M000000177A	True Friend, Helen, Haimdal, Smolenski, Western, Barge, Ben Harrison, Edem Pasha,	9	198.651	$993

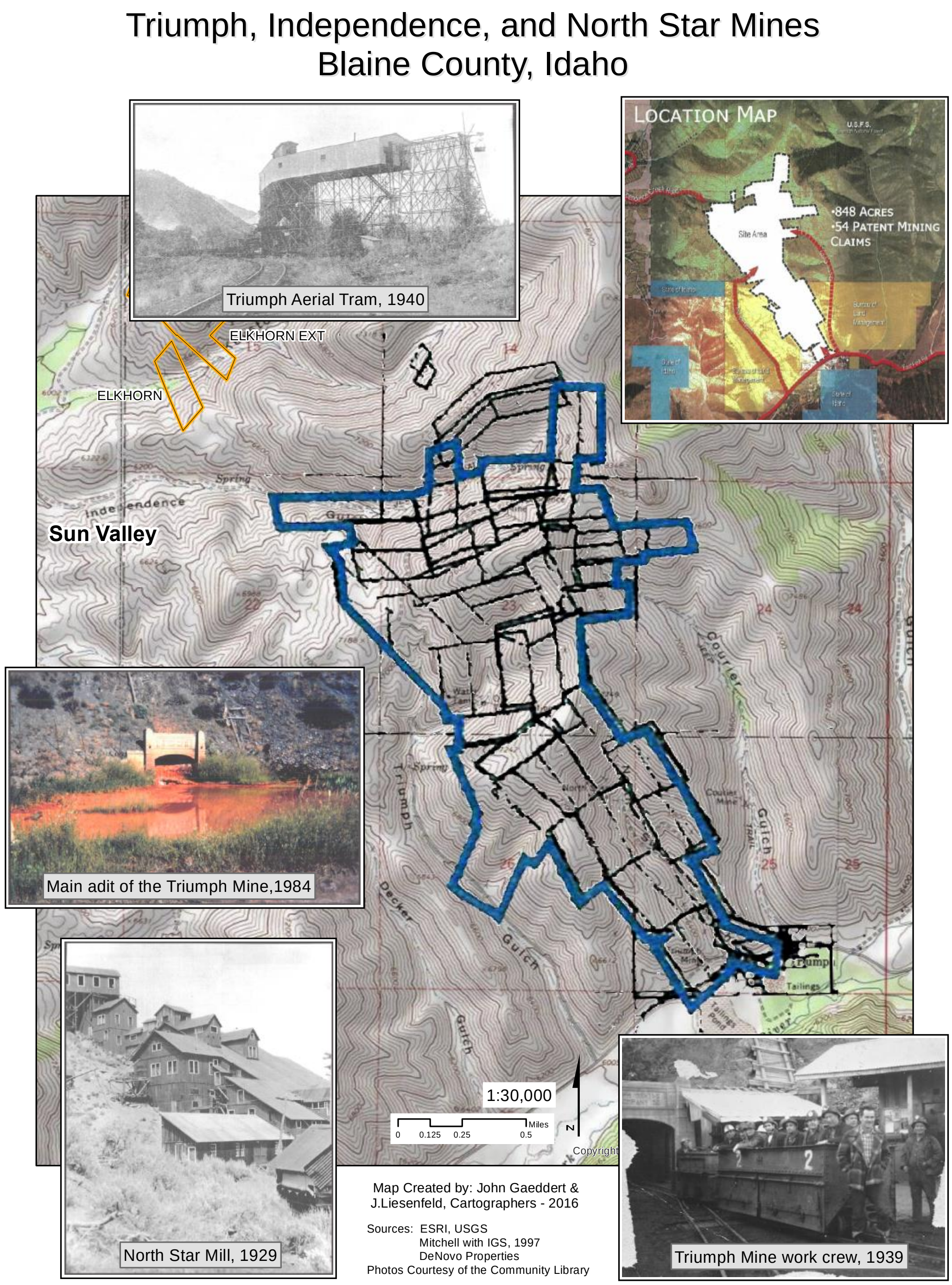
Parcel Number	Legal Description	Secondary Category Code	Acres	2015 Assessed Valuation
	American Eagle, Teller			
RP1 M000000177B	May Leaf, Triumph, Minerva, Mary, Redemption, Koeniger, Sec 23, Neighbor	9	130.355	$652
RPM 0000001780	Woodrow, Bryan, Domski, North Star	9	104.021	$520
TOTAL:			848.250	$4,241

Table 1.25 shows the six tax assessment records of the Triumph, Independence, and North Star grouping of PLMs in Blaine County. The records in this case, although not depicted, are held in common ownership and combined total 848.25 acres. As shown in the table, each property record was assigned a secondary category code of 9 and, consistent with the statutory provisions of Idaho Code §63-2801 for mineral lode mines, had assessed values of five dollars an acre ($5/acre) that, in aggregate, totaled $4,241 in tax year 2015.

The property valuation depicted in Table 1.25, above, for the Triumph, Independence, and North Star Mines was typical for other Neglected PLMs in Idaho in 2015. However, differences emerge in the case of these Blaine County PLMs when entitlement timeframes are considered and circumstances of the proposed subdivision of the Triumph, Independence, and North Star Mines are described.

Triumph Mine has been characterized by the USGS (2016) as a world class deposit. The mine was once valued for its rich ore deposits, but in 2007 was purchased by a brownfield developer for a reported six million dollars ($6,000,000). After purchase, additional site reclamation occurred and then from late-2007 to early-2009 the property was proposed for a 36-lot residential subdivision to be annexed into the City of Sun Valley.

Map 7, as depicted on the following page, provides an illustrative history of the Triumph, Independence, and North Star Mine that ended in 2009 in the failed redevelopment of the property into a 36-lot residential subdivision.



Map 7. Triumph, Independence, and North Star Mines in Blaine County

Map 7 can be viewed as a vignette of the 125-year history of the Triumph, Independence, and North Star Mines, which were patented in 1892, 1892, and 1886, respectively. As shown on the location map, the site area of the Triumph, Independence, and North Star Mines includes 54 mining claims and consists of 848 acres. The property, as shown on the location map with dashed red lines, is accessible by three seasonal roads, including Triumph and Courier Gulches from the south and Independence Creek Road and the City of Sun Valley from the north. The location map also shows adjoining land ownership, including USFS (shown in green), BLM (shown in yellow) and State of Idaho (shown in blue).

Three inset photos on Map 7 convey the rich visual history and overall integrity of the mining landscape that was associated with the Triumph Mine. The top inset photo was taken in 1940 and features the Triumph Aerial Tramway adjacent to the Union Pacific rail line, which was built to receive ore from the higher elevation Triumph Mine and transfer it into rail ore cars for subsequent processing at the smelter in Ketchum. The bottom right inset photo, also taken just prior to World War II, shows a mining crew outside the main Triumph portal. The oldest inset photo was taken in 1929 and features a classic mill design with buildings, one after the other, stepping down the hillside. As such, the 1929 North Star Mill photo exemplifies past attributes of functional architecture in mining, as each lower building was affiliated with a higher concentration of ore, starting with stamping and crushing of larger ore fragments at the top, followed increasingly with chemicals and ore benefication separating processes in the bottom buildings.

The last photo inset features the main Triumph adit in 1984, which was four years before the State of Idaho performed its first preliminary assessment of the mine (IDEQ, 2016). The 1984 Triumph adit photo is also 20 years before the state completed its remediation of the Triumph Mine consistent with a 1994 consent order entered into after the USEPA proposed to list the property as a superfund site[56] (IDEQ, 2016). In 2004, the state completed its reclamation work at the Triumph Mine, as well as neighboring state endowment lands (as shown in blue on the location map inset of Map 7). Completed were a series of remediation activities, including wetland restoration, the removal of soil from backyards, the capping and revegetation of tailings, and plugging of the Triumph adit (IDL, 2017; IDEQ, 2016).

The last element of the vignette portrayed by Map 7 and its depiction of the history of the Triumph, Independence, and North Star Mines, including site remediation, is the main topographic map upon which the various photo insets are placed. As shown, the Triumph, Independence, and North Star are individual mines within a cluster of separate and distinct patented lode claims. The individual PLMs extend north to south nearly two miles with the hodgepodge of claims patented in seven different land sections.

The topographic map of the Triumph, Independence and North Star Mines shows the property boundary. On the south, the property abuts a public road near the unincorporated area of Triumph. North of the unincorporated town of Triumph, property features include the old foundations from the North Star Mill and various remnant mine between Triumph Gulch on the west and Courier Gulch on the east. The property

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[56] As reported by the Idaho Department of Environmental Quality (IDEQ), "The United States Environmental Protection Agency (USEPA) proposed to list the [Triumph Mine] site on the National Priorities List but this resulted in strong community opposition. The community opposition resulted in a Memorandum of Agreement between IDEQ and the EPA deferring remediation responsibility to the IDEQ. IDEQ entered into a Consent Order with [the former owner] ASARCO and IDL in 1994 to perform cleanup of the site" (IDEQ, 2016, p. 1).

encompasses the entire south facing slope, as well as the ridge above the unincorporated town of Triumph. Along the ridge, the property elevation varies between 7,168 and 8,348 and includes natural features, such as a spring, knolls and plateau areas.

Located along the ridge overlooking Sun Valley, near the area referenced as spring on the topographic map (within section 23), homes overlooking the Boulder Mountains and the Cities of Ketchum and Sun Valley were proposed. Services were requested of Sun Valley with primary access proposed from the eastern City Limits of Sun Valley through Independence and Keystone Gulches. However, neither the City of Sun Valley nor Blaine County have approved the proposal by DeNovo Properties for a 36-lot residential subdivision.

Approximately two years after the property was purchased, the proposed redevelopment of the Triumph Mine 36-lot residential community project was denied. In its findings, the City of Sun Valley found the proposal incompatible with its goals, as set forth in its adopted comprehensive plan. Other noted reasons for denial included inadequate road access and, as a result, an inability on the part of the City to provide essential public services (Sun Valley, 2009). The city further documented that it was "not in the best interest of the City to include contaminated lands in its Future Land Use Map for residential development because of the hazards associated with…. [k]nown contaminants, include[ing] … arsenic, cadmium, lead and cyanide which pose threats to people and wildlife" (Sun Valley, 2009, p. 4).

The proposed residential development on the Triumph, North Star, and Independence grouping of PLMs was found inconsistent with the goals of the community. Misrepresentation lawsuits have since been filed and settled. The project not only shows how competing values in environmental decision-making can manifest on PLMs. It also shows the clear disconnect between the economic pursuits of the PLM landowner and the priorities of the community. Non-facilitative entitlement timeframes conveyed this message.

Differing community and developer priorities manifested in the proposed Triumph 36-lot Residential PLM. Despite previous reclamation involving the Idaho Department of Lands, millions of dollars in acquisition costs, and an attempt to re-purpose the PLMs for high-end residential uses, the community rejected the proposal. The 848 acre Triumph grouping of mines remain neglected. In fact, in tax year 2015 the Triumph, Independence, and North Star PLMs were assessed based on a non-speculative “mineral” valuation of five dollars an acre ($5/acre) for a total taxable value of $4,241.

Statistically, without any reference as to the merits of the DeNovo Properties residential subdivision proposal, the logit regression results set forth in Table 1.17 indicate at least two variables worked against and one variable worked for the Triumph group of pre-1920 PLMs being subdivided. Statistically favorable was that the property was close to Sun Valley (≤ 5 miles) and not greater than five miles (> 5 miles) from an incorporated city where fewer residential subdivisions occurred statewide as of 2015 by 81.5 %.

Statistically unfavorable for the proposed Triumph grouping of PLMs re-development was Blaine County’s increased land use permit entitlement timeframe and ranking at the top of the 4th quartile in median property tax rate. As noted, as the median property tax rate increases, the odds of a pre-1920 PLM being subdivided decreases by 77.4%. Further, for every six week increase in land use permit entitlement timeframes, the odds of a PLM being categorized as subdivided is lower by 49.3%. The result is that a trend line of higher Neglected PLMs exists with counties having less facilitative entitlement timeframes.

APPENDIX L

Subdivided Residential PLM Logit Regression Analysis and Outputs

In order to account for multiple PLMs throughout Idaho being subdivided,[57] a new variable "subdivided mine" was coded into the data and the logit regression analysis was re-run.[58] Table 1.26, below, shows the association of the seven measured independent variables using Pearson's correlation coefficient, *r*, in a matrix format.[59] The direction and strength of the relationship of the two jurisdictional, four surface estate, and the control variables are noted. In particular, entitlement timeframes, median property tax rate, distances to incorporated areas, amenities, seasonal and all-season roads, and population density per square mile were correlated.

Table 1.26 Correlation Table Depicting Subdivided Residential PLMs in Idaho in 2015

		esidential (Category 12 or Equivalent)	ineral Index Score	5 Miles to Inc. City	5 Miles to All-Season Road	0.25 Miles to Seasonal Road	5 Miles to Amenity	onths to Entitle	edian Property Tax Rate	ounty Population Density Per Square Mile	ubdivided PLM
esidential (Cat 12 or Equivalent)	earson's		.040	120**	202**	189**	145**	.215**	.188**	014	660**
	ig. (2-tailed)		492	000	000	000	000	000	000	511	.000
		171	94	171	171	171	152	171	167	167	171
ineral	earson's	.040		.044	.084	.138*	.042	.153**	.089	.013	b

---

[57] See Appendix I for additional detail on subdivided PLMs.

[58] The process of accounting for new records created by the division of pre-1920 PLMs for various government, commercial, and residential purposes, as generally set forth in Table 1.9, resulted in an N of 2,171; or, approximately 263 more records than the total number of pre-1920 PLMs (1,908). Of these 263 additional records, the vast majority at 252 records are additional residential lots.

[59] Logistic regression output for the Subdivided Mine variable is provided at the end of this Appendix.

Index Score	ig. (2-tailed)	492		451	150	018	469	008	129	828	.000
		94	94	94	94	94	94	94	94	94	94
5 Miles to Inc. City	earson's	120**	.044		658**	262**	084**	.204**	086**	.038	239**
	ig. (2-tailed)	000	451		000	000	000	000	000	077	000
		171	94	171	171	171	152	171	167	167	171
5 Miles to All-Season Road	earson's	202**	.084	658**		333**	094**	.192**	062**	038	154**
	ig. (2-tailed)	000	150	000		000	000	000	004	078	000
		171	94	171	171	171	152	171	167	167	171
0.25 Miles to Seasonal Road	earson's	189**	.138*	262**	333**		280**	.272**	.107**	.038	140**
	ig. (2-tailed)	000	018	000	000		000	000	000	075	000
		171	94	171	171	171	152	171	167	167	171
5 Miles to Amenity	earson's	145**	.042	084**	094**	280**		.236**	.248**	.051*	014
	ig. (2-tailed)	000	469	000	000	000		000	000	017	507
		152	94	152	152	152	152	152	148	148	152
onths to Entitle	earson's	.215**	.153**	.204**	.192**	.272**	.236**		704**	044*	.232**
	ig. (2-tailed)	000	008	000	000	000	000		.000	042	000
		171	94	171	171	171	152	171	167	167	171
edian Property Tax Rate	earson's	.188**	.089	086**	062**	.107**	.248**	704**		156**	.161**
	ig. (2-tailed)	000	129	000	004	000	000	.000		000	000
		167	94	167	167	167	148	167	167	167	167
ounty Populati on Density per Sq. Mile	earson's	014	.013	.038	038	.038	.051*	044*	156**		002
	ig. (2-tailed)	511	828	077	078	075	017	042	000		920
		167	94	167	167	167	148	167	167	167	167

ubdivide d PLM	earson's	660**	b	239**	154**	140**	014	.232**	.161**	002	
	ig. (2-tailed)	000	.000	000	000	000	507	000	000	920	
		171	94	171	171	171	152	171	167	167	171

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

b. Cannot be computed because at least one of the variables is constant.

As shown in the correlation matrix set forth in Table 1.25, the subdivided mine is three times more positively correlated with Residential PLMs, displaying a factor of .660. Also shown was the strength and magnitude of each of the variables to one another with the last value comparing the correlation of the subdivided PLMs with residential PLMs. With a possible range from -1 to +1 and negative and positive values indicating the relative direction of the relationship, Table 1.25 indicates at a 95% (or 0.05) confidence level that the control variable and each of the surface estate proximity to roads and services variables are positively correlated with the residential use of PLMs, while the jurisdictional variables (months to entitle and median property tax rate) are negatively correlated. Given the strength of the noted correlation,[60] further regression analysis was deemed appropriate.

Table 1.27, below, shows an additional logistic regression model summary that includes the subdivided residential PLM variable in the equation. As noted, the model output includes all variables except the ordinal-level mineral index score.

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[60] A collinearity diagnostic was performed between median property tax and permit entitlement timeframe as the two variables crossed the conservative threshold of 0.7. Specifically, the correlation table was used to test each of the independent variables for collinearity using the cutoff points of 0.7, 0.8, and 0.9, respectively. Upon analysis, it was found that no violation of collinearity existed as all the VIF values were below the “5” threshold.

Table 1.27 Logistic Regression Model Summary and Equation Variables for Subdivided Residential PLMs

MODEL SUMMARY	-2 Log Likelihood	Cox & Snell R Square		Nagelkerke R Square					
	1 117.074	.351		.571					
VARIABLES IN EQUATION	B	.E.	Wald	f	ig.	Exp(B)	95% C.I. for EXP(B) Lower	95% C.I. for EXP(B) Higher	
Subdivided Mine	-4.886	258	359.535		000	.008	.005	.013	
Distance to Incorporated City (≤ 5 mi, y=1, n=0)	1.433	225	40.511		000	4.190	2.695	6.514	
Distance to All-Season Road (≤ 5 mi, y=1, n=0)	-1.591	204	60.567		000	.204	.136	.304	
Distance to Seasonal Road (≤ 0.25 mi, y=1, n=0)	-.875	265	10.877		001	.417	.248	.701	
Distance to Amenity (≤ 5 mi, y=1, n=0)	-1.095	177	38.264		000	.335	.237	.473	
Months to Entitle (1 to 5, Easy to Hard)	.096	090	1.156		282	1.101	.924	1.313	
Median Property Tax Rate	-.532	164	10.504		001	.587	.426	.810	

County Population Density Per Sq. Mile	.004	003	2.547		110	1.004	.999	1.009
Constant	3.746	359	108.693		000	42.354		

Based upon the Pseudo R Squares, the fit of the model as shown in Table 1.27 is moderately strong, with approximately 35%-57% of Residential PLMs being explained by land subdivisions. The data indicates that all variables, except for months to entitle and county population density, were significant factors in residential land subdivisions.

The odds for each variable are outlined below:

- if the distance to an incorporated city is greater than 5 miles, the odds of a PLM being categorized as residential is greater by 319 %;
- if the distance an all-season road is greater than 5 miles, the odds of a PLM being categorized as residential is lower by a 79.6 %;
- if the distance to a seasonal road is greater than 0.25 miles, the odds of a PLM being categorized as residential is lower by 58.3 %;
- if the distance to an amenity is greater than 5 miles, the odds of a PLM being categorized as residential is lower by 66.5 %; and
- as the median property tax rate increases, the odds of a PLM being categorized as residential is lower by 41.3 %.

The increased fit of the model at 35%-57% compared to the initial model of 11%-18% suggests that the analysis is at least partially correct in finding that land subdivision plays a role in the residential categorization of PLMs. However, upon examining the output, it seemed curious that months to entitlement was not significant once the new subdivided variable was added to the model. The odds suggested that a pre-1920 PLM was more likely to be residential in 2015 if it was farther away from a city, yet still close to other infrastructure such as roadways and amenities.

In an attempt to further understand the factors affecting the residential subdivision of PLMs, one further regression analysis was pursued using residentially subdivided PLMs as the dependent variable. Table 1.28, below, shows this final logistic regression model summary with the dependent variable changed from residential / not residential to residential subdivided PLMs.

Table 1.28 Logistic Regression Model Summary and Equation with Subdivided Residential PLMs the Dependent Variable

MOD EL SUMMARY	- 2 Log Likelihood 1 282.666	Cox & Snell R Square .130		Nagelkerke R Square .249				
VAR IABLES IN EQUATION	B	.E.	W ald	f	ig.	E xp(B)	9 5% C.I. for EXP(B L ower	9 5% C.I. for EXP(B) H igher
D istance to Incorporate d City (≤ 5 mi, y=1, n=0)	- 1.686	236	5 1.002		000	. 185	. 117	. 294
D istance to All-Season Road (≤ 5 mi, y=1, n=0)	. 169	237	. 509		476	1 .184	. 745	1 .882
D istance to Seasonal Road (≤ 0.25 mi, y=1, n=0)	- .382	238	2 .575		109	. 682	. 428	1 .088
D istance to								

Amenity (≤ 5 mi, y=1, n=0)	.425	148	8.220		004	1.529	1.144	2.044
Months to Entitle (1 to 5, Easy to Hard)	-.679	139	23.848		000	.507	.386	.666
Median Property Tax Rate	-1.487	214	348.399		000	.226	.149	.344
County Population Density Per Sq. Mile	.009	002	19.707		000	1.009	1.005	1.014
Constant	2.500	461	29.459		000	12.182		

Based upon the Pseudo R Squares, the fit of the model as shown in Table 1.28 was weak to moderate, with approximately 13%-25% of a PLM subdivision being explained by the jurisdictional variables of months to entitle and median property tax, as well as the control variable of county population density. Distance to an all-season road was not significant with a value of 0.476, which was larger than the confidence interval threshold of .05 or 95 %. The odds factors are outlined below:

- if the distance to an incorporated city is greater than five miles (> 5 miles), the odds of a PLM being categorized as subdivided is lower by 81.5 %;
- if the distance to an amenity is > 5 mile, the odds of a PLM being categorized as subdivided increases by 52.9 %;
- for every 6 week increase in land use permit entitlement timeframes, the odds of a PLM being categorized as subdivided is lower by 49.3 %;

- as the median property tax rate increases, the odds of a PLM being categorized as subdivided is lower by 77.4 %; and
- as the county population density increases, the odds of a PLM being categorized as residential is greater by 0.9 %.

The data supports the assumption that several factors are significant to the prediction of the residential subdivision and residential use of pre-1920 PLMs in 2015. Notably from the original grand total of 1,908 pre-1920 PLMs, 1,759 were not residential while 147 were residential; however, of the 147 residential PLMs, 33 were subdivided creating 252 additional residential lots for a total of 399 residential lots. To represent the key factors affecting these 399 residential PLM uses, a model was developed as illustrated in Figure 4, below.

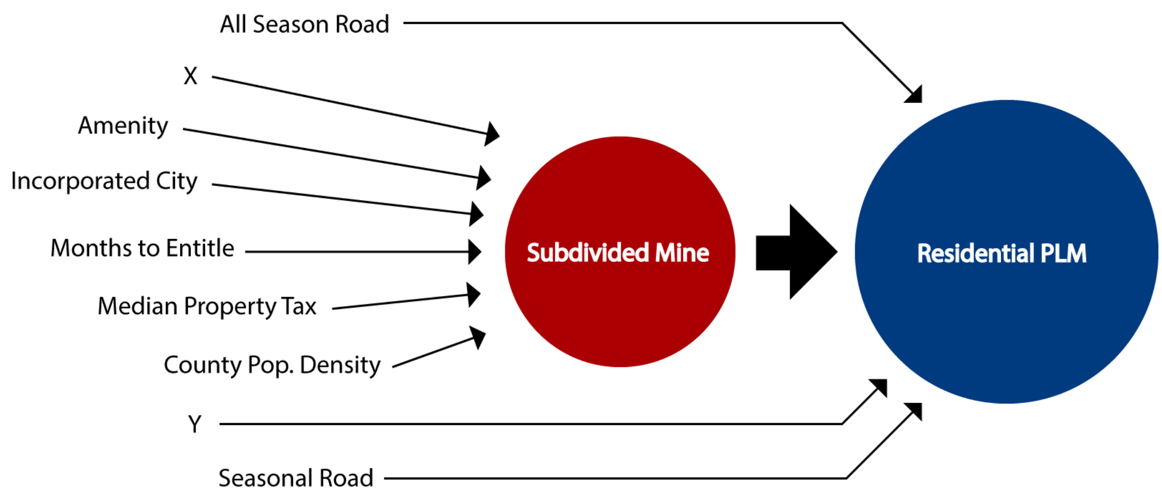


Figure 4. Key Factors Affecting the Residential Use and Subdivision of pre-1920 PLMs in Idaho in 2015

The model set forth in Figure 4 illustrates the relationships uncovered with the regression analysis. As noted, distance to incorporated city and median property tax rate affect residential subdivision PLM use the most, followed by a PLMs distance to an amenity and a given jurisdiction's entitlement timeframes. Population density also influences residential subdivision use, although the impact is negligible. Both distances to a seasonal or an all-season road affect residential PLM use. Placeholder variables x and y are provided to account for factors that were not specified in the model and possibly could be a subject of further research.

Table 1.29, below, shows the Subdivided Mine variable logistic regression output.

Table 1.29 Subdivided Mine Logistic Regression Correlation Output

Subdivided Mine

Crosstab

			Subdivided_mine		Total
			no	subdivided	
CAT_12_RESIDENTIAL_LAND	Non-Residential	Count	1737	33	1770
		Expected Count	1555.6	214.4	1770.0
	Residential	Count	171	230	401
		Expected Count	352.4	48.6	401.0
Total		Count	1908	263	2171
		Expected Count	1908.0	263.0	2171.0

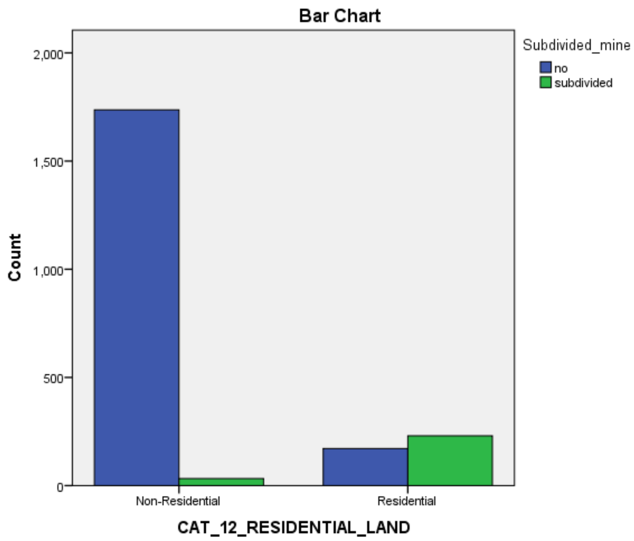
Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Interval by Interval	Pearson's R	.660	.021	40.911	.000[c]
Ordinal by Ordinal	Spearman Correlation	.660	.021	40.911	.000[c]
N of Valid Cases		2171			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.


Bar Chart
Subdivided_mine
no
subdivided
Count
2,000
1,500
1,000
500
0
Non-Residential
Residential
CAT_12_RESIDENTIAL_LAND

Logistic Regression All Variables

Case Processing Summary

Unweighted Cases[a]		N	Percent
Selected Cases	Included in Analysis	294	13.5
	Missing Cases	1877	86.5
	Total	2171	100.0
Unselected Cases		0	.0
Total		2171	100.0

a. If weight is in effect, see classification table for the total number of cases.

Dependent Variable Encoding

Original Value	Internal Value
Non-Residential	0
Residential	1

Categorical Variables Codings

		Frequency	Parameter coding (1)
DISTANCE_TO_AMENITY_LESSEQUAL_5MI_YES1_NO0	No	127	1.000
	Yes	167	.000
DISTANCE_TO_ALLSEASON_ROAD_LESSEQUAL_5MI_YES1_NO0	No	157	1.000
	Yes	137	.000
DISTANCE_TO_SEASONAL_ROAD_LESSEQUAL_QUARTERMI_YES1_NO0	No	81	1.000
	Yes	213	.000
DISTANCE_TO_INCORP_CITY_LESSEQAUL_5MI_YES1_NO0	No	195	1.000
	Yes	99	.000

Classification Table[a,b]

	Observed		Predicted: CAT_12_RESIDENTIAL_LAND Non-Residential	Predicted: CAT_12_RESIDENTIAL_LAND Residential	Predicted: Percentage Correct
Step 0	CAT_12_RESIDENTIAL_LAND	Non-Residential	271	0	100.0
		Residential	23	0	.0
	Overall Percentage				92.2

a. Constant is included in the model.

b. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 0	Constant	-2.467	.217	128.990	1	.000	.085

Variables not in the Equation

			Score	df	Sig.
Step 0	Variables	DISTANCE_TO_INCORP_CITY_LESSEQAUL_5MI_YES1_NO0(1)	2.962	1	.085
		DISTANCE_TO_ALLSEASON_ROAD_LESSEQUAL_5MI_YES1_NO0(1)	.015	1	.902
		DISTANCE_TO_SEASONAL_ROAD_LESSEQUAL_QUARTERMI_YES1_NO0(1)	2.631	1	.105
		DISTANCE_TO_AMENITY_LESSEQUAL_5MI_YES1_NO0(1)	2.977	1	.084
		MONTHS_TO_ENTITLE_1_TO_5_EASYTOHARD	1.590	1	.207
		MEDIAN_PROPERTY_TAX	.650	1	.420
		COUNTY_POP_DENSITY_PER_SQ_MI	7.848	1	.005
		MINERAL_INDEX_SCORE	.476	1	.490
	Overall Statistics		20.666	8	.008

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	16.645	8	.034
	Block	16.645	8	.034
	Model	16.645	8	.034

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	144.719[a]	.055	.130

a. Estimation terminated at iteration number 6 because parameter estimates changed by less than .001.

Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	21.159	8	.007

Contingency Table for Hosmer and Lemeshow Test

		CAT_12_RESIDENTIAL_LAND = Non-Residential		CAT_12_RESIDENTIAL_LAND = Residential		
		Observed	Expected	Observed	Expected	Total
Step 1	1	27	26.579	0	.421	27
	2	30	29.304	0	.696	30
	3	28	29.025	2	.975	30
	4	28	27.790	1	1.210	29
	5	23	26.491	5	1.509	28
	6	28	26.253	0	1.747	28
	7	26	24.027	0	1.973	26
	8	30	28.074	1	2.926	31
	9	23	26.984	8	4.016	31
	10	28	26.474	6	7.526	34

Classification Table[a]

			Predicted		
			CAT_12_RESIDENTIAL_LAND		Percentage Correct
	Observed		Non-Residential	Residential	
Step 1	CAT_12_RESIDENTIAL_LAND	Non-Residential	271	0	100.0
		Residential	22	1	4.3
	Overall Percentage				92.5

a. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	Upper
Step 1[a]	DISTANCE_TO_INCORP_CITY_LESSEQAUL_5MI_YES1_NO0(1)	1.555	.715	4.732	1	.030	4.736	1.167	19.231
	DISTANCE_TO_ALLSEASON_ROAD_LESSEQUAL_5MI_YES1_NO0(1)	-.461	.559	.679	1	.410	.631	.211	1.887
	DISTANCE_TO_SEASONAL_ROAD_LESSEQUAL_QUARTERMI_YES1_NO0(1)	-.933	.711	1.722	1	.189	.394	.098	1.585
	DISTANCE_TO_AMENITY_LESSEQUAL_5MI_YES1_NO0(1)	-.712	.545	1.707	1	.191	.491	.169	1.428
	MONTHS_TO_ENTITLE_1_TO_5_EASYTOHARD	-.184	.207	.788	1	.375	.832	.555	1.248
	MEDIAN_PROPERTY_TAX	.114	.423	.073	1	.787	1.121	.489	2.571
	COUNTY_POP_DENSITY_PER_SQ_MI	.034	.024	2.005	1	.157	1.035	.987	1.085
	MINERAL_INDEX_SCORE	-.040	.079	.260	1	.610	.961	.823	1.121
	Constant	-2.786	1.092	6.504	1	.011	.062		

a. Variable(s) entered on step 1: DISTANCE_TO_INCORP_CITY_LESSEQAUL_5MI_YES1_NO0, DISTANCE_TO_ALLSEASON_ROAD_LESSEQUAL_5MI_YES1_NO0, DISTANCE_TO_SEASONAL_ROAD_LESSEQUAL_QUARTERMI_YES1_NO0, DISTANCE_TO_AMENITY_LESSEQUAL_5MI_YES1_NO0, MONTHS_TO_ENTITLE_1_TO_5_EASYTOHARD, MEDIAN_PROPERTY_TAX, COUNTY_POP_DENSITY_PER_SQ_MI, MINERAL_INDEX_SCORE.

Logistic Regression All Variables Without Index Score or Subdivided Mine

Case Processing Summary

Unweighted Cases[a]		N	Percent
Selected Cases	Included in Analysis	2148	98.9
	Missing Cases	23	1.1
	Total	2171	100.0
Unselected Cases		0	.0
Total		2171	100.0

a. If weight is in effect, see classification table for the total number of cases.

Dependent Variable Encoding

Original Value	Internal Value
Non-Residential	0
Residential	1

Categorical Variables Codings

		Frequency	Parameter coding (1)
DISTANCE_TO_AMENITY_LESSEQUAL_5MI_YES1_NO0	No	1338	1.000
	Yes	810	.000
DISTANCE_TO_ALLSEASON_ROAD_LESSEQUAL_5MI_YES1_NO0	No	1103	1.000
	Yes	1045	.000
DISTANCE_TO_SEASONAL_ROAD_LESSEQUAL_QUARTERMI_YES1_NO0	No	616	1.000
	Yes	1532	.000
DISTANCE_TO_INCORP_CITY_LESSEQAUL_5MI_YES1_NO0	No	1481	1.000
	Yes	667	.000

Classification Table[a,b]

	Observed		Predicted: CAT_12_RESIDENTIAL_LAND Non-Residential	Predicted: CAT_12_RESIDENTIAL_LAND Residential	Predicted: Percentage Correct
Step 0	CAT_12_RESIDENTIAL_LAND	Non-Residential	1755	0	100.0
		Residential	393	0	.0
	Overall Percentage				81.7

a. Constant is included in the model.

b. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 0	Constant	-1.496	.056	719.017	1	.000	.224

Variables not in the Equation

			Score	df	Sig.
Step 0	Variables	DISTANCE_TO_INCORP_CITY_LESSEQAUL_5MI_YES1_NO0(1)	33.466	1	.000
		DISTANCE_TO_ALLSEASON_ROAD_LESSEQUAL_5MI_YES1_NO0(1)	83.428	1	.000
		DISTANCE_TO_SEASONAL_ROAD_LESSEQUAL_QUARTERMI_YES1_NO0(1)	76.117	1	.000
		DISTANCE_TO_AMENITY_LESSEQUAL_5MI_YES1_NO0(1)	45.843	1	.000
		MONTHS_TO_ENTITLE_1_TO_5_EASYTOHARD	102.003	1	.000
		MEDIAN_PROPERTY_TAX	76.813	1	.000
		COUNTY_POP_DENSITY_PER_SQ_MI	.428	1	.513
	Overall Statistics		206.603	7	.000

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	256.114	7	.000
	Block	256.114	7	.000
	Model	256.114	7	.000

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	1788.153[a]	.112	.183

a. Estimation terminated at iteration number 6 because parameter estimates changed by less than .001.

Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	258.874	8	.000

Contingency Table for Hosmer and Lemeshow Test

		CAT_12_RESIDENTIAL_LAND = Non-Residential		CAT_12_RESIDENTIAL_LAND = Residential		
		Observed	Expected	Observed	Expected	Total
Step 1	1	204	201.768	0	2.232	204
	2	166	175.436	15	5.564	181
	3	234	221.056	1	13.944	235
	4	234	214.326	4	23.674	238
	5	170	185.741	47	31.259	217
	6	125	173.198	97	48.802	222
	7	204	242.646	124	85.354	328
	8	122	95.052	15	41.948	137
	9	235	168.282	13	79.718	248
	10	61	77.496	77	60.504	138

Classification Table[a]

			Predicted		
			CAT_12_RESIDENTIAL_LAND		Percentage Correct
	Observed		Non-Residential	Residential	
Step 1	CAT_12_RESIDENTIAL_LAND	Non-Residential	1746	9	99.5
		Residential	390	3	.8
	Overall Percentage				81.4

a. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	Upper
Step 1[a]	DISTANCE_TO_INCORP_CITY_LESSEQAUL_5MI_YES1_NO0(1)	-.023	.160	.021	1	.885	.977	.714	1.337
	DISTANCE_TO_ALLSEASON_ROAD_LESSEQUAL_5MI_YES1_NO0(1)	-.966	.161	35.872	1	.000	.380	.277	.522
	DISTANCE_TO_SEASONAL_ROAD_LESSEQUAL_QUARTERMI_YES1_NO0(1)	-.747	.193	14.966	1	.000	.474	.325	.692
	DISTANCE_TO_AMENITY_LESSEQUAL_5MI_YES1_NO0(1)	-.290	.122	5.613	1	.018	.748	.589	.951
	MONTHS_TO_ENTITLE_1_TO_5_EASYTOHARD	-.152	.071	4.542	1	.033	.859	.747	.988
	MEDIAN_PROPERTY_TAX	-.880	.141	39.169	1	.000	.415	.315	.546
	COUNTY_POP_DENSITY_PER_SQ_MI	.006	.002	10.024	1	.002	1.006	1.002	1.009
	Constant	1.233	.284	18.852	1	.000	3.432		

a. Variable(s) entered on step 1: DISTANCE_TO_INCORP_CITY_LESSEQAUL_5MI_YES1_NO0, DISTANCE_TO_ALLSEASON_ROAD_LESSEQUAL_5MI_YES1_NO0, DISTANCE_TO_SEASONAL_ROAD_LESSEQUAL_QUARTERMI_YES1_NO0, DISTANCE_TO_AMENITY_LESSEQUAL_5MI_YES1_NO0, MONTHS_TO_ENTITLE_1_TO_5_EASYTOHARD, MEDIAN_PROPERTY_TAX, COUNTY_POP_DENSITY_PER_SQ_MI.

```
             Step number: 1

             Observed Groups and Predicted Probabilities

     320 +                                                                                                    +
         I                                                                                                    I
         I                                                                                                    I
F        I                                R                                                                   I
R    240 +                          R     N                                                                   +
E        I                          R     N                                                                   I
Q        I N                        R     N                                                                   I
U        I N   N                    R     N                                                                   I
E    160 + N   N                    R     N                                                                   +
N        I N   N                    R     N                                                                   I
C        I N   N                    N     N                                                                   I
Y        I N   N     N              N    RN                                                                   I
      80 +NN   N     N R          RNN    NN                                                                   +
         INN N NN N NN RN     N   RNN    NN            R                                                      I
         INN NNNN N NN NN   N N  RRNN    NN      R     R                                                      I
         INN NNNNNNNNNNNNN NN N  NRNN  N NN      N     R N                                                    I
Predicted ---------+---------+---------+---------+---------+---------+---------+---------+---------+----------
  Prob:   0       .1        .2        .3        .4        .5        .6        .7        .8        .9         1
  Group:  NNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRR

          Predicted Probability is of Membership for Residential
          The Cut Value is .50
          Symbols: N - Non-Residential
                   R - Residential
          Each Symbol Represents 20 Cases.
```

Logistic Regression All Variables and Subdivided Mine Without Index Score

Case Processing Summary

Unweighted Cases[a]		N	Percent
Selected Cases	Included in Analysis	2148	98.9
	Missing Cases	23	1.1
	Total	2171	100.0
Unselected Cases		0	.0
Total		2171	100.0

a. If weight is in effect, see classification table for the total number of cases.

Dependent Variable Encoding

Original Value	Internal Value
Non-Residential	0
Residential	1

Categorical Variables Codings

		Frequency	Parameter coding (1)
DISTANCE_TO_AMENITY_LESSEQUAL_5MI_YES1_NO0	No	1338	1.000
	Yes	810	.000
DISTANCE_TO_INCORP_CITY_LESSEQAUL_5MI_YES1_NO0	No	1481	1.000
	Yes	667	.000
DISTANCE_TO_ALLSEASON_ROAD_LESSEQUAL_5MI_YES1_NO0	No	1103	1.000
	Yes	1045	.000
DISTANCE_TO_SEASONAL_ROAD_LESSEQUAL_QUARTERMI_YES1_NO0	No	616	1.000
	Yes	1532	.000
Subdivided_mine	Original Mine	1889	1.000
	Subdivided	259	.000

Classification Table[a,b]

	Observed		Predicted: CAT_12_RESIDENTIAL_LAND Non-Residential	Predicted: CAT_12_RESIDENTIAL_LAND Residential	Predicted: Percentage Correct
Step 0	CAT_12_RESIDENTIAL_LAND	Non-Residential	1755	0	100.0
		Residential	393	0	.0
	Overall Percentage				81.7

a. Constant is included in the model.

b. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 0	Constant	-1.496	.056	719.017	1	.000	.224

Variables not in the Equation

			Score	df	Sig.
Step 0	Variables	Subdivided_mine(1)	968.715	1	.000
		DISTANCE_TO_INCORP_CITY_LESSEQAUL_5MI_YES1_NO0(1)	33.466	1	.000
		DISTANCE_TO_ALLSEASON_ROAD_LESSEQUAL_5MI_YES1_NO0(1)	83.428	1	.000
		DISTANCE_TO_SEASONAL_ROAD_LESSEQUAL_QUARTERMI_YES1_NO0(1)	76.117	1	.000
		DISTANCE_TO_AMENITY_LESSEQUAL_5MI_YES1_NO0(1)	45.843	1	.000
		MONTHS_TO_ENTITLE_1_TO_5_EASYTOHARD	102.003	1	.000
		MEDIAN_PROPERTY_TAX	76.813	1	.000
		COUNTY_POP_DENSITY_PER_SQ_MI	.428	1	.513
	Overall Statistics		1068.913	8	.000

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	927.193	8	.000
	Block	927.193	8	.000
	Model	927.193	8	.000

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	1117.074[a]	.351	.571

a. Estimation terminated at iteration number 6 because parameter estimates changed by less than .001.

Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	52.286	7	.000

Contingency Table for Hosmer and Lemeshow Test

		CAT_12_RESIDENTIAL_LAND = Non-Residential		CAT_12_RESIDENTIAL_LAND = Residential		Total
		Observed	Expected	Observed	Expected	
Step 1	1	291	288.669	1	3.331	292
	2	208	207.019	3	3.981	211
	3	214	208.101	0	5.899	214
	4	210	213.285	12	8.715	222
	5	179	196.654	32	14.346	211
	6	303	281.497	11	32.503	314
	7	183	180.103	27	29.897	210
	8	137	149.672	78	65.328	215
	9	30	30.000	229	229.000	259

Classification Table[a]

Observed			Predicted		
			CAT_12_RESIDENTIAL_LAND		Percentage Correct
			Non-Residential	Residential	
Step 1	CAT_12_RESIDENTIAL_LAND	Non-Residential	1725	30	98.3
		Residential	163	230	58.5
	Overall Percentage				91.0

a. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	Upper
Step 1[a]	Subdivided_mine(1)	-4.886	.258	359.535	1	.000	.008	.005	.013
	DISTANCE_TO_INCORP_CITY_LESSEQAUL_5MI_YES1_NO0(1)	1.433	.225	40.511	1	.000	4.190	2.695	6.514
	DISTANCE_TO_ALLSEASON_ROAD_LESSEQUAL_5MI_YES1_NO0(1)	-1.591	.204	60.567	1	.000	.204	.136	.304
	DISTANCE_TO_SEASONAL_ROAD_LESSEQUAL_QUARTERMI_YES1_NO0(1)	-.875	.265	10.877	1	.001	.417	.248	.701
	DISTANCE_TO_AMENITY_LESSEQUAL_5MI_YES1_NO0(1)	-1.095	.177	38.264	1	.000	.335	.237	.473
	MONTHS_TO_ENTITLE_1_TO_5_EASYTOHARD	.096	.090	1.155	1	.282	1.101	.924	1.313
	MEDIAN_PROPERTY_TAX	-.532	.164	10.504	1	.001	.587	.426	.810
	COUNTY_POP_DENSITY_PER_SQ_MI	.004	.003	2.547	1	.110	1.004	.999	1.009
	Constant	3.746	.359	108.693	1	.000	42.354		

a. Variable(s) entered on step 1: Subdivided_mine, DISTANCE_TO_INCORP_CITY_LESSEQAUL_5MI_YES1_NO0, DISTANCE_TO_ALLSEASON_ROAD_LESSEQUAL_5MI_YES1_NO0, DISTANCE_TO_SEASONAL_ROAD_LESSEQUAL_QUARTERMI_YES1_NO0, DISTANCE_TO_AMENITY_LESSEQUAL_5MI_YES1_NO0, MONTHS_TO_ENTITLE_1_TO_5_EASYTOHARD, MEDIAN_PROPERTY_TAX, COUNTY_POP_DENSITY_PER_SQ_MI.

```
            Step number: 1

            Observed Groups and Predicted Probabilities

     400 +                                                                                                    +
         I                                                                                                    I
         I                                                                                                    I
F        I N                                                                                                  I
R    300 + N       R                                                                                          +
E        I N R     N                                                                                          I
Q        I N N     N                                                                                          I
U        I N N     N                                                                                          I
E    200 + NRN     N                                                                                          +
N        I NNN     N                                                                                          I
C        I NNN     N                                                                                          I
Y        INNNN R   N    R                                                                   R                I
     100 +NNNN N    N    N                                                                   R                +
         INNNN N    N    N                                                                   R                I
         INNNN N  NNN   NN                N        R                                         R    R     R     I
         INNNNNNN NNN RNNN   N  N         N  R R   R                                         R    R    RR   R I
Predicted ---------+---------+---------+---------+---------+---------+---------+---------+---------+----------
  Prob:   0       .1        .2        .3        .4        .5        .6        .7        .8        .9         1
  Group:  NNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRR

          Predicted Probability is of Membership for Residential
          The Cut Value is .50
          Symbols: N - Non-Residential
                   R - Residential
          Each Symbol Represents 25 Cases.
```

Positive Correlates With Index Score

Case Processing Summary

Unweighted Cases[a]		N	Percent
Selected Cases	Included in Analysis	294	13.5
	Missing Cases	1877	86.5
	Total	2171	100.0
Unselected Cases		0	.0
Total		2171	100.0

a. If weight is in effect, see classification table for the total number of cases.

Dependent Variable Encoding

Original Value	Internal Value
Non-Residential	0
Residential	1

Categorical Variables Codings

		Frequency	Parameter coding (1)
DISTANCE_TO_AMENITY_LESSEQUAL_5MI_YES1_NO0	No	127	1.000
	Yes	167	.000
DISTANCE_TO_ALLSEASON_ROAD_LESSEQUAL_5MI_YES1_NO0	No	157	1.000
	Yes	137	.000
DISTANCE_TO_SEASONAL_ROAD_LESSEQUAL_QUARTERMI_YES1_NO0	No	81	1.000
	Yes	213	.000
DISTANCE_TO_INCORP_CITY_LESSEQAUL_5MI_YES1_NO0	No	195	1.000
	Yes	99	.000

Classification Table[a,b]

	Observed		Predicted: CAT_12_RESIDENTIAL_LAND Non-Residential	Predicted: CAT_12_RESIDENTIAL_LAND Residential	Predicted: Percentage Correct
Step 0	CAT_12_RESIDENTIAL_LAND	Non-Residential	271	0	100.0
		Residential	23	0	.0
	Overall Percentage				92.2

a. Constant is included in the model.

b. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 0	Constant	-2.467	.217	128.990	1	.000	.085

Variables not in the Equation

			Score	df	Sig.
Step 0	Variables	DISTANCE_TO_INCORP_CITY_LESSEQAUL_5MI_YES1_NO0(1)	2.962	1	.085
		DISTANCE_TO_ALLSEASON_ROAD_LESSEQUAL_5MI_YES1_NO0(1)	.015	1	.902
		DISTANCE_TO_SEASONAL_ROAD_LESSEQUAL_QUARTERMI_YES1_NO0(1)	2.631	1	.105
		DISTANCE_TO_AMENITY_LESSEQUAL_5MI_YES1_NO0(1)	2.977	1	.084
		COUNTY_POP_DENSITY_PER_SQ_MI	7.848	1	.005
		MINERAL_INDEX_SCORE	.476	1	.490
	Overall Statistics		19.666	6	.003

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	15.792	6	.015
	Block	15.792	6	.015
	Model	15.792	6	.015

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	145.572[a]	.052	.124

a. Estimation terminated at iteration number 6 because parameter estimates changed by less than .001.

Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	12.461	8	.132

Contingency Table for Hosmer and Lemeshow Test

		CAT_12_RESIDENTIAL_LAND = Non-Residential		CAT_12_RESIDENTIAL_LAND = Residential		Total
		Observed	Expected	Observed	Expected	
Step 1	1	28	27.530	0	.470	28
	2	31	30.253	0	.747	31
	3	25	26.200	2	.800	27
	4	24	26.770	4	1.230	28
	5	29	27.447	0	1.553	29
	6	27	26.303	1	1.697	28
	7	28	26.707	1	2.293	29
	8	25	24.898	3	3.102	28
	9	25	25.465	4	3.535	29
	10	29	29.428	8	7.572	37

Classification Table[a]

	Observed		Predicted: CAT_12_RESIDENTIAL_LAND Non-Residential	Predicted: CAT_12_RESIDENTIAL_LAND Residential	Percentage Correct
Step 1	CAT_12_RESIDENTIAL_LAND	Non-Residential	271	0	100.0
		Residential	22	1	4.3
	Overall Percentage				92.5

a. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	95% C.I.for EXP(B) Upper
Step 1[a]	DISTANCE_TO_INCORP_CITY_LESSEQAUL_5MI_YES1_NO0(1)	1.519	.679	5.000	1	.025	4.568	1.206	17.300
	DISTANCE_TO_ALLSEASON_ROAD_LESSEQUAL_5MI_YES1_NO0(1)	-.543	.547	.986	1	.321	.581	.199	1.697
	DISTANCE_TO_SEASONAL_ROAD_LESSEQUAL_QUARTERMI_YES1_NO0(1)	-1.045	.696	2.253	1	.133	.352	.090	1.377
	DISTANCE_TO_AMENITY_LESSEQUAL_5MI_YES1_NO0(1)	-.733	.532	1.899	1	.168	.481	.169	1.363
	COUNTY_POP_DENSITY_PER_SQ_MI	.034	.022	2.384	1	.123	1.035	.991	1.081
	MINERAL_INDEX_SCORE	-.036	.080	.204	1	.651	.964	.824	1.129
	Constant	-2.862	.673	18.101	1	.000	.057		

a. Variable(s) entered on step 1: DISTANCE_TO_INCORP_CITY_LESSEQAUL_5MI_YES1_NO0, DISTANCE_TO_ALLSEASON_ROAD_LESSEQUAL_5MI_YES1_NO0, DISTANCE_TO_SEASONAL_ROAD_LESSEQUAL_QUARTERMI_YES1_NO0, DISTANCE_TO_AMENITY_LESSEQUAL_5MI_YES1_NO0, COUNTY_POP_DENSITY_PER_SQ_MI, MINERAL_INDEX_SCORE.

Positive Correlates Without Index Score

Case Processing Summary

Unweighted Cases[a]		N	Percent
Selected Cases	Included in Analysis	2148	98.9
	Missing Cases	23	1.1
	Total	2171	100.0
Unselected Cases		0	.0
Total		2171	100.0

a. If weight is in effect, see classification table for the total number of cases.

Dependent Variable Encoding

Original Value	Internal Value
Non-Residential	0
Residential	1

Categorical Variables Codings

		Frequency	Parameter coding (1)
DISTANCE_TO_AMENITY_LESSEQUAL_5MI_YES1_NO0	No	1338	1.000
	Yes	810	.000
DISTANCE_TO_INCORP_CITY_LESSEQAUL_5MI_YES1_NO0	No	1481	1.000
	Yes	667	.000
DISTANCE_TO_ALLSEASON_ROAD_LESSEQUAL_5MI_YES1_NO0	No	1103	1.000
	Yes	1045	.000
DISTANCE_TO_SEASONAL_ROAD_LESSEQUAL_QUARTERMI_YES1_NO0	No	616	1.000
	Yes	1532	.000
Subdivided_mine	Original Mine	1889	1.000
	Subdivided	259	.000

Classification Table[a,b]

Observed			Predicted: CAT_12_RESIDENTIAL_LAND Non-Residential	Predicted: CAT_12_RESIDENTIAL_LAND Residential	Percentage Correct
Step 0	CAT_12_RESIDENTIAL_LAND	Non-Residential	1755	0	100.0
		Residential	393	0	.0
	Overall Percentage				81.7

a. Constant is included in the model.

b. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 0	Constant	-1.496	.056	719.017	1	.000	.224

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	914.790	6	.000
	Block	914.790	6	.000
	Model	914.790	6	.000

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	1129.477[a]	.347	.565

a. Estimation terminated at iteration number 6 because parameter estimates changed by less than .001.

Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	67.574	8	.000

Contingency Table for Hosmer and Lemeshow Test

		CAT_12_RESIDENTIAL_LAND = Non-Residential		CAT_12_RESIDENTIAL_LAND = Residential		
		Observed	Expected	Observed	Expected	Total
Step 1	1	215	211.816	0	3.184	215
	2	232	229.342	1	3.658	233
	3	217	229.937	21	8.063	238
	4	230	222.438	1	8.562	231
	5	156	162.355	16	9.645	172
	6	234	210.194	1	24.806	235
	7	183	190.435	32	24.565	215
	8	178	182.998	36	31.002	214
	9	88	91.053	77	73.947	165
	10	22	24.432	208	205.568	230

Classification Table[a]

Observed			Predicted		
			CAT_12_RESIDENTIAL_LAND		Percentage Correct
			Non-Residential	Residential	
Step 1	CAT_12_RESIDENTIAL_LAND	Non-Residential	1725	30	98.3
		Residential	163	230	58.5
	Overall Percentage				91.0

a. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	95% C.I.for EXP(B) Upper
Step 1[a]	Subdivided_mine(1)	-5.047	.254	394.226	1	.000	.006	.004	.011
	DISTANCE_TO_INCORP_CITY_LESSEQAUL_5MI_YES1_NO0(1)	1.625	.214	57.796	1	.000	5.076	3.339	7.716
	DISTANCE_TO_ALLSEASON_ROAD_LESSEQUAL_5MI_YES1_NO0(1)	-1.519	.199	58.497	1	.000	.219	.148	.323
	DISTANCE_TO_SEASONAL_ROAD_LESSEQUAL_QUARTERMI_YES1_NO0(1)	-.880	.257	11.729	1	.001	.415	.251	.686
	DISTANCE_TO_AMENITY_LESSEQUAL_5MI_YES1_NO0(1)	-1.228	.172	51.048	1	.000	.293	.209	.410
	COUNTY_POP_DENSITY_PER_SQ_MI	.002	.003	.582	1	.446	1.002	.997	1.007
	Constant	2.900	.243	142.801	1	.000	18.170		

a. Variable(s) entered on step 1: Subdivided_mine, DISTANCE_TO_INCORP_CITY_LESSEQAUL_5MI_YES1_NO0, DISTANCE_TO_ALLSEASON_ROAD_LESSEQUAL_5MI_YES1_NO0, DISTANCE_TO_SEASONAL_ROAD_LESSEQUAL_QUARTERMI_YES1_NO0, DISTANCE_TO_AMENITY_LESSEQUAL_5MI_YES1_NO0, COUNTY_POP_DENSITY_PER_SQ_MI.

Negative Correlates With Index Score

Case Processing Summary

Unweighted Cases[a]		N	Percent
Selected Cases	Included in Analysis	294	13.5
	Missing Cases	1877	86.5
	Total	2171	100.0
Unselected Cases		0	.0
Total		2171	100.0

a. If weight is in effect, see classification table for the total number of cases.

Dependent Variable Encoding

Original Value	Internal Value
Non-Residential	0
Residential	1

Classification Table[a,b]

			Predicted		
			CAT_12_RESIDENTIAL_LAND		Percentage Correct
	Observed		Non-Residential	Residential	
Step 0	CAT_12_RESIDENTIAL_LAND	Non-Residential	271	0	100.0
		Residential	23	0	.0
	Overall Percentage				92.2

a. Constant is included in the model.

b. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 0	Constant	-2.467	.217	128.990	1	.000	.085

Variables not in the Equation

			Score	df	Sig.
Step 0	Variables	MINERAL_INDEX_SCORE	.476	1	.490
		MONTHS_TO_ENTITLE_1_TO_5_EASYTOHARD	1.590	1	.207
		MEDIAN_PROPERTY_TAX	.650	1	.420
	Overall Statistics		2.409	3	.492

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	2.493	3	.477
	Block	2.493	3	.477
	Model	2.493	3	.477

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	158.871[a]	.008	.020

a. Estimation terminated at iteration number 6 because parameter estimates changed by less than .001.

Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	14.123	8	.079

Contingency Table for Hosmer and Lemeshow Test

		CAT_12_RESIDENTIAL_LAND = Non-Residential		CAT_12_RESIDENTIAL_LAND = Residential		Total
		Observed	Expected	Observed	Expected	
Step 1	1	25	24.952	1	1.048	26
	2	31	30.445	1	1.555	32
	3	31	29.150	0	1.850	31
	4	31	29.960	1	2.040	32
	5	24	26.982	5	2.018	29
	6	27	30.121	6	2.879	33
	7	20	19.037	1	1.963	21
	8	23	21.655	1	2.345	24
	9	29	30.435	5	3.565	34
	10	30	28.264	2	3.736	32

Classification Table[a]

Observed			Predicted: CAT_12_RESIDENTIAL_LAND Non-Residential	Predicted: CAT_12_RESIDENTIAL_LAND Residential	Percentage Correct
Step 1	CAT_12_RESIDENTIAL_LAND	Non-Residential	271	0	100.0
		Residential	23	0	.0
	Overall Percentage				92.2

a. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	95% C.I.for EXP(B) Upper
Step 1[a]	MINERAL_INDEX_SCORE	-.060	.073	.689	1	.407	.941	.816	1.086
	MONTHS_TO_ENTITLE_1_TO_5_EASYTOHARD	-.193	.180	1.156	1	.282	.824	.579	1.172
	MEDIAN_PROPERTY_TAX	-.077	.335	.053	1	.818	.926	.480	1.786
	Constant	-1.594	.741	4.626	1	.031	.203		

a. Variable(s) entered on step 1: MINERAL_INDEX_SCORE, MONTHS_TO_ENTITLE_1_TO_5_EASYTOHARD, MEDIAN_PROPERTY_TAX.

Negative Correlates Without Index Score

Case Processing Summary

Unweighted Cases[a]		N	Percent
Selected Cases	Included in Analysis	2167	99.8
	Missing Cases	4	.2
	Total	2171	100.0
Unselected Cases		0	.0
Total		2171	100.0

a. If weight is in effect, see classification table for the total number of cases.

Dependent Variable Encoding

Original Value	Internal Value
Non-Residential	0
Residential	1

Classification Table[a,b]

Observed			Predicted CAT_12_RESIDENTIAL_LAND Non-Residential	Predicted CAT_12_RESIDENTIAL_LAND Residential	Percentage Correct
Step 0	CAT_12_RESIDENTIAL_LAND	Non-Residential	1767	0	100.0
		Residential	400	0	.0
	Overall Percentage				81.5

a. Constant is included in the model.

b. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 0	Constant	-1.486	.055	719.824	1	.000	.226

Variables not in the Equation

			Score	df	Sig.
Step 0	Variables	MONTHS_TO_ENTITLE_1_TO_5_EASYTOHARD	101.596	1	.000
		MEDIAN_PROPERTY_TAX	76.854	1	.000
	Overall Statistics		107.121	2	.000

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	140.943	2	.000
	Block	140.943	2	.000
	Model	140.943	2	.000

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	1931.915[a]	.063	.102

a. Estimation terminated at iteration number 6 because parameter estimates changed by less than .001.

Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	100.617	4	.000

Contingency Table for Hosmer and Lemeshow Test

		CAT_12_RESIDENTIAL_LAND = Non-Residential		CAT_12_RESIDENTIAL_LAND = Residential		
		Observed	Expected	Observed	Expected	Total
Step 1	1	349	354.328	14	8.672	363
	2	191	197.672	31	24.328	222
	3	192	196.583	43	38.417	235
	4	78	63.457	1	15.543	79
	5	743	677.426	132	197.574	875
	6	214	277.534	179	115.466	393

Classification Table[a]

Observed			Predicted: CAT_12_RESIDENTIAL_LAND Non-Residential	Residential	Percentage Correct
Step 1	CAT_12_RESIDENTIAL_LAND	Non-Residential	1767	0	100.0
		Residential	400	0	.0
	Overall Percentage				81.5

a. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	Upper
Step 1[a]	MONTHS_TO_ENTITLE_1_TO_5_EASYTOHARD	-.392	.060	42.359	1	.000	.676	.601	.761
	MEDIAN_PROPERTY_TAX	-.482	.114	18.052	1	.000	.617	.494	.771
	Constant	.177	.216	.675	1	.411	1.194		

a. Variable(s) entered on step 1: MONTHS_TO_ENTITLE_1_TO_5_EASYTOHARD, MEDIAN_PROPERTY_TAX.

Index Score on Its Own

Case Processing Summary

Unweighted Cases[a]		N	Percent
Selected Cases	Included in Analysis	294	13.5
	Missing Cases	1877	86.5
	Total	2171	100.0
Unselected Cases		0	.0
Total		2171	100.0

a. If weight is in effect, see classification table for the total number of cases.

Dependent Variable Encoding

Original Value	Internal Value
Non-Residential	0
Residential	1

Classification Table[a,b]

Observed			Predicted: CAT_12_RESIDENTIAL_LAND Non-Residential	Predicted: CAT_12_RESIDENTIAL_LAND Residential	Percentage Correct
Step 0	CAT_12_RESIDENTIAL_LAND	Non-Residential	271	0	100.0
		Residential	23	0	.0
	Overall Percentage				92.2

a. Constant is included in the model.

b. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 0	Constant	-2.467	.217	128.990	1	.000	.085

Variables not in the Equation

			Score	df	Sig.
Step 0	Variables	MINERAL_INDEX_SCORE	.476	1	.490
	Overall Statistics		.476	1	.490

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	.499	1	.480
	Block	.499	1	.480
	Model	.499	1	.480

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	160.865[a]	.002	.004

a. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	20.410	6	.002

Contingency Table for Hosmer and Lemeshow Test

		CAT_12_RESIDENTIAL_LAND = Non-Residential		CAT_12_RESIDENTIAL_LAND = Residential		Total
		Observed	Expected	Observed	Expected	
Step 1	1	31	29.300	0	1.700	31
	2	8	10.275	3	.725	11
	3	70	71.361	7	5.639	77
	4	18	16.608	0	1.392	18
	5	36	33.094	0	2.906	36
	6	30	33.927	7	3.073	37
	7	47	46.515	4	4.485	51
	8	31	29.920	2	3.080	33

Classification Table[a]

Observed			Predicted		
			CAT_12_RESIDENTIAL_LAND		Percentage Correct
			Non-Residential	Residential	
Step 1	CAT_12_RESIDENTIAL_LAND	Non-Residential	271	0	100.0
		Residential	23	0	.0
	Overall Percentage				92.2

a. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	95% C.I.for EXP(B) Upper
Step 1[a]	MINERAL_INDEX_SCORE	-.051	.075	.473	1	.491	.950	.820	1.100
	Constant	-2.199	.433	25.762	1	.000	.111		

a. Variable(s) entered on step 1: MINERAL_INDEX_SCORE.

Subdivided Mine on Its Own

Case Processing Summary

Unweighted Cases[a]		N	Percent
Selected Cases	Included in Analysis	2171	100.0
	Missing Cases	0	.0
	Total	2171	100.0
Unselected Cases		0	.0
Total		2171	100.0

a. If weight is in effect, see classification table for the total number of cases.

Dependent Variable Encoding

Original Value	Internal Value
Non-Residential	0
Residential	1

Categorical Variables Codings

		Frequency	Parameter coding (1)
Subdivided_mine	Original Mine	1908	1.000
	Subdivided	263	.000

Classification Table[a,b]

	Observed		Predicted CAT_12_RESIDENTIAL_LAND Non-Residential	Predicted CAT_12_RESIDENTIAL_LAND Residential	Percentage Correct
Step 0	CAT_12_RESIDENTIAL_LAND	Non-Residential	1770	0	100.0
		Residential	401	0	.0
	Overall Percentage				81.5

a. Constant is included in the model.

b. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 0	Constant	-1.485	.055	720.739	1	.000	.227

Variables not in the Equation

			Score	df	Sig.
Step 0	Variables	Subdivided_mine(1)	945.600	1	.000
	Overall Statistics		945.600	1	.000

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	727.644	1	.000
	Block	727.644	1	.000
	Model	727.644	1	.000

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	1349.816[a]	.285	.462

a. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

Contingency Table for Hosmer and Lemeshow Test

		CAT_12_RESIDENTIAL_LAND = Non-Residential		CAT_12_RESIDENTIAL_LAND = Residential		Total
		Observed	Expected	Observed	Expected	
Step 1	1	1737	1737.000	171	171.000	1908
	2	33	33.000	230	230.000	263

Classification Table[a]

Observed			Predicted		
			CAT_12_RESIDENTIAL_LAND		Percentage Correct
			Non-Residential	Residential	
Step 1	CAT_12_RESIDENTIAL_LAND	Non-Residential	1737	33	98.1
		Residential	171	230	57.4
	Overall Percentage				90.6

a. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1[a]	Subdivided_mine(1)	-4.260	.203	441.785	1	.000	.014	.009	.021
	Constant	1.942	.186	108.791	1	.000	6.970		

a. Variable(s) entered on step 1: Subdivided_mine.

Subdivided Mine as Dependent Variable

Case Processing Summary

Unweighted Cases[a]		N	Percent
Selected Cases	Included in Analysis	2148	98.9
	Missing Cases	23	1.1
	Total	2171	100.0
Unselected Cases		0	.0
Total		2171	100.0

a. If weight is in effect, see classification table for the total number of cases.

Dependent Variable Encoding

Original Value	Internal Value
no	0
subdivided	1

Categorical Variables Codings

		Frequency	Parameter coding (1)
DISTANCE_TO_AMENITY_LESSEQUAL_5MI_YES1_NO0	No	1338	1.000
	Yes	810	.000
DISTANCE_TO_ALLSEASON_ROAD_LESSEQUAL_5MI_YES1_NO0	No	1103	1.000
	Yes	1045	.000
DISTANCE_TO_SEASONAL_ROAD_LESSEQUAL_QUARTERMI_YES1_NO0	No	616	1.000
	Yes	1532	.000
DISTANCE_TO_INCORP_CITY_LESSEQAUL_5MI_YES1_NO0	No	1481	1.000
	Yes	667	.000

Classification Table[a,b]

	Observed		Predicted Subdivided_mine no	Predicted Subdivided_mine subdivided	Predicted Percentage Correct
Step 0	Subdivided_mine	no	1889	0	100.0
		subdivided	259	0	.0
	Overall Percentage				87.9

a. Constant is included in the model.

b. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 0	Constant	-1.987	.066	899.254	1	.000	.137

Variables not in the Equation

			Score	df	Sig.
Step 0	Variables	DISTANCE_TO_INCORP_CITY_LESSEQAUL_5MI_YES1_NO0(1)	126.607	1	.000
		DISTANCE_TO_ALLSEASON_ROAD_LESSEQUAL_5MI_YES1_NO0(1)	55.107	1	.000
		DISTANCE_TO_SEASONAL_ROAD_LESSEQUAL_QUARTERMI_YES1_NO0(1)	42.079	1	.000
		DISTANCE_TO_AMENITY_LESSEQUAL_5MI_YES1_NO0(1)	.531	1	.466
		MONTHS_TO_ENTITLE_1_TO_5_EASYTOHARD	116.934	1	.000
		MEDIAN_PROPERTY_TAX	55.895	1	.000
		COUNTY_POP_DENSITY_PER_SQ_MI	.011	1	.917
	Overall Statistics		228.015	7	.000

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	298.578	7	.000
	Block	298.578	7	.000
	Model	298.578	7	.000

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	1282.666[a]	.130	.249

a. Estimation terminated at iteration number 8 because parameter estimates changed by less than .001.

Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	117.041	7	.000

Contingency Table for Hosmer and Lemeshow Test

		Subdivided_mine = no		Subdivided_mine = subdivided		Total
		Observed	Expected	Observed	Expected	
Step 1	1	264	264.917	1	.083	265
	2	226	225.742	2	2.258	228
	3	206	210.354	12	7.646	218
	4	189	181.147	2	9.853	191
	5	194	183.131	1	11.869	195
	6	195	200.345	24	18.655	219
	7	139	170.672	60	28.328	199
	8	235	193.668	13	54.332	248
	9	241	259.025	144	125.975	385

Classification Table[a]

Observed			Predicted		
			Subdivided_mine		Percentage Correct
			no	subdivided	
Step 1	Subdivided_mine	no	1868	21	98.9
		subdivided	237	22	8.5
	Overall Percentage				88.0

a. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	Upper
Step 1[a]	DISTANCE_TO_INCORP_CITY_LESSEQAUL_5MI_YES1_NO0(1)	-1.686	.236	51.002	1	.000	.185	.117	.294
	DISTANCE_TO_ALLSEASON_ROAD_LESSEQUAL_5MI_YES1_NO0(1)	.169	.237	.509	1	.476	1.184	.745	1.882
	DISTANCE_TO_SEASONAL_ROAD_LESSEQUAL_QUARTERMI_YES1_NO0(1)	-.382	.238	2.575	1	.109	.682	.428	1.088
	DISTANCE_TO_AMENITY_LESSEQUAL_5MI_YES1_NO0(1)	.425	.148	8.220	1	.004	1.529	1.144	2.044
	MONTHS_TO_ENTITLE_1_TO_5_EASYTOHARD	-.679	.139	23.848	1	.000	.507	.386	.666
	MEDIAN_PROPERTY_TAX	-1.487	.214	48.399	1	.000	.226	.149	.344
	COUNTY_POP_DENSITY_PER_SQ_MI	.009	.002	19.707	1	.000	1.009	1.005	1.014
	Constant	2.500	.461	29.459	1	.000	12.182		

a. Variable(s) entered on step 1: DISTANCE_TO_INCORP_CITY_LESSEQAUL_5MI_YES1_NO0, DISTANCE_TO_ALLSEASON_ROAD_LESSEQUAL_5MI_YES1_NO0, DISTANCE_TO_SEASONAL_ROAD_LESSEQUAL_QUARTERMI_YES1_NO0, DISTANCE_TO_AMENITY_LESSEQUAL_5MI_YES1_NO0, MONTHS_TO_ENTITLE_1_TO_5_EASYTOHARD, MEDIAN_PROPERTY_TAX, COUNTY_POP_DENSITY_PER_SQ_MI.

APPENDIX M

Clearwater County Patents 11-75-0059 and 1230212

Appendix M includes findings from outside the pre-1920 patented lode mine unit of analysis of this study. Specifically, findings regarding tax year 2015 use of two *post-*1920 patented *placer* mines in Clearwater County, Idaho are presented. This analysis is pursued for two reasons. One, anomalous parcel data from the assessment records of Clearwater County, Idaho was uncovered during the investigation of pre-1920 PLM in Idaho. Two, inquiry into these two Clearwater County post-1920 placer mine provides an opportunity to further expand upon one of the research sub-questions set forth previously in Chapter 4. Namely, *what* consequence does not having a mineral disclosure requirement in the 1872 Mining Act have on 21st century patented mine use? In the case of the Pioneer and First Chance Placers, the results are as follows.

<u>Mineral Production Data</u>

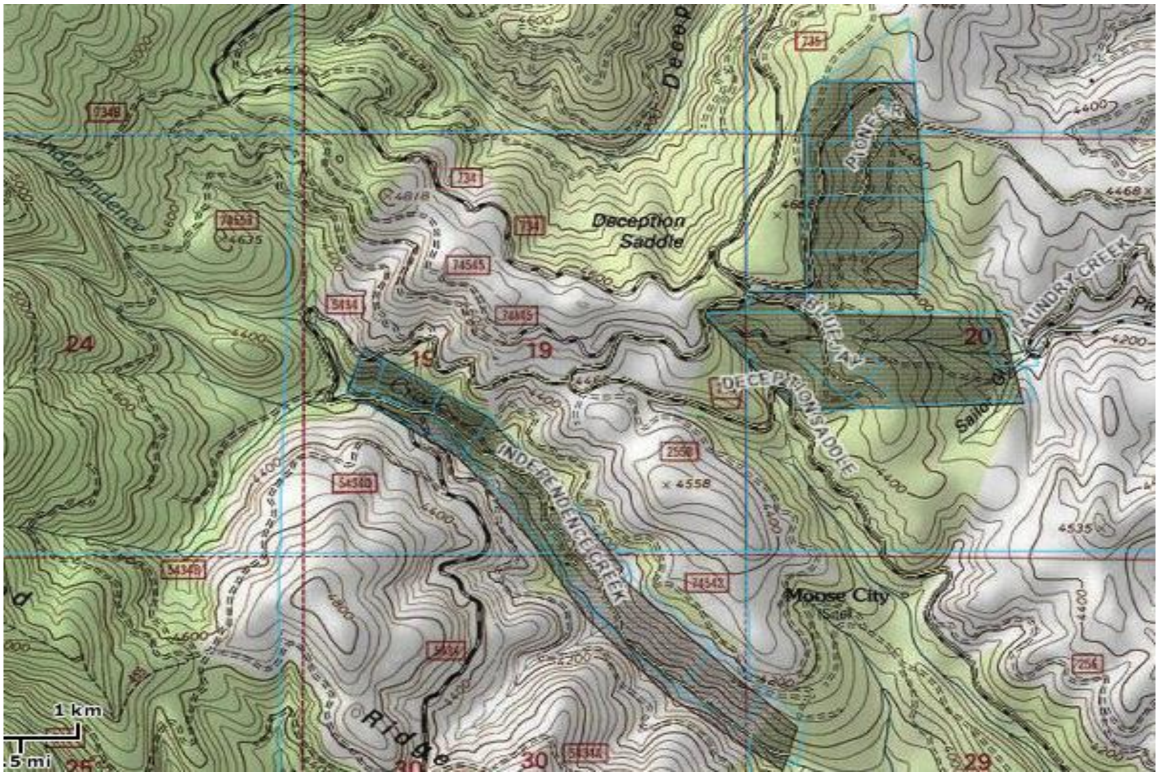
The mineral survey documents on record with the BLM regarding the Pioneer and First Chance placer patents date to 1959 and 1960. These records feature survey descriptions and field notes of property improvements that, in whole or part, support mineral extraction. No assay or mineral data is included, nor details as to the type of valuable mineral mined. In the case of the Pioneer Placer patent, the applicable Mineral Survey #3530 indicates that construction of an earth-filled log dam with placer workings below the dam occurred and that the estimated cost of construction was $5,000 (BLM, 2017) and, thus, exceeded the $500 in assessment work required by the 1872 Mining Act for patent issuance. In the case of the First Chance Placer patent, Mineral Survey #3539 shows that a "discovery pit," a tunnel "15 ft. long, 8 ft. wide and 4'ft. deep," and an 80' long log and plank dam was built (BLM, 2017). In both cases, log cabins were built.

No production records were discovered for either patent in the geological survey records of the IGS and USGS. This finding is not surprising, however. As noted in previous chapters, a patentee is not obligated to disclose discoveries or property use post-patent. In this instance, the extent of documented mineral activity on the Pioneer and First Chance placer patents is fairly nominal with only the original mineral survey documents on file with the BLM discovered.

Patent Issuance Data

On January 4, 1963 the First Chance Placer, consisting of 93.70 acres, was issued patent 1230212, pursuant to the 1872 Mining Act. Relied upon was Mineral Survey #3539 and a showing of greater than $500 in assessment work. Subject patent included private land within the southwest portion of Township 40 North, Range 11 East, Sections 17, 19 and 20 of Clearwater County, Idaho. In like manner, on December 12, 1974 the Pioneer Placer, consisting of 83.02 acres, was issued patent 11-75-0059, pursuant to the 1872 Mining Act. It relied upon Mineral Survey #3530 and similar work representations. Subject patent includes private land within the northeast portion of the aforementioned township and range area. Both properties are shown in Picture 3, below (BLM, 2016).

Combined, the First Chance and Pioneer Placer patents include 176.72 acres of private property. Both properties, as depicted in Picture 2, are inholdings within the public land domain and, in this case, the properties are surrounded by United States



Picture 2. Clearwater County Assessor’s Map Showing Primarily Residential Lots on Mineral Patent Property

Forest Service (USFS) land and accessed by a series of public roads with interesting road names, like Independence Creek, Laundry Creek, Bluejay, Pioneer, and Deception Saddle. As Picture 2 also shows, the placer patents have been parceled into smaller lots. This is highlighted in greater detail in the tax year 2015 assessment records.

<u>County Assessment Data</u>

The tax year Clearwater County assessment records for the northeast and southwest portions of the lands shown in Picture 3 show that both the Pioneer Placer (patent 11-75-0059) and First Chance Placer (patent 1230212) were assessed primarily for residential purposes in 2015. Table 1.30 shows the parcel identification numbers and uses of eighteen properties in Sections 17, 19, 29, and 30 of Township 40 North,

Table 1.30 Residential Valuations on Mineral Patent Land in Clearwater County

Clearwater County Assessor Identification Number	Acreage	Residential Market Value of Land (Cat 10)	Residential Value of Land Improvements (Cat 31)	Forest Land Value (Cats 6, 7)	Total Assessed Value
RP40N11E174905A	7.018	$33,681	$8,110	$2,051*	$43,857
RP40N11E174901A	9.8	Owned by USFS			
RP40N11E174913A	7	$23,581	$6,410	$864	$30,855
RP40N11E174904A	7.032	$40,081	$46,097	$868	$87,046
RP40N11E194310A	4.09	$41,524			$41,524
RP40N11E204199A	15.78	$36,081	$33,140	$6,655	$75,866
RP40N11E204198A	21.06			$3,032	$3,032
RP40N11E204188A	10.69	$33,581	$32,542	$1,392	$67,615
RP40N11E204187A	10.401	$36,081	$36,548	$1,353	$73,982
PIONEER PLACER (83.02 Acres)	82.47				
RP40N11E194951A	6.09	$13,583	$40,366	$733	$54,952
RP40N11E195350A	5.49	$646	$13,853		$14,499
RP40N11E195000A	5.68	$24,453	$59,581	$674	$84,742
RP40N11E195410A	2.7			$389	$395
RP40N11E196600A	19.57	$24,453	$22,719	$2,674	$49,892
RP40N11E300002A	9.99	$23,681	$20,624		$44,327
RP40N11E300003A	9.99	$23,681	$3,480		$27,183
RP40N11E300600A	14.25	$21,453	$46,907	$5,976	$74,369
RP40N11E301800A	19.89			$2,864	$2,899
FIRST CHANCE PLACER (93.7 Acres)	93.65				
* Also includes $1,190 in non-residential improvements					

Range 11 East of Clearwater County, Idaho. These individual identification numbers indicate that one of the properties is owned by the USFS and three more properties have no residential improvements with total assessed valuations between $389 and $3,032. The remaining 14 properties each have an assessed valuation greater than $14,000 with nine of the properties having residential (category 31) improvements greater than $20,000. The highest two total assessed valuations for a residence, improvements, and forested land valuation were $75,866 and $84,742 in tax year 2015.

Conclusion

In conclusion, the lack of a mineral disclosure requirement in the 1872 Mining Act has created difficulties dispelling concerns that the statute was abused and lands were patented for non-mineral purposes. In the case of the Pioneer or First Chance placer patents, only nominal evidence of past mineral extraction exists for either patent. Removed nearly 50 years from when the first of these placer claims was patented, only indeterminate evidence is available to know whether valuable minerals were ever discovered, located, and worked or whether the creation of a residential development surrounded by USFS land featuring 18 residential lots with homes was always the design. "Of course," as Leshy (1987) cautioned, "lack of mining activity on a patented mine does not lead unavoidably to the conclusion that an abuse of the Mining Law has occurred. The mine resources could have been worked and the mineral exhausted or deemed unprofitable" (p. 75).

One clear consequence of the lack of mineral disclosure specificity in the 1872 Mining Act is the subordination of policy decisions to inadequate and possibly inaccurate information. This would not surprise Wallace Stegner (1954), who recognized that an on-going and distinctive pattern of land legislation in the West is based on inadequate or inaccurate information. When the 1872 Mining Act is amended or re-written next, the lack of a mineral disclosure provision in the statute should be revisited with the dual purpose of benefitting the public and integrity of the mining industry.