

West Susitna Access Reconnaissance Study West Susitna Access to Resource Development

Transportation Analysis Report



Appendix F: Economic Considerations



West Susitna

Reconnaissance Study for Access to Resource Development Opportunities

Roads to Resources



West Susitna Access

Reconnaissance Study for Access to Resource Development Opportunities

Minerals

The study discusses a number of activities, including hardrock mineral exploration, placer gold mining, and coal exploration and development. There are more than 3,000 active mining claims in the Study Area.

Oil & Gas

Active oil and gas exploration continues to occur in Northern Cook Inlet. There are nine producing oil and gas units and fields in the Study Area.

Agriculture

The Alaska Department of Natural Resources has identified about 65,000 acres in the Study Area for potential agricultural uses.

Forest /Timber

The Alaska Department of Natural Resources has identified more than 700,000 acres in the Study Area for potential forest harvest.

Alternative Energy

Examples of alternative energy resource opportunities previously identified in the Study Area include geothermal exploration, hydropower, and woody biomass resources.

Recreational Resources

Recreational resource opportunities in the Study Area are immense. These include sportfishing, hunting, wildlife viewing, firewood harvesting, and remote private cabins and wilderness lodges.

Overview

The Alaska Department of Transportation and Public Facilities' (DOT&PF) Roads to Resources Program initiated the West Susitna Access Reconnaissance Study in January 2013. The purpose of this reconnaissance-level study is to evaluate and consider the need for surface access to resource development opportunities west of the Susitna River in Southcentral Alaska. This study aims to identify locations that may benefit from a proposed surface connection. The study will:

- » Identify resource development opportunities west of the Susitna River.
- » Identify one or more potential crossings of the Susitna River.
- » Identify one or more potential transportation corridors to access identified resources.

Resource Development = Economic Benefit

So what does this mean for Alaska?

Alaska has a diverse natural resource base. Some of the natural resource deposits or prospects in Alaska are world-renowned and considered some of the largest in the world. However, surface access to most of these resource development opportunities around the State is minimal or non-existent, largely due to their remoteness. The transportation infrastructure in these areas is one of the most challenging issues that constrain resource development efforts in the state. Providing access to these natural resources increases the opportunity for job creation and economic growth, which in turn supports funding for essential State programs and boosts the state's treasury. The resource categories inventoried in this study are:

- » Mineral Resources
- » Oil and Gas Resources
- » Forestry/Timber and Agricultural Resources
- » Alternative Energy Resources
- » Recreational Resources

Economic benefits of proposed access

Investment in surface access transportation infrastructure to remote areas in Alaska, such as the area west of the Susitna River, can help reduce costs associated with resource development, such as the mobilization of personnel and construction or extraction equipment. Further cost reductions may be realized in fuel, construction materials, food and other basic necessities. Such investment can improve the production capacity of the state and drive overall economic development. There are concerns, however, that these investments can negatively impact the subsistence and remote lifestyles of people in these areas. While these concerns are valid and warrant a careful assessment of all impacts, the economic opportunities offer a strong basis for investment. What is needed is a long range strategic plan for prioritizing and funding infrastructure investments.

Investing in transportation infrastructure to the remote areas of Alaska will directly impact a number of resource development industries, including oil, gas, and mining, all of which have been plagued by high costs of transportation and operations. Strategic and pro-active investments have the opportunity to address these issues and generate improved production and consequently stimulate economic development.

Study area

To put it into context, in many ways, a West Susitna access road has some similarities to the Denali National Park and Preserve Road. It's generally one ribbon of roadway that provides access to a remote area of approximately 6 million acres.

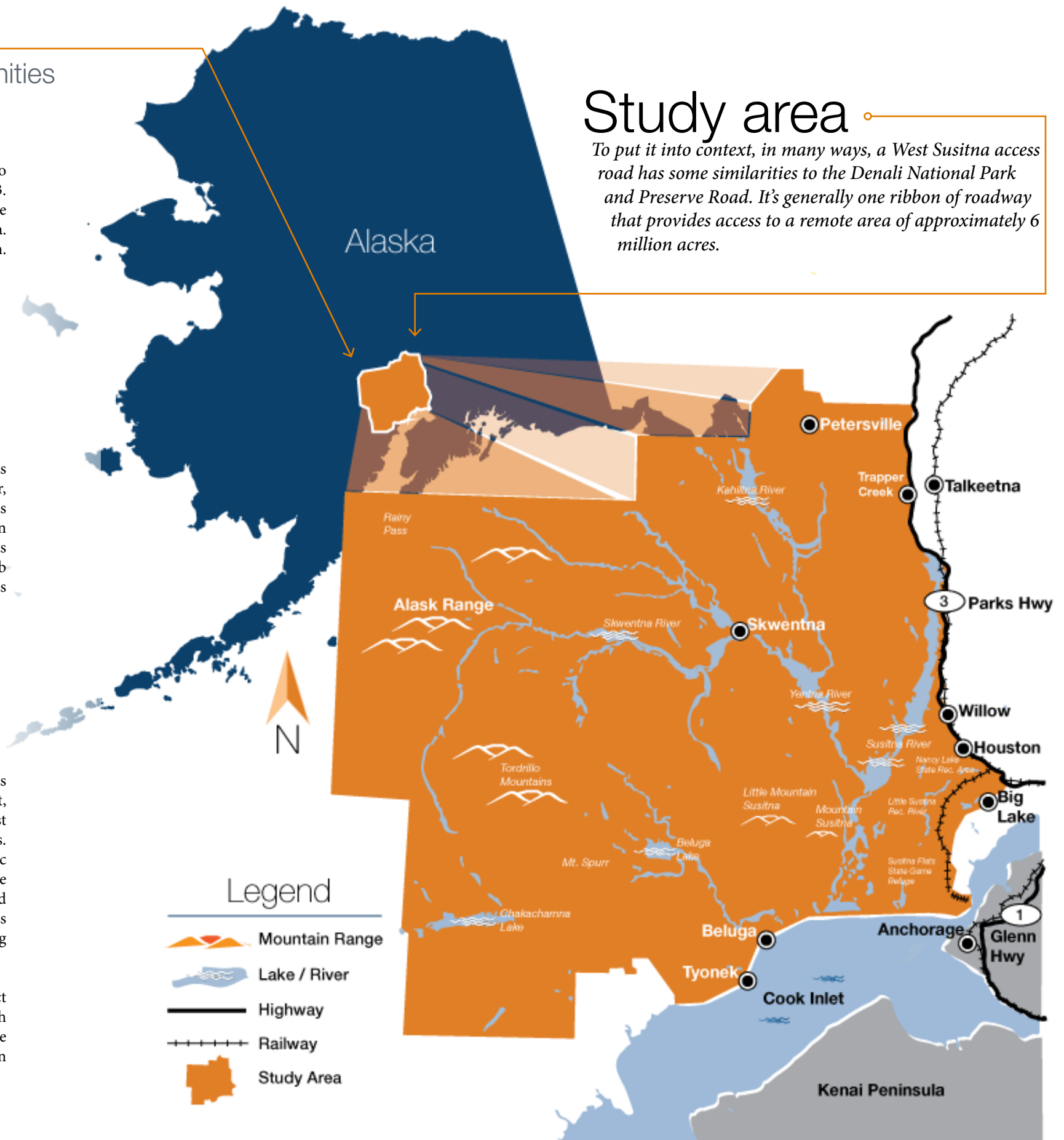
















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1 Mineral Resources - Hardrock and Coal



There are more than 3,000 active mining claims in the Study Area. The highest concentration of claim activity is in the northern portion of the Tordrillo Mountains in the Alaska Range near Rainy Pass area. Possible commodities include copper, gold, silver, molybdenum, platinum group elements (PGEs), and possibly diamonds. Also, the inferred State placer gold mining claims in the Study Area cover an area of 45,133 acres and are held by 113 Alaska Department of Natural Resources (DNR)-identified customer names.

Based on interviews conducted during the reconnaissance study and estimates of other producing mines in Alaska, there is considerable mining-related job potential in the Study Area. Kiska Metals Corporation, with its 144,000 lease acres, is estimated to generate over 200 direct permanent jobs¹ and upwards of 130 additional indirect jobs² when in full production. To put these estimates in context, statewide, approximately 1,000 people were employed in the mining industry³. Other leases, such as Millrock's nearly 120,000 acres could generate a commensurate number of jobs.

According to the Alaska Department of Labor, mining jobs are high paying, with earnings higher than any other industry except, oil and gas. In 2009, for instance, the average earning for each mining job was \$91,100 per year (almost twice the statewide average)⁴ and had reached \$98,000 per year by 2011⁵.

¹ Based on Kiska's estimates during interviews.
² Based on indirect: direct at same ratio Pogo Mine report, Alaska Journal of Commerce, September 2013
³ Alaska Department of Labor. Alaska Economic Trends. May 2013.
⁴ Alaska Department of Labor. Alaska Economic Trends. October 2010.
⁵ Alaska Department of Labor. Alaska Economic Trends. May 2013.

Table 1.1: Major Hardrock Mineral Exploration Activities in the Study Area

Company	Project/Prospect Name	Resources/Commodities	Lease Size (acres)
Kiska Metals Corporation	Whistler mainly, also Island Mountain and Muddy Creek	Copper, gold, silver	144,000
Millrock Resources, Inc.	Estelle, Cristo, Distin	Copper, gold	119,150
Intercept Alaska, Inc.	A single claim block (JL claims)	Copper, gold	17,760
Kennecott Exploration Company	Copper Joe	Copper, gold, molybdenum	16,000
On-Line Exploration Services, Inc.	Estelle, Molly, Beaver Creek, Kichatna	Copper, gold, molybdenum, possibly iron	14,225
Alaska Earth Sciences	Four claim blocks (55 claims)	Primarily copper and gold; silver	8,750
Shulin Lake Mining Company	Moderate-sized claim block (57 claims)	Gold, platinum group elements (PGE), possibly diamonds	4,860

Source: Alaska Department of Natural Resources-Division of Geological and Geophysical Surveys (DNR-DGGS) Alaska Mineral Resources Map (www.dggs.alaska.gov/webpubs/dggs/mp/oversized/mp149_sh001.pdf)

Stone Photo Courtesy of HDR Alaska, Inc. - Summer Hudson

ROAD ACCESS SUPPORTS LOCAL HIRE

Road access can greatly influence the location of a mine's workforce. For example the Pogo mine has road access via a private mine road to the public road system. The Pogo mine provides a crew shift bus to the mine site for employees and uses a relatively short four-day work shift. As a result, most of the staff is local hire (Fairbanks, Delta Junction) because the travel burden is workable. If the road did not exist, the likely shift change would be via aircraft and rotations would be once every two weeks similar to the Red Dog mine in northwest Alaska. Quite possibly, there would be more non-local hire able to work this rotation schedule.

The local hire can mean a lot for the local economy. For example, consider the multiplier effects of mine employee property taxes. At the Greens Creek mine in Southeast Alaska, locally hired employees living in Juneau paid approximately \$430,000 in property taxes. Likewise, Fort Knox Gold Mine employees were estimated to have paid approximately \$1 million in property taxes in 2010 to Fairbanks. Projects like the Chuitna coal or Linc Energy's underground coal gasification are estimated to require hundreds of employees – the economic implications of where these employees live likely would be significant.



Photo courtesy of HDR Alaska, Inc.

Table 1.2 Estimated Coal Resources Potential in or near the Study Area

Coal Province and Field	Coal Rank	Identified Resources (Short tons)	Identified Potential Sale Revenue (Dollars, billions)	Hypothetical Resources (Short tons)	Hypothetical Potential Sale Revenue (Dollars, billions)
Cook Inlet-Susitna Province					
Beluga Field	Subbituminous	10 billion	\$153.4	30 billion	\$460.2
Yentna Field	Subbituminous	1 billion	\$15.3	2.5 billion	\$38.3
Susitna Field	Subbituminous	110 million	\$1.7	2.3 billion	\$35.3

Source: DNR-DGGS. October 8, 2013. Personal communication with Jim Clough. Potential sale revenue was calculated by multiplying the resource quantity by the average sales price of coal nationwide in 2012 (an average state sales price was not available). This was recorded as being \$66.04/short ton (Bituminous), \$15.34/ short ton (Subbituminous), and \$80.21/short ton (Anthracite). For those fields that are thought to have multiple coal ranks, an average was used (per U.S. Energy Information Administration (EIA) 2012 Annual Coal Report; available at: <http://www.eia.gov/coal/annual/>).

COAL

There are a variety of types of proposed coal development projects in the Study Area, which are at varying stages of project development. Coal projects or areas of interest in the Study Area include:

- » Alaska Energy Corporation's proposed Canyon Creek Coal lease
- » PacRim Coal, LP's Chuitna Coal mine project in the Beluga coal field – in advanced permitting stage
- » Beluga Coal Company– active leases for surface coal reserves in the Beluga coal field
- » Linc Energy Alaska, Inc., Cook Inlet Region, Inc. (CIRI)/ Stone Horn Ridge, LLC – Underground Coal Gasification (UCG) testing in the Beluga coal field
- » Coal-to-liquid plant considerations

A study prepared by the U.S. Geological Survey in 2004 divided the estimated coal resources in Alaska into three major provinces: Northern Alaska-Slope, Central Alaska-Nenana, and Southern Alaska-Cook Inlet⁶ (which includes the Study Area). Of the two latter provinces, the report found that only a small fraction of the identified coal resources has been produced (over 40 million short tons or 36 million metric tons) of the more than 13.5 billion short tons (12.25 billion metric tons) that are estimated to occur in these two provinces.

if these prospects were fully developed, estimates of job development associated with these prospects indicate a potential for more than 1,200 direct jobs and an additional 850 indirect jobs could be generated within the study area. That is more than 2,000 jobs total. To put that into context, Usibelli Coal Mine near Healy employs about 130 people and averages about 2 million tons of coal production per year⁷.

⁶ USGS. 2004. Alaska Coal Geology, Resources, and Coalbed Methane Potential.
⁷ <http://usibelli.com/>

These tables and figures depict a snapshot of some of the larger and/or more active mineral resource activities occurring in the West Susitna Study Area.

Table 1.3: Hardrock and Gold Placer Mining Opportunities

Estimated Prospects		Estimated Prospects	
1	Estimated Copper, Gold and Silver Kiska Metals Corporation – Whistler, Island Mountain and Muddy Creek Size = 144,000 acres Estimated Employment – 200 direct and 130 indirect full time employees	10	Estimated Gold (Placer) Daniel Frietas Size = 2,862 acres (72 claims)
2	Estimated Copper, Gold and Silver Alaska Earth Sciences Size = 8,750 acres (four claim blocks consisting of 55 claims)	11	Estimated Gold (Placer) Wolverine Creek (2 claims)
3	Estimated Gold (Placer) Petersville/Peters Creek 94 claim holders Size = 20,957 acres (499 claims and leaseholds)	12	Heavy Mineral (Placer) Size = 1,600 acres (21 claim block)
4	Estimated Gold and Mining Opportunities (Placer) Lewis Clark – no mining leases, but two leasehold locations Beluga River – one mining claim Theodore River – a block of 133 state mining claims	13	Estimated Gold (Placer) Size = 401 acres (16 claims)
5	Estimated Copper, Gold, Molybdenum and Iron On-Line Exploration Services, Inc. – Estelle, Molly, Beaver Creek and Kichatna Size: 14,225 acres	14	Estimated Gold Mills and Twin Creeks Size = 2,066 acres
6	Estimated Gold Millrock Resources, Inc. – Estelle, Cristo and Distin Size = 119,150 acres	15	Estimated Gold (Placer) Lake Creek (8 claims)
7	Estimated Gold (Placer) and Gem Diamond Gold Corporation and one other party – Yenlo Hills Size = 2,340 acres (23 claims)	16	Estimated Copper, Gold and Molybdenum Kennecott Exploration Company – Copper Joe Size = 16,000 acres
8	Estimated Gold (Placer) Individual claim holders Size = 1,800+ acres (19 claims)	17	Estimated gold, platinum group elements (PGE) and Diamonds Shulin Lake Mining Company Diamond claims are speculative Size = 4,860 (claim block consists of 57 claims)
9	Precious Metals Teryl Resources Corporation Size = 3,680 acres	18	Estimated Gold (Placer) and Copper Intercept Alaska, Inc. Size = 17,760 acres (one claim block)
		19	Estimated Gold (Placer) K N Resources, LLC and Jim D. Espinola – Kichatna Size = 14,634 acres

**Note: Property values and employment forecasts are best estimates based upon interviews, existing information and comparative analysis of similar mining operations. Information also came from the DNR's mineral estate permits and leases database and/or DNR-Division of Mining, Land and Water staff.*

Table 1.4: Coal Mining Opportunities

Mineral Resources / Coal		Mineral Resources / Coal	
20	Alaska Energy Corp – Canyon Creek Coal Size = 13,175 acres Estimated Land Value: \$200 million with expected production of 2 MT/annually Estimated Employment: 100 direct and 65 indirect full time employees	22	Beluga Coal Company Size = 17,580 acres Estimated Land Value: \$600 million with expected production of 12 MT/annually Estimated Employment: 350 direct and 220 indirect full time employees Number estimates based on similar sized adjacent Chuitna project
21	PacRim Coal, LP – Chuitna Size = 20,450 acres Estimated Land Value: \$600 million with expected production of 12 MT/annually Estimated Employment: 350 direct and 220 indirect full time employees		CIRI and Laurus Energy, Inc. – Stone Horn Ridge Estimated Employment: 200 direct and 200 indirect full time employees
			Linc Energy, Inc. – Kenai and Tyonek Coal Leases Total area: 98,700 acres Estimated Employment: 200 direct and 200 indirect full time employees (up to 1,000 peak season)

**Note: Property values and employment forecasts are best estimates based upon interviews, existing information and comparative analysis of similar mining operations.*

Figure 1.1: Hardrock and Gold Placer Mining Opportunities

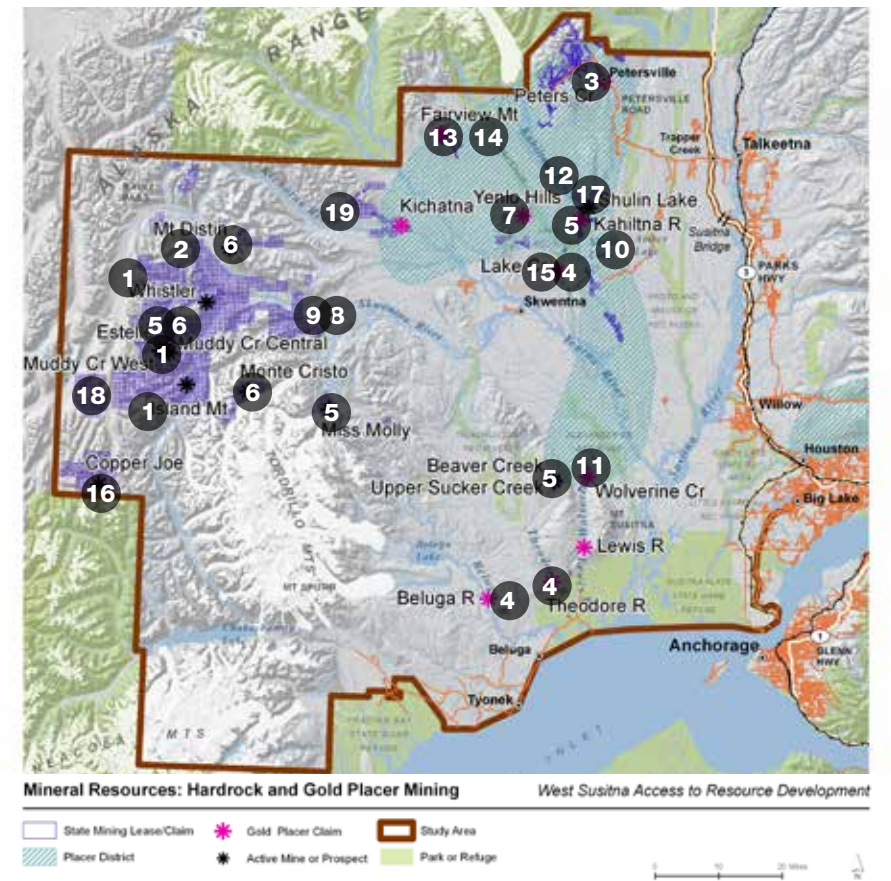
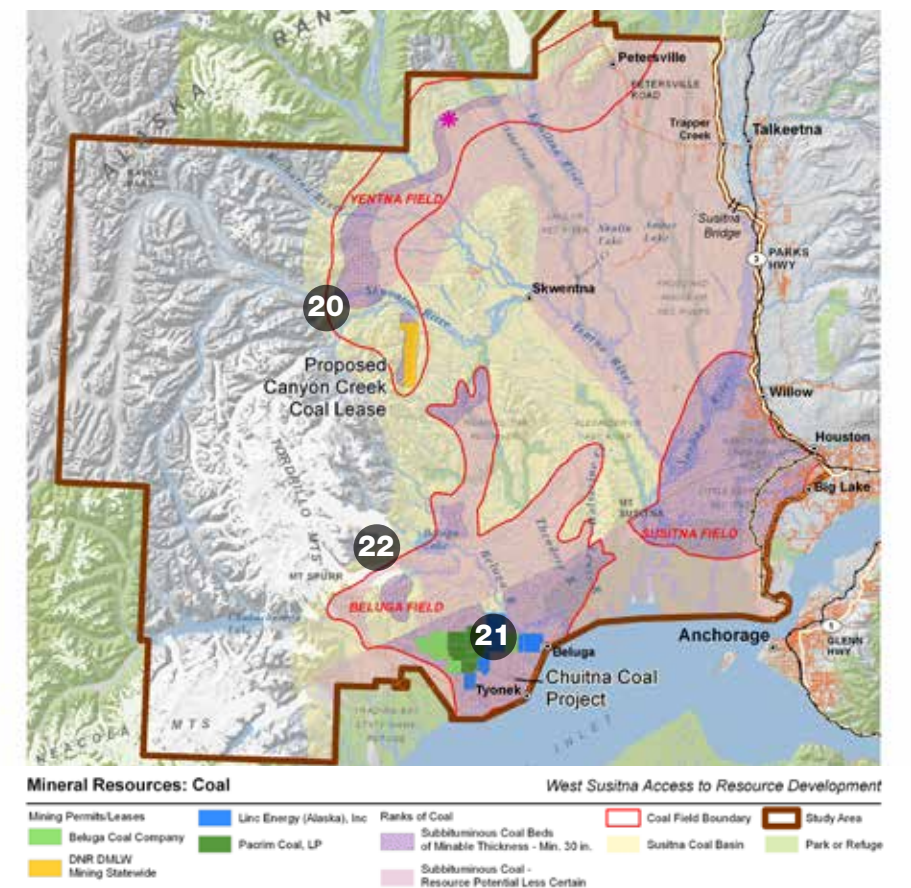


Figure 1.2: Coal Mining Opportunities



2 Oil and Gas Resources



Active oil and gas exploration continues to occur in Northern Cook Inlet. According to the Alaska Department of Natural Resources, recent drilling has proven new reserves in existing fields. Cook Inlet oil production peaked at 230,000 barrels per day (bpd) in 1970, dropping to about 10,800 bpd in FY 2012⁸. As of early December 2013, there are 398 leases in Cook Inlet totaling 1.12 million acres, of which about one-third are on-shore and two-thirds are off-shore⁹. There are nine producing oil and gas units and fields in the Study Area (in Northern Cook Inlet and the Susitna Basin) owned by six different companies; the Beluga River Unit is a major supplier for local electric utilities and home gas usage in the Anchorage area.

⁸ Resource Development Council Web page. Alaska's Oil & Gas Industry Background. Available at: www.akrdc.org/issues/oilgas/overview.html (accessed March 2013).
⁹ DNR-Division of Oil and Gas. December 2013. Active Oil and Gas Lease Inventory Web page. Available at: <http://dog.dnr.alaska.gov/Publications/OGInventory.htm> (accessed December 2013).

Cook Inlet Region

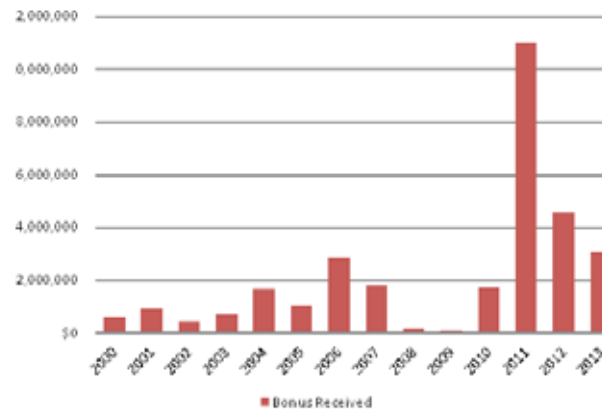
The majority of the State of Alaska's income is generated from the oil industry (approximately 93.4 percent in Fiscal Year 2012)¹⁰. According to the Alaska Economic Report Supplement (2013), the Department of Revenue is expecting production of an average of 13,500 barrels of oil/day, a 52 percent increase in Cook Inlet production since 2010 and this trend is likely to continue¹¹. The U.S. Geological Survey (USGS) has estimated that the Cook Inlet Region has 599 million barrels of oil and 13.7 trillion cubic feet of natural gas yet to be discovered¹². The Alaska Department of Revenue forecasts a crude oil price of \$105.68 for Fiscal Year 2014¹³. Natural gas prices in September 2013 were \$5,550 per million cubic foot¹⁴. Based on these prices there would be approximately \$63.3 billion worth of oil and approximately \$76 billion worth of natural gas in Cook Inlet.

Interest in Cook Inlet increased early this decade and has been generating lease revenues to the State. The adjacent graph shows the amount of lease revenue generated from Cook Inlet. Revenue peaked in 2011 with nearly \$11 million in lease bonuses received and 545,000 acres leased.

North Cook Inlet Region

Oil and gas units or fields located specifically in the West Susitna Study Area, in the Northern Cook Inlet region, are depicted in Tables 2.1 and 2.2 and Figure 2.1.

State Competitive Oil and Gas Lease Sales Cook Inlet Bonus Received 2000-2013



Source: <http://dog.dnr.alaska.gov/Leasing/SaleResults.htm#cinlet2> (Accessed December 2013)

Note: Data depicts Cook Inlet as a whole and not just Northern Cook Inlet.

¹⁰ Alaska Department of Natural Resources Division of Oil and Gas. State of Alaska Five-Year Program of Proposed Oil and Gas Lease Sales, January 2013
¹¹ Alaska Economic Report Supplement December 4, 2013
¹² Stanley, Richard G. et al. 2011. Assessment of Undiscovered Oil and Gas Resources of the Cook Inlet Region, South-Central Alaska, 2011. Prepared by the Cook Inlet USGS Assessment Team. Available at: <http://pubs.usgs.gov/fs/2011/3068/> (Accessed December 2013)
¹³ Revenue Sources Book Fall 2013, Alaska Department of Revenue – Tax Division December 4, 2013
¹⁴ <http://www.eia.gov/dnav/ng/hist/n3050ak3m.htm>

Cook Inlet Aerial Photo Courtesy of HDR Alaska, Inc.

Table 2.1: Oil and Gas Units/Fields in the Study Area, as of November 2013

Unit/Field	Current Ownership (%)	Inception	Size (acres)	Number of Wells*	Cumulative Production		
					Condensate (barrels [bbl])	Water (bbl)	Gas (millions of cubic feet [MCF])
Ivan River **	Hilcorp: 99.8 Uncommitted: 0.2	1990	2,295	6	0	33,872	84,283,767
Stump Lake	Hilcorp: 100	1990	4,880	1	0	505	6,647,923
Beluga River ***	ConocoPhillips: 50 MOA: 33.33 Hilcorp 16.67	1963	8,227	26	0	1,966,167	1,269,300,564
Lewis River	Hilcorp: 100	1984	620	3	0	13,113	14,313,420
Pretty Creek **	Hilcorp: 100	1986	4,600	2	0	17,252	9,540,022
Three Mile Creek	Aurora Gas: 50 Cook Inlet Energy: 50	2005	3,320	2	0	28,719	2,381,336
Lone Creek (CIRI)	Aurora Gas: 100	2003	n/a	3	0	33,467	9,933,627
Moquawkie (CIRI)	Aurora Gas: 100	1967	n/a	5	0	7,582	4,914,788
Nicolai Creek	Aurora Gas: 100	1968	470	6	1	56,764	8,034,348

Source: Personal communication with Alaska Oil and Gas Conservation Commission (AOGCC). Note: AOGCC maintains production data. Production numbers are as of October 31, 2013.

* Number of completed wells that have been completed and not been plugged and abandoned, as of December 11, 2013.
 ** There are two gas storage leases in the Study Area: Ivan River and Pretty Creek.
 ***Cumulative production for Beluga River is approximately 1.3 trillion cubic feet.

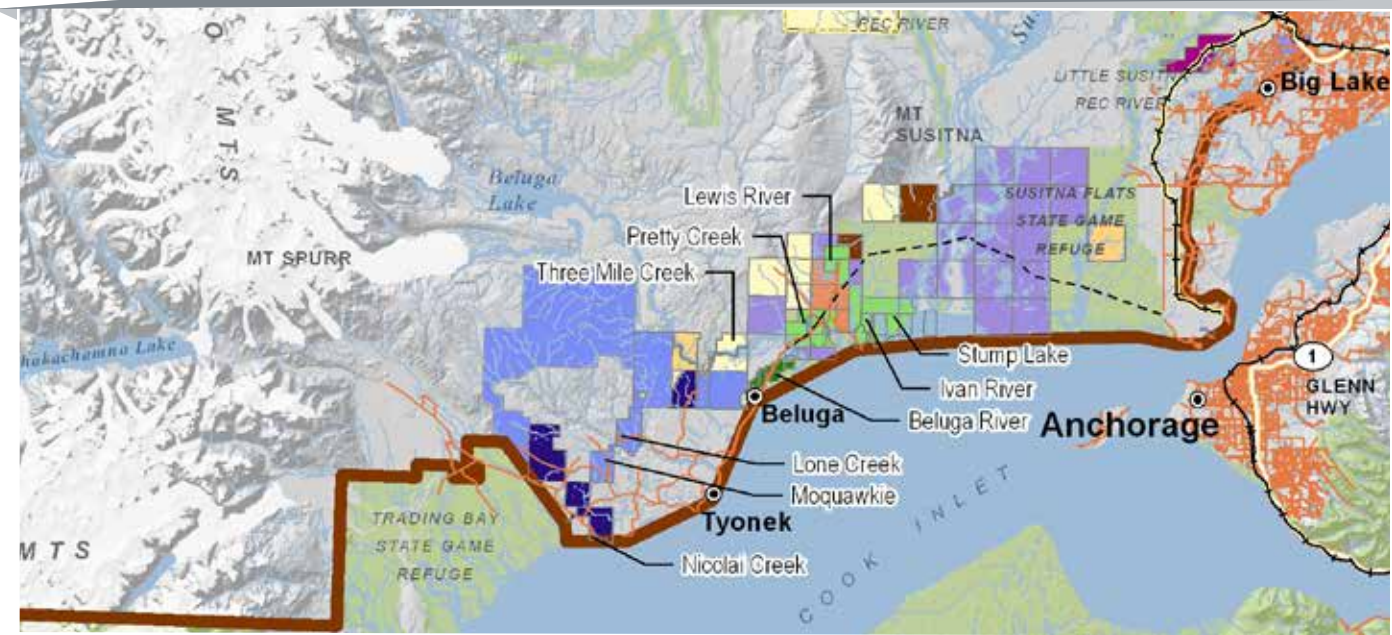
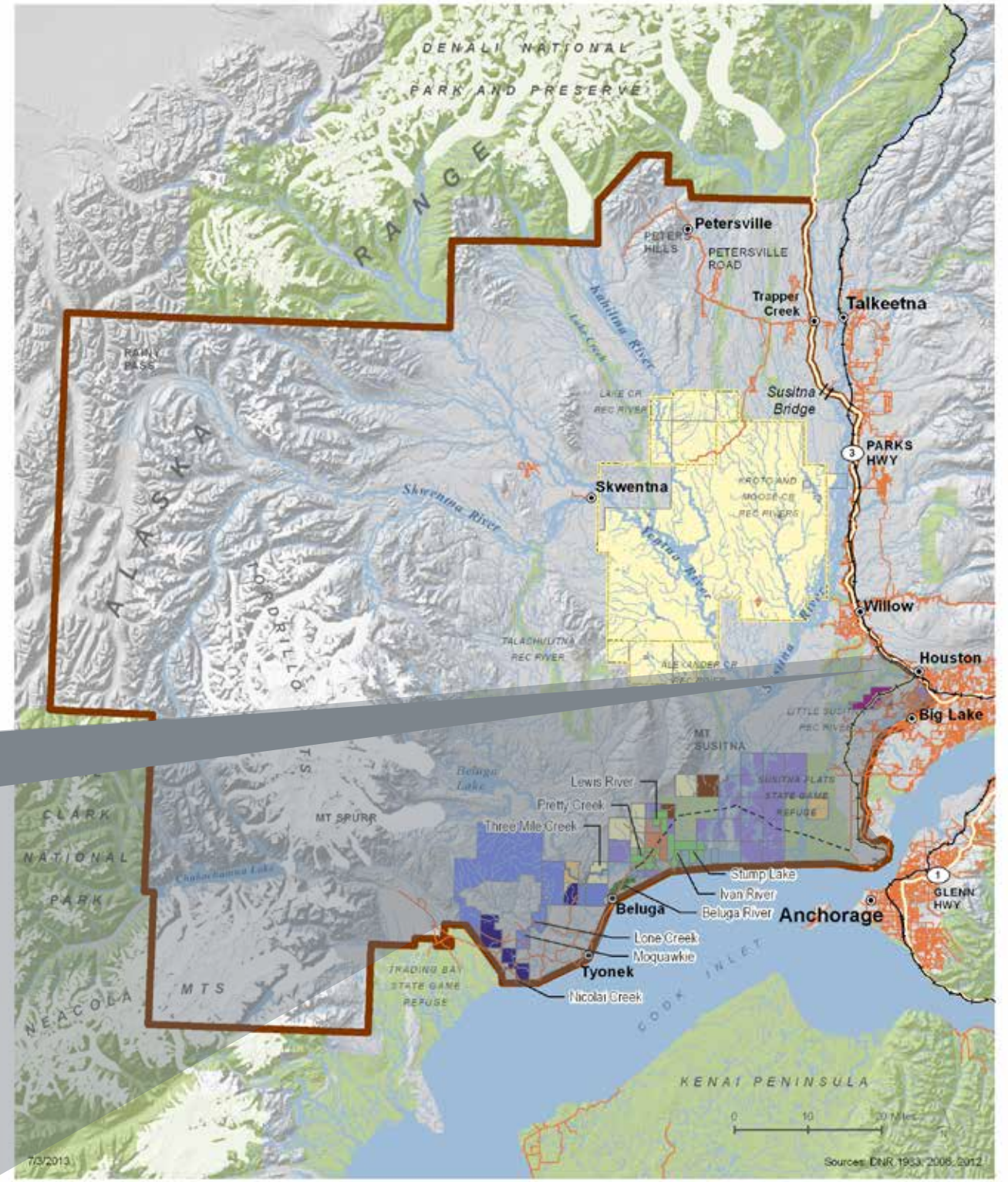


Cook Inlet Photo Courtesy of HDR Alaska, Inc.

These oil and gas permits /leases correspond to those depicted on the adjacent figure.

Table 2.2: Oil and Gas Permits/Leases	Table 2.2: Oil and Gas Permits/Leases
Natural Gas and/or Oil Potential Otter – Cook Inlet Energy Active Exploration Operations	Natural Gas Beluga River – ConocoPhillips (50%); MOA (33.3%); Hilcorp (16.7%) Size = 8,227 acres 26 wells; 1,259.9 MCF gas production in 1963
Natural Gas and/or Oil Potential Susitna Basin – Cook Inlet Energy Size = 680,000 acres (5 targets)	Natural Gas Potential Kenai LNG Facility – ConocoPhillips
Natural Gas and/or Oil Potential Olsen Creek – Cook Inlet Energy Active Exploration Operations	Natural Gas Lewis River, Ivan River (Gas Storage Lease); Petty Creek (Gas Storage Lease); Stump Lake; Beluga River Units Hilcorp, Conoco Phillips and MOA
Natural Gas Development Aurora Gas – Apache	Natural Gas Stump Lake – Hilcorp (100%) Size = 4,880 acres 1 well; 6.6 MCF gas production since 1990
Potential Oil Development - Apache	Natural Gas Ivan River – Hilcorp (99.8%) Size = 2,295 acres 6 wells; 83.9 MCF gas production since 1990
Natural Gas Lone Creek (CIRI) – Aurora Gas (100%) 3 wells; 9.8 MCF gas production since 2003	Natural Gas Lewis River – Hilcorp (100%) Size = 620 acres 3 wells; 14.1 MCF gas production since 1984
Natural Gas Three Mile Creek – Aurora Gas (50%) and CIRI (50%) Size = 3,320 acres 2 wells; 2.4 MCF gas production since 2005	Natural Gas Petty Creek – Hilcorp (100%) Size = 4,600 acres 2 wells; 9.5 MCF gas production since 1986
Natural Gas Moquakie Unit (CIRI) – Aurora Gas (100%) 3 wells; 4.9 MCF gas production since 1967	
Natural Gas Nicolai Creek – Aurora Gas (100%) 6 wells; 7.7 MCF gas production since 1968	
Natural Gas Three Mile Creek Field, Lone Creek, Moquakie Unit and Nicolai Creek Aurora Gas (Shallow); Apache (Deep) Size = 45,000 acres with exploration expected over 10 to 15 years	

Figure 2.1: Oil and Gas Permits/Leases



3 Forestry/Timber Resources



GROWING THE REGION'S TIMBER INDUSTRY

The Region has a long history and interest in further development of the existing timber industry. Current mills are small and serve niche markets, many of which are high value. Access to the regions forest resources has been a major impediment to fully developing the current industry and evaluating new opportunities. If improved year-round access to lands west of the Little Susitna and Susitna rivers was provided, this would remove a major barrier and access significant acreages of public lands identified for forest management. A new timber supply that is both sustainable and economic to produce would be a tremendous asset to the region.

A number of potential forestry and timber resource areas have been identified in the Study Area that may be available for future development, particularly if a new road made these areas more accessible.

A large amount of land in the Study Area is currently under consideration for legislative designation as a State Forest. House Bill 79/Senate Bill 28 was introduced to the State Legislature in 2013 and was delayed for review until the 2014 session. The bill would create a new State Forest in the Susitna Valley and expand DNR authority to offer negotiated timber sales. The proposed 763,000 acre Susitna State Forest, if adopted, would become the

fourth state forest in Alaska, joining the Tanana Valley, Haines, and Southeast State Forests.

DNR area planning documents for the Susitna Matanuska area delineate the area into a number of sub-regions. These sub-regions are summarized in the following table. According to the MSB's 2007 Market Analysis and Timber Appraisal Report, the average timber value per acre was \$85.23 (for year 2007). Accounting inflation, the estimated value per acre in 2013 dollars is \$92.90. With a total of approximately 701,000 acres of potential forest for harvest identified in the Study Area, the expected monetary value in 2013 dollars would be approximately \$65 million.

Table 3.1: Forest Resources in the Study Area by DNR Planning Regions

DNR Planning Region	Size (acres)	Specifically-Identified Areas for Potential Forest Harvest	Hypothetical Applied Direct Economic Value (\$)**
Petersville	71,000	Peters Creek, Moose Creek and Kroto Creek areas	\$6.6 million
Sunflower Basin	15,000	Near Kahiltna River and Lake Creek Corridor	\$1.4 million
Susitna Lowlands	319,000	Far western edge of Susitna Lowlands; Skwentna River, Alexander Creek, Trail Ridge, west of Lake Creek	\$29.6 million
Mt. Susitna	219,000	Alexander Creek, Skwentna River, Mount Susitna	\$20 million
Beluga	32,000	None specifically identified	\$3.0 million
Alaska Range	45,000	Limited. Eastern areas of the Region at lower elevations	\$4.2 million
All planning regions in Study Area	701,000	Assumed total harvest, if acreage is fully realized	\$65 million

Source: DNR 1985 Susitna Area Plan, 2011 Susitna Matanuska Area Plan.

* Planning regions were redrawn between the 1985 and 2011 DNR plans. The Beluga planning region is specific to the 1985 Susitna Area Plan. The study team recognizes that the 1985 Susitna Area Plan was superseded by the 2011 Susitna Matanuska Area Plan. However, some information from the 1985 study, such as existing inventories, was considered relevant background to retain and be cited in the West Susitna Access Reconnaissance study, particularly since part of the scope is to identify known resources in the Study Area.

** An assumed value per acre in 2013 dollars is \$92.90. This applied economic direct value was based on a market analysis conducted in 2007 in which an average value for timber per acre was available. This value does not include indirect or spin-off economic benefits.

Figure 3.1: Forestry/Timber Resource Potential

LOCAL TIMBER BENEFITS LOCAL ECONOMIES

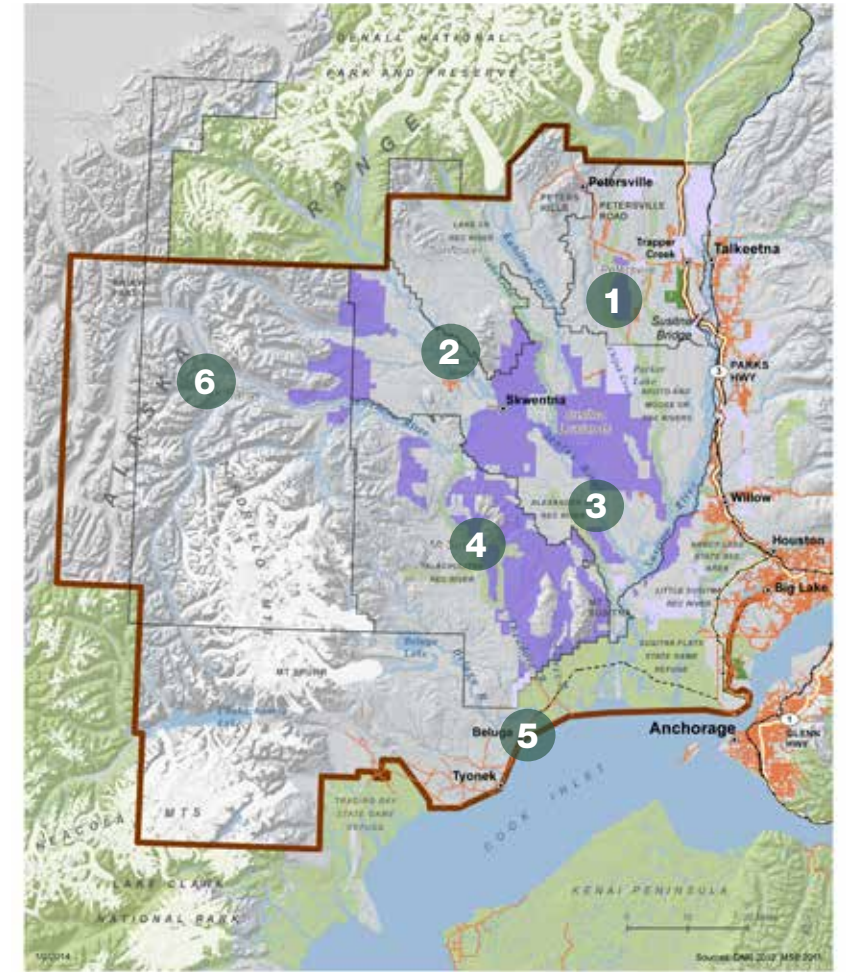
Having enhanced access to areas for forestry strengthens Alaska's economy not just through direct and indirect gains but also through spin-off industries such as building supplies, heating sources, food resources, and products for export or local use. Shipping costs drive up the overall costs of quality products such as custom cabinetry and logs for home construction. Local businesses such as sawmills in the Matanuska Susitna Borough and Anchorage and custom cabinet builders and distributors across the state would benefit from increased local supplies.

Table 3.2: Areas for Potential Forest Harvest

1	Petersville 71,000 acres considered for potential timber harvest Note: near existing roadways; some lands designated as forestry, with specific locations considered for timber harvest
2	Sunflower Basin 15,000 acres considered for potential timber harvest, including personal use activities (house logs and firewood) Note: small commercial forestry potential near major rivers (e.g., Kahiltna River and Lake Creek); Kahiltna River area designated by DNR-Division of Forestry as priority area
3	Susitna Lowlands 319,000 acres for timber management, half of which has high or moderate potential to be commercial timber
4	Mt. Susitna 219,000 acres, some of which has potential for commercial forestry Note: DNR attributes lack of commercial harvest in area to absence of road and bridge access
5	Beluga 32,000 acres for timber harvest until the area is utilized for coal development
6	Alaska Range 45,000 acres, though limited potential (due to slow growth rates and uncertainty associated with timber regeneration)

Specific 2011 DNR-identified areas for Potential Forest Harvest Total: 701,000 acres of forest lands.
Note: overlaps with State of Alaska's Proposed Susitna State forest area

Potential Timber Resources
State of Alaska's Proposed Susitna State Forest: Proposed 763,000-acres Status: Bill under consideration in State Legislature in 2013 and 2014. Note: Would become Alaska's fourth State forest; overlaps with 2011 DNR-identified forest resource areas



Timber Resources West Susitna Access to Resource Development



Timber Photo Courtesy of HDR Alaska, Inc - Sasha Prewit

4 Agricultural Resources



Agriculture has had a long presence in the Matanuska-Susitna valley and was one of the area's first economic drivers. Agriculture has always played an important role in the Mat-Su economy, with a total value of agricultural production in 2007 valued at \$11.8 million¹⁵. The Susitna Matanuska area encompasses the last large area of State-owned agricultural land in Southcentral Alaska¹⁶.

DNR's 2011 Susitna Matanuska Area Plan identified a number of potential agricultural project areas west of the Susitna River. A major hindrance in the expansion of agriculture is the lack of access.

15 2008 Mat-Su Comprehensive Economic Development Strategy Update
16 2011 Susitna Matanuska Area Plan

POSSIBLE ECONOMIC BENEFITS

Approximately 65,000 acres of agricultural lands have been identified within the project vicinity. Much of this land is not accessible by road and is currently land locked making access a limiting factor for agricultural pursuits.

According to the U.S. Department of Agriculture (USDA), in 2012 approximately 17% of Alaska households were food insecure or very low food secure. What this means is that a large percentage of households in Alaska don't have access to nutritionally adequate or safe foods. If the State were to provide better access to viable agricultural lands and produce more food resources within the state, it may help keep costs down to the end consumer for products such as potatoes, carrots, grain for local use, hay for livestock operations, and other products. In turn this could promote buying local and keeping the end prices more affordable.

SUPPORTING FAMILY FARMS¹⁷

According to the USDA, more than 80% of the farms in Alaska are family owned and operated. Bruce Bush, a small scale vegetable farmer in the Matanuska Valley, provided some insight on employment at his commercial farming operation. He farms 26



17 USDA. 2013. USDA Economic Research Service State Fact Sheets, updated as of November 6, 2013. <http://1.usa.gov/KIBnKQ> (accessed 12/13/2013)

Wetlands Photo Courtesy of HDR Alaska, Inc.
Round bail Photo Shutterstock - © HDR Inc.

Figure 4.1: Agricultural Resources in the Study Area

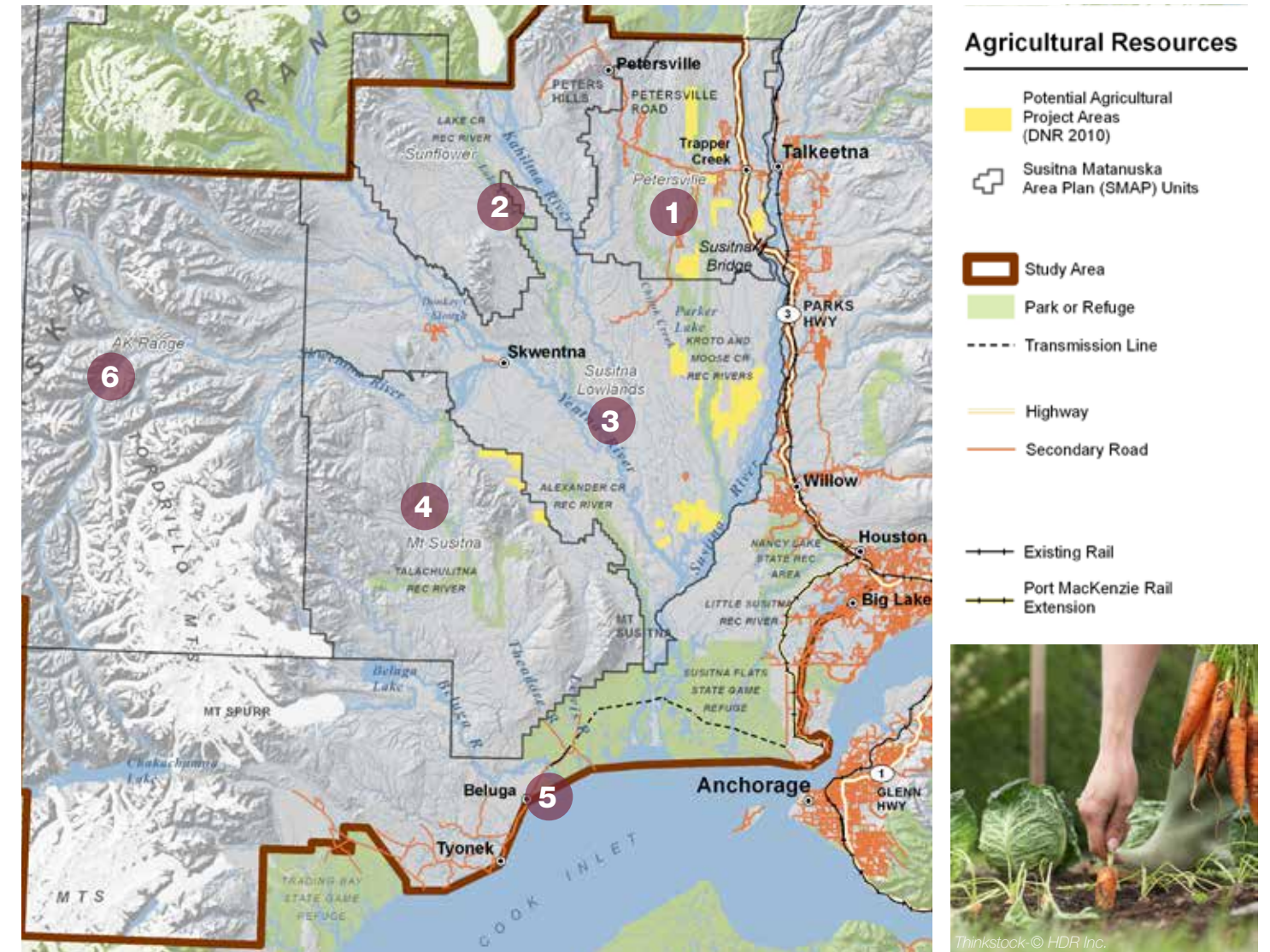


Table 4.1: Agricultural Resources in the Study Area

DNR Planning Region	Size (acres)	Specifically-Identified Areas for Potential Agricultural Uses	Estimated Direct Annual Economic Value (\$) *
1 Petersville	20,000	Near existing roadways; near Moose Creek	\$16.1 million
2 Sunflower Basin	n/a	Lake Creek area; Kahiltna River	n/a
3 Susitna Lowlands	38,000	Kashwitna Knobs area, west of the Susitna River	\$30.6 million
4 Mt. Susitna	7,000	Scattered tracts in lowlands west of Alexander Creek	\$5.6 million
5 Beluga	n/a	Scattered tracts	n/a
6 Alaska Range	n/a	None. Limited potential due to soils, topography and climate	n/a
All planning regions in Study Area	65,000	Assumed total harvest, if acreage is fully realized	\$52.4 million

Source: DNR 1985 Susitna Area Plan, 2011 Susitna Matanuska Area Plan. Note: Planning regions were redrawn between the 1985 and 2011 DNR plans. The Beluga planning region is specific to the 1985 Susitna Area Plan.

* An assumed value per acre is \$806.45. This applied economic direct value was based on the 2012 USDA State Agricultural Census, given approximately \$25 million of income was produced from crops on nearly 31,000 acres.

5 Alternative Energy



Alaska boasts some of the greatest renewable energy resources in the world, which has the potential to help offset some of the state's high energy costs. Some of the main alternative energy resource opportunities in Alaska include hydroelectric power, geothermal energy, woody biomass, wind power, solar power, and ocean and river hydrokinetics. Within the Study Area, two types of alternative energy resource projects have been historically studied. These are the Mount Spurr Geothermal and the Chakachamna Hydroelectric projects. A third alternative energy resource opportunity – woody biomass – is currently being considered.

Geothermal exploration is increasing in the state¹⁸. For several decades, the State has held geothermal lease sales near the Mount Spurr volcano, which is located about 80 miles west of Anchorage on the west side of Cook Inlet.

Over the years, the State of Alaska has considered a number of potential sites for hydropower projects for serving the needs of Southcentral Alaska's communities. The two most notable hydropower projects in Southcentral Alaska are the Susitna-Watana Hydroelectric project and Chakachamna Hydroelectric project. While the State actually chose and is pursuing the Susitna-Watana site, it's important to note that potential hydroelectric resources exist on Chakachamna Lake, located within the Study Area approximately 85 miles west of Anchorage.

Wood continues to remain an important renewable energy source

¹⁸ Alaska Energy Authority and Renewable Energy Alaska Project (REAP). August 2011. Renewable Energy Atlas of Alaska. http://ftp.aiea.org/AEAPublications/2011_RenewableEnergyAtlasofAlaska.pdf (accessed March 2013).

for Alaskans. The community of Tyonek is currently undergoing the grant application process to implement a biomass project, while the community of Talkeetna, located very close to the Study Area, received grant funds in 2011. The Matanuska-Susitna Borough also has identified forest management units located within the Study Area that have the potential to yield measurable woody biomass. Early trials in Juneau have found that residential woody biomass systems provide a 40% savings on the price of fuel.

OTHER POTENTIAL ALTERNATIVE ENERGY SOURCES

Limited exploration of other potential alternative energy sources within the Study Area has occurred. Elsewhere, the combination of wind and hydroelectric, Kodiak Electric Association shuts off their diesel generators for the majority of the year, while saving their members over \$6 million since 2009¹⁹.

¹⁹ Wind Power in Alaska, Fall 2013

Table 5.1: Potential Alternative Energy Resources

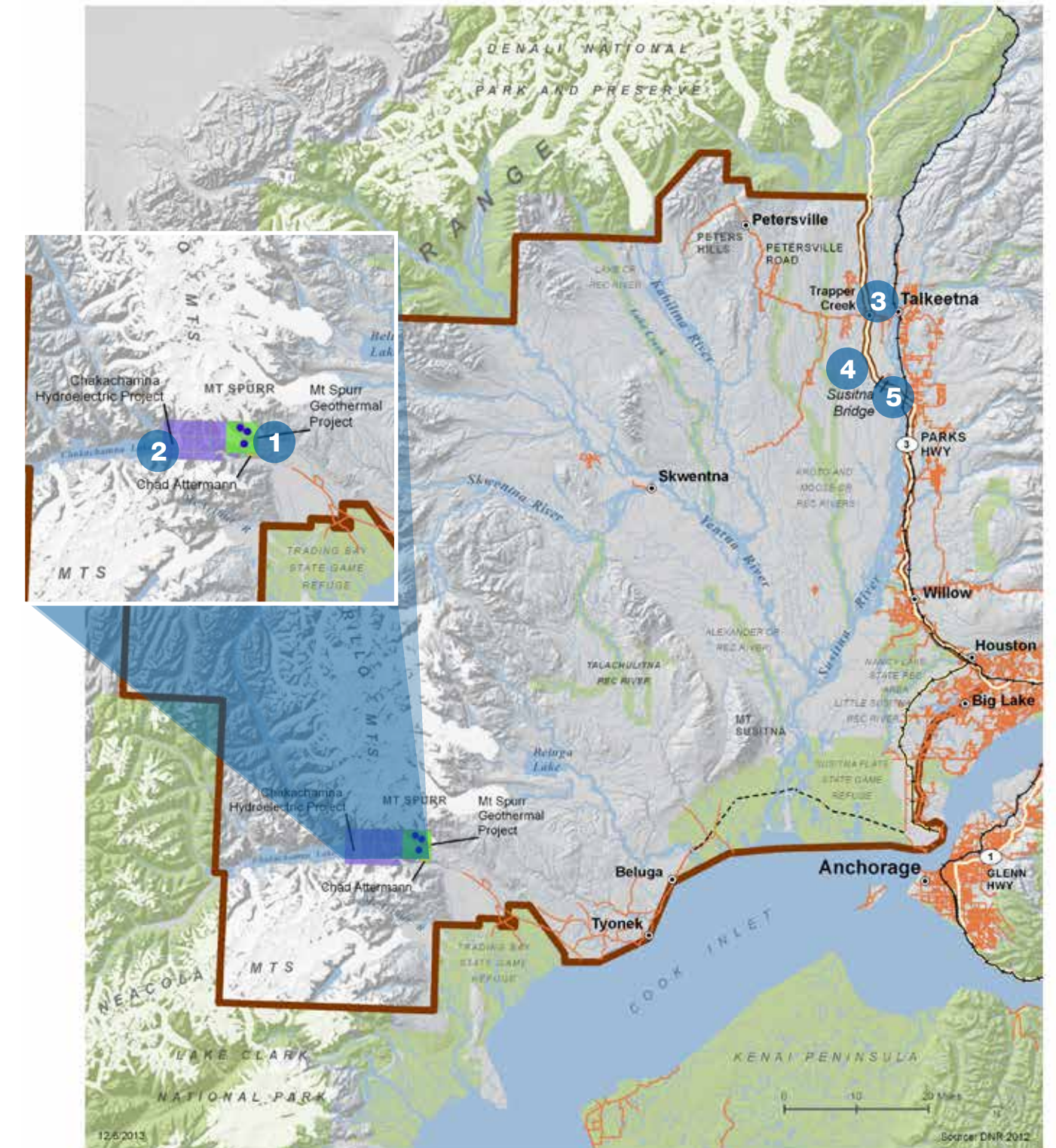
1	<p>Potential geothermal energy resource Mt. Spurr Geothermal Lease Ormat Technologies, Inc. Owns 15 leases over approximately 30,000 acres (there are 16 leases total covering 36,000 acres) Status: Initial estimates were for a 50-megawatt base load of power from a geothermal power plant, though it was found to be half of what would be a viable geothermal project. Drilling to resume in 2014 after a hiatus.</p>
2	<p>Potential hydropower resource Chakachamna Hydroelectric Project TDX Power, Inc. received a 3-year permit in 2006 to study the potential for a 300-MW project Status: State of Alaska chose a different location to pursue (Susitna-Watana project, located northeast of the West Susitna Study Area)</p>

Wind Turbine Photo Courtesy of HDR Alaska, Inc.

Table 5.1: Potential Alternative Energy Resources

3	<p>Potential for Woody biomass resources Talkeetna Talkeetna has received grant money to implement a biomass project. Tyonek is undergoing an application process. Note: As of the summer of 2013, 19 biomass heating projects are operated in that state, with 50 communities expressing interest in starting biomass programs.</p>
4	<p>MSB-Owned Forest Management Units with Measurable Woody Biomass Yields Rabideux Creek 1,568 acres of operable forest land With an assumed 1.0 fuel-wood yield ratio of dry ton/acre/year, total yield is 1,568 acres.</p>
5	<p>MSB-Owned Forest Management Units with Measurable Woody Biomass Yields Susitna River Corridor 2,330 acres of operable forest land With an assumed 1.0 fuel-wood yield ratio of dry ton/acre/year, total yield is 2,330 acres.</p>

Figure 5.1: Potential Alternative Energy Resources



Alternative Energy

West Susitna Access to Resource Development



6 Recreational Resources



Recreation is a popular use of State lands in Alaska. A majority of the land within the more than 6 million acres that make up the Study Area is State land, and much of that is considered to have recreational potential. Within the Study Area, the large acreages of undeveloped lands contribute to vast recreational opportunities. The Study Area is well endowed with recreational resources opportunities, from its low-lying areas consisting of fish-filled lakes and rivers to the foothills and mountains of the Alaska Mountain Range.

In 2007, the Cook Inlet Region experienced 761,221 resident angler days and 481,877 non resident angler days. That equated to \$989 million of spending in the Southcentral region directly generating \$240 million in income to nearly 8,000 full and part time workers. The Cook Inlet subregion contributed \$279 million of income and 8,056 jobs to the larger Southcentral economy, including economic multiplier effects.

According to the 2008 Mat-Su Borough Comprehensive Economic Development Strategy Plan, the tourism and visitor industry accounts for over \$282 million per year. It also provides approximately 4,000 jobs and \$100 million in direct payroll with between 780,000 – 800,000 visitors per year²⁰.

Sport fisheries are accessed by boat and air. About 70,000 angler days are expended annually west of the Susitna River, compared to 95,000 angler days annually on the road-accessible rivers east of the Susitna River²¹. Much of this effort is incorporated in

remote lodge operations, but also includes a large number of private cabin owners. Statewide each angler day was worth \$277 dollars on average²². Meaning more than \$19 million dollars was spent on the 70,000 angler days west of the Susitna and more than \$26 million was spent on road accessible areas. If the study area were made more accessible, additional visitation and the economic benefits that come with it would be substantial.

The Susitna Flats State Game Refuge (SGR) provides public uses of fish and wildlife, such as waterfowl, bear, and moose hunting; wildlife viewing and photography; and general outdoor recreation. Approximately 10 percent of the annual waterfowl harvest in the state occurs on the SGR with about 15,000 ducks and 500 geese taken. Rivers within the SGR are also popular for sportfishing, with the Theodore and Lewis rivers supporting more than 7,000 user-days a year.

Table 6.1: Recreational Resource Potential

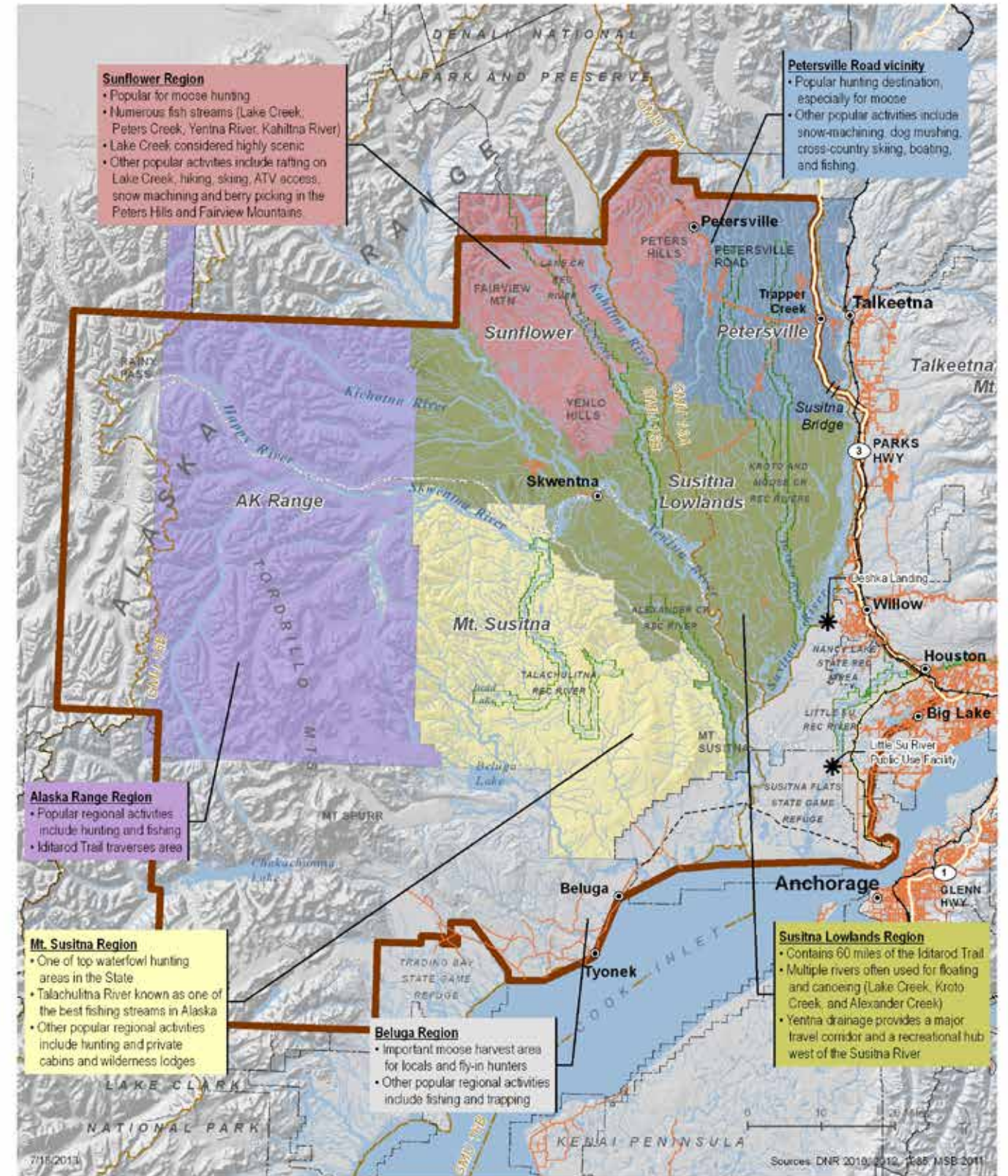
Recreational Opportunities	
Activities like snowmachining, hiking, dog mushing, cross-country skiing, and boating, to name just a few.	
Patented Mining Claims/ Recreational Mining	
Note: More than 100 nine to ten-acre lots are available for private ownership in the Cache Creek mining district area, near the end west of Petersburg Road. The lots are federally-patented land and allow for recreational gold mining.	
Hunting	
» Moose, sheep, caribou, and black and brown bear are all hunted in the Study Area	
» Waterfowl: Approximately 10% of the State's annual waterfowl harvest occurs on the Susitna Flats Game Refuge.	
Sportfishing	
» Within the Susitna Flats Game Refuge, the Theodore and Lewis rivers support more than 7,000 sportfishing user-days a year.	
» Annual angler days:	
– 70,000 west of the Susitna River, and 95,000 on the road-accessible rivers east of the Susitna River	
» Annual harvests:	
– 5,000 Chinook on the Deshka River, 3,000 Chinook on Lake Creek, 14,000 Coho among all west-side tributaries, and 30,000 rainbow trout, mainly from Lake Creek, Deshka River, and Talachulitna River	
» Guides:	
– Lake Creek area supports ~60 guides	
» Other anadromous fish streams producing salmon for Cook Inlet fisheries: Kichatna River, Skwentna River, Happy River and their tributaries	
» Other important salmon streams: Chuitna, Nicolai, and Beluga Rivers	
» Alexander Lake is known for its pike fishing	

²⁰ Mat-Su Comprehensive Economic Development Strategy December 2008 Update. Mat-Su Resource Conservation and Development Council
²¹ Alaska Department of Fish and Game (ADF&G). April 29, 2013. Letter from ADF&G Habitat Biologist Marla Carter.

²² ADF&G. 2008. Economic Impacts and Contributions of Sportfishing in Alaska, 2007

Iditarod Photo Courtesy of HDR Alaska, Inc - Sasha Prewitt


Figure 6.1: Recreational Resource Potential



Recreational Resources

West Susitna Access to Resource Development

Susitna Matanuska Area Plan (SMAP) Units within the Study Area	Mt Susitna	State-designated Recreational River	ADF&G Game Management Unit (GMU)	Existing Rail
AK Range	Petersville	Park or Refuge	Highway	Port MacKenzie Rail Extension
Sunflower	Susitna Lowlands	Study Area	Secondary Road	National Historic Iditarod Trail



Murray Walsh, Roads to Resources Manager

Alaska Department of Transportation & Public Facilities

DOT&PF, Commissioner's Office

PO BOX 112500; Juneau, AK 99811-2500

Telephone: 907-465-6973

e-mail: Murray.Walsh@alaska.gov