

K3.9 SUBSISTENCE

This section briefly summarizes the most recent available comprehensive subsistence harvest surveys for 13 communities that are farther away from the proposed mine site, transportation corridor, or port site locations. A summary of the subsistence harvest surveys for the six communities closest to the project area can be found in Section 3.9, Subsistence. This appendix also includes additional maps for the six communities discussed in Section 3.9, Subsistence. The purpose of this appendix is to provide supplemental information for the six communities closest to the project area, as well as provide baseline subsistence harvest and use information for communities that are unlikely to be directly affected by the proposed project and alternatives, but could experience indirect effects or could be impacted by one of the spill scenarios discussed in Section 4.27, Spill Risk. The communities included in this section that may experience indirect impacts to subsistence are one community on Lake Clark, the more distant communities down the Kvichak River drainage and Nushagak River drainage, as well as a pair of Cook Inlet communities. These are included in this section. Communities for which there were older data or no data were not included.

Wildlife and subsistence fish harvest data were reviewed for current and historic levels of harvest in the project area. There are no harvest monitoring programs by Alaska Department of Fish and Game (ADF&G) for subsistence harvest of non-salmon fish in Areas N, S, and T. Data by Game Management Unit (GMU) for large land mammal harvest of species (for the animals that ADF&G collects information for) by GMU is shown in Table K3.9-1. Specific locations of harvested animals and hunter personal information is protected, and therefore no locations of harvests are provided (ADF&G 2018-RFI 089).

Table K3.9-1 Large Land Mammal Harvest by GMU, 2013-2017

GMU	2013	2014	2015	2016	2017	Total
Brown Bear						
9A	47	0	50	2	63	162
9B	57	3	42	1	31	134
9C	27	4	45	6	33	115
15C	16	6	13	9	15	59
17B	60	47	49	37	35	228
17C	34	21	10	12	16	93
Total	241	81	209	67	193	791
Black Bear						
9A	5	0	3	0	2	10
9B	0	0	0	1	1	2
9C	0	0	0	0	0	0
15C	110	118	93	154	159	634
17B	4	2	4	0	6	16
17C	0	1	1	0	1	3
Total	119	121	101	155	169	665

Table K3.9-1 Large Land Mammal Harvest by GMU, 2013-2017

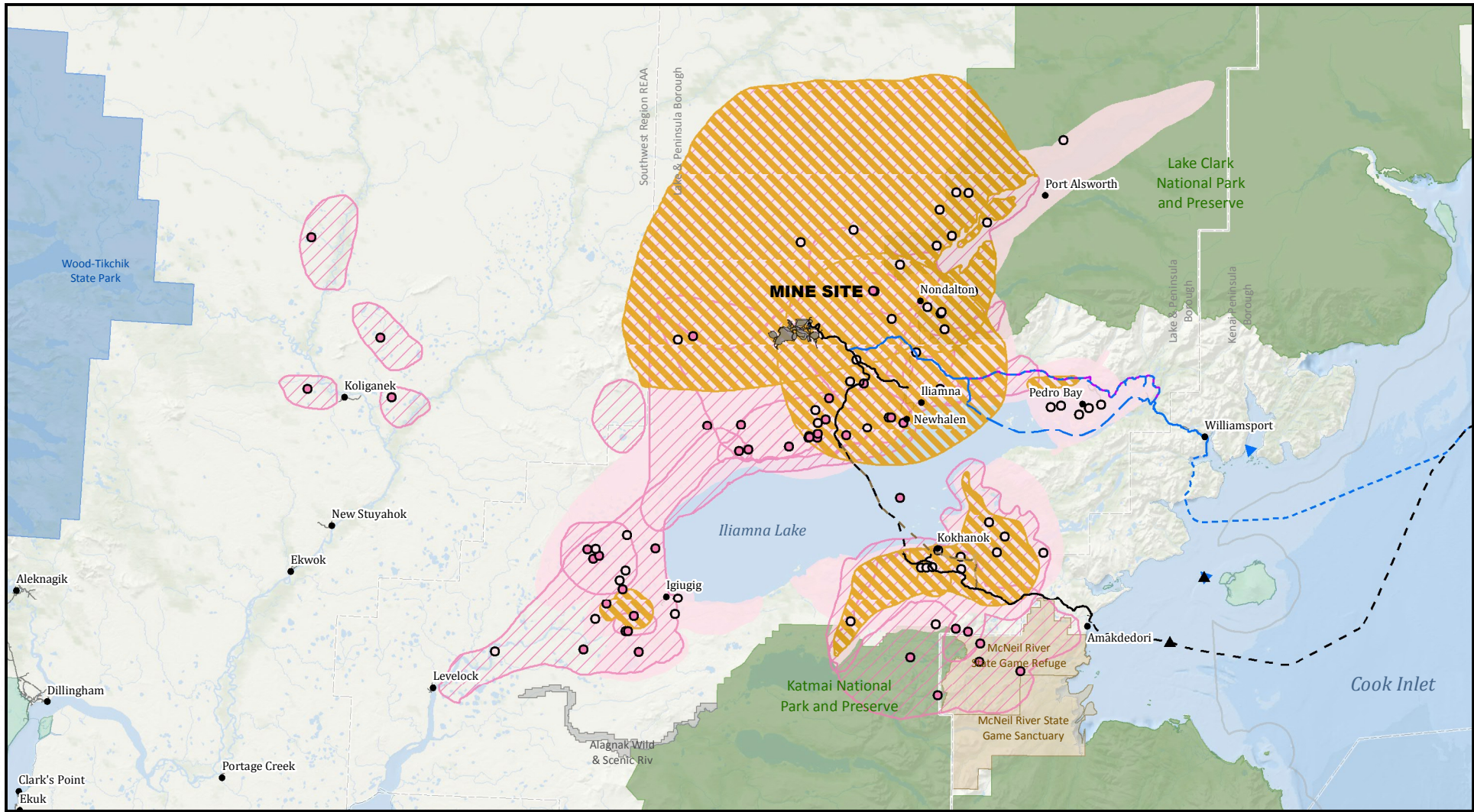
GMU	2013	2014	2015	2016	2017	Total
Moose						
9A	3	3	4	1	5	16
9B	28	41	26	56	42	193
9C	16	22	30	32	24	124
15C	116	116	180	202	176	840
17B	37	35	43	60	45	220
17C	148	149	162	170	160	789
Total	348	416	445	521	452	2,182
Caribou						
9A	0	0	0	1	2	3
9B	11	14	15	29	16	85
9C	1	2	0	36	14	53
15C	1	4	4	4	3	16
17B	38	39	60	76	74	287
17C	6	17	37	83	140	283
Total	57	76	116	229	249	727
Wolf						
9A	1	0	4	0	2	7
9B	10	2	3	2	9	26
9C	5	6	5	4	7	27
15C	8	6	6	14	13	47
17B	8	1	4	50	33	96
17C	13	5	20	15	51	104
Total	45	20	42	85	115	307
Wolverine						
9A	1	0	0	0	0	1
9B	1	2	2	19	5	29
9C	7	6	3	9	4	29
15C	7	3	7	5	7	30
17B	8	3	15	16	12	54
17C	8	3	3	16	18	50
Total	35	17	30	65	46	193
Goat						
15C	34	29	40	35	39	177
Total	34	29	40	35	39	177

Table K3.9-1 Large Land Mammal Harvest by GMU, 2013-2017

GMU	2013	2014	2015	2016	2017	Total
Sheep						
15C	1	1	0	0	2	4
Total	1	1	0	0	2	4

Source: ADF&G 2018-RFI 089

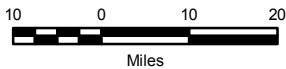
Below are community profiles and harvest composition for communities not discussed in Section 3.9, Subsistence, including a pie chart for the composition of subsistence harvest by estimated edible weight. Following each community group are maps that show the search and harvest areas that communities use for large land mammals, fish, vegetation, marine mammals, marine invertebrates, birds, and small mammals. Large land mammals include caribou, moose, brown bear, black bear, and sheep or goats. Fish figures are divided by salmon and non-salmon, and vegetation combines plants, wood, berries, and fungi. "Marine mammals," refers to seals, sea lions, sea otters, and whales and marine invertebrates include clams, mussels, scallops, crabs, octopus, and shrimp. Upland game birds include grouse and ptarmigan, and waterfowl refers to ducks and geese. Eggs primarily come from ducks, geese, and seabirds. The figures for small land mammals include beaver, muskrat, river otter, foxes, hares, weasels, wolf, wolverine, squirrels, porcupine, and lynx.



Sources: PLP 2018; Fall et al. 2006; Krieg et al. 2009; (Study years 2004 and 2005)



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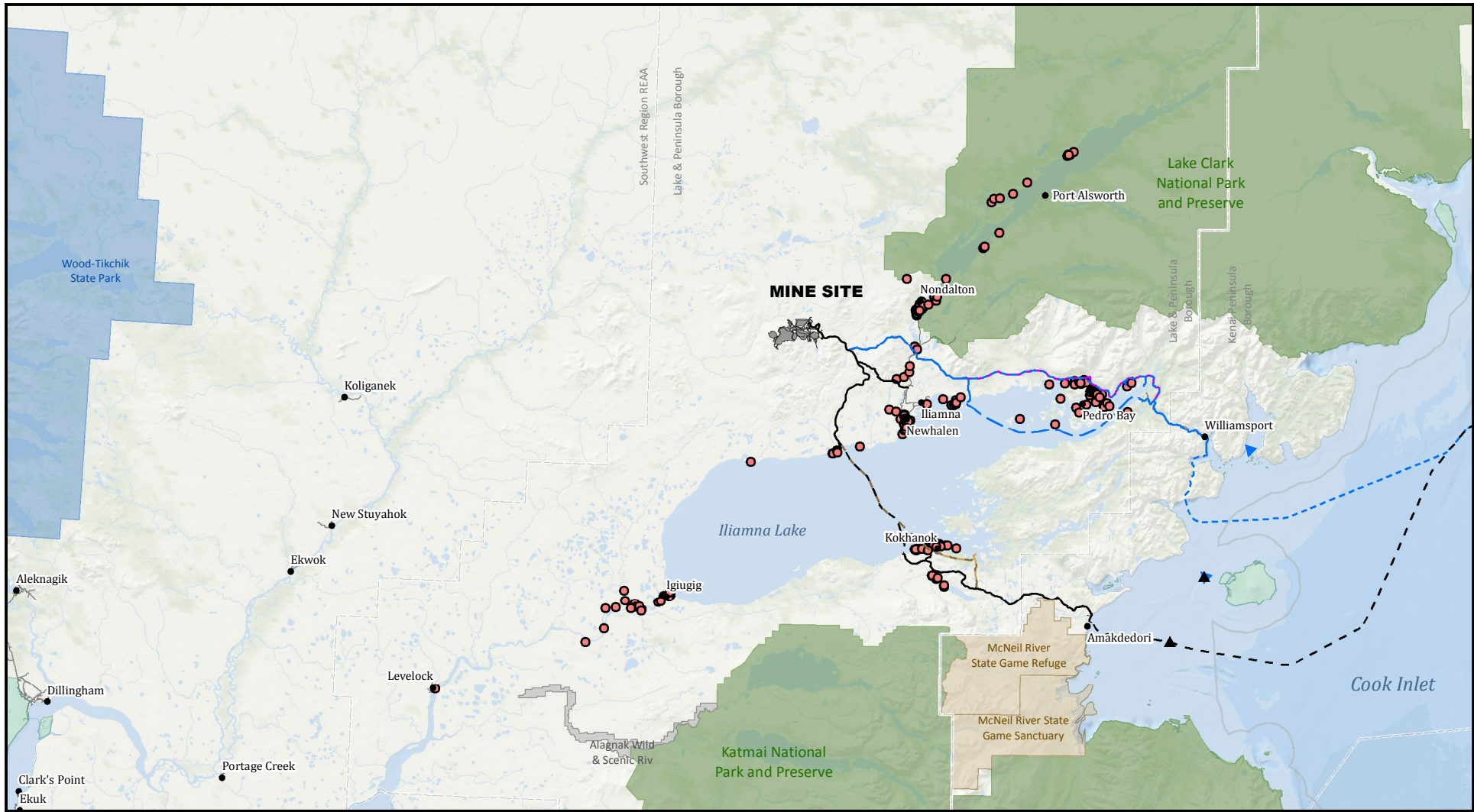


- | | | | |
|---|---|---|---|
| <p>Large Land Mammal Harvest Areas</p> <ul style="list-style-type: none"> ● Caribou (Point) ○ Moose (Point) 🐻 Brown bear 🦌 Caribou 🐃 Moose <p>Alternative 1</p> <ul style="list-style-type: none"> ▲ Lightening Locations | <ul style="list-style-type: none"> ● Mine Site — Transportation Corridor - · - Natural Gas Pipeline Kokhanok East Ferry Terminal Variant — Transportation Corridor - · - Natural Gas Pipeline Alternative 2 — Transportation Corridor | <ul style="list-style-type: none"> — Ferry Route Alternative 2/3 ▲ Lightening Location - · - Natural Gas Pipeline Alternative 3 — Transportation Corridor Other Features — Local Roads | <ul style="list-style-type: none"> — Three Nautical Mile Line — Borough Boundary ● Locality ■ National Park ■ National Wildlife Refuge ■ Alaska State Park ■ State Game Refuge/Sanctuary |
|---|---|---|---|

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LARGE LAND MAMMAL HARVEST AREAS: ILIAMNA, NEWHALEN, PEDRO BAY, NONDALTON, IGIUGIG, AND KOKHANOK

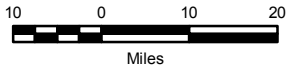
FIGURE K3.9-1



Sources: PLP 2018; Fall et al. 2006; Krieg et al. 2009; (Study years 2004 and 2005)



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Salmon Harvest Areas

● Salmon (Point)

Alternative 1

▲ Lightering Locations

■ Mine Site

— Transportation Corridor

- - - Natural Gas Pipeline

Kokhanok East Ferry Terminal Variant

— Transportation Corridor

- - - Natural Gas Pipeline

Alternative 2

— Transportation Corridor

— Ferry Route

Alternative 2/3

▲ Lightering Location

Alternative 3

— Transportation Corridor

- - - Natural Gas Pipeline

Other Features

— Local Roads

— Three Nautical Mile Line

— Borough Boundary

● Locality

— Natural Gas Pipeline

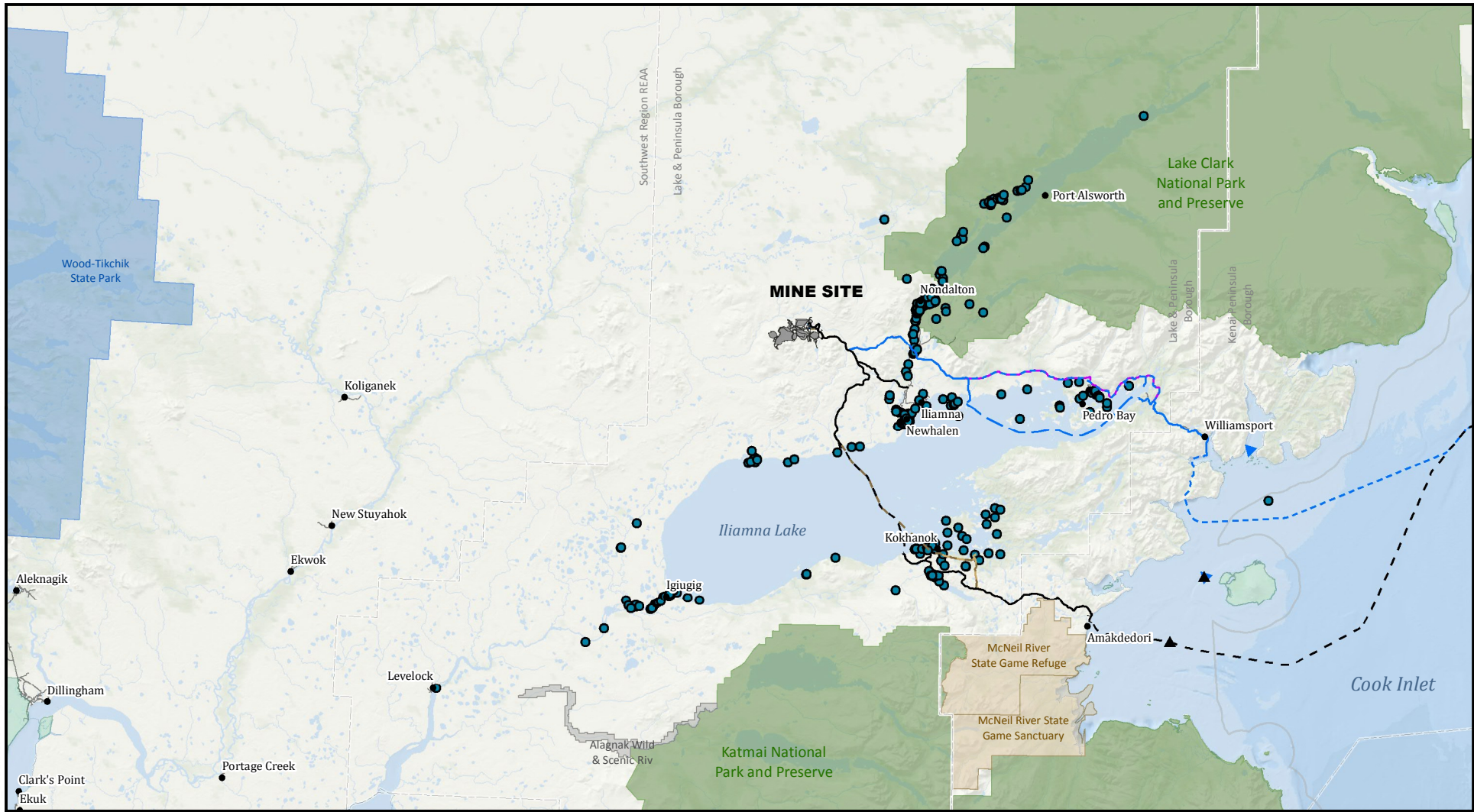
■ National Park

■ National Wildlife Refuge

■ Alaska State Park

■ State Game Refuge/Sanctuary

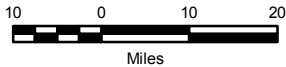
**SALMON HARVEST AREAS:
ILIAMNA, NEWHALEN,
PEDRO BAY, NONDALTON,
IGIUGIG, AND KOKHANOK**



Sources: PLP 2018; Fall et al. 2006; Krieg et al. 2009; (Study years 2004 and 2005)



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Non-Salmon Harvest Areas

- Non-Salmon Fish (Point)
- ▲ Lightering Locations
- Mine Site
- Transportation Corridor
- - - Natural Gas Pipeline

Kokhanok East Ferry Terminal Variant

- Transportation Corridor
- - - Natural Gas Pipeline
- Alternative 1
- Alternative 2
- Alternative 2/3
- ▲ Lightering Location

Alternative 3

- Transportation Corridor
- - - Natural Gas Pipeline

Other Features

- Local Roads
- Three Nautical Mile Line
- Borough Boundary
- Locality

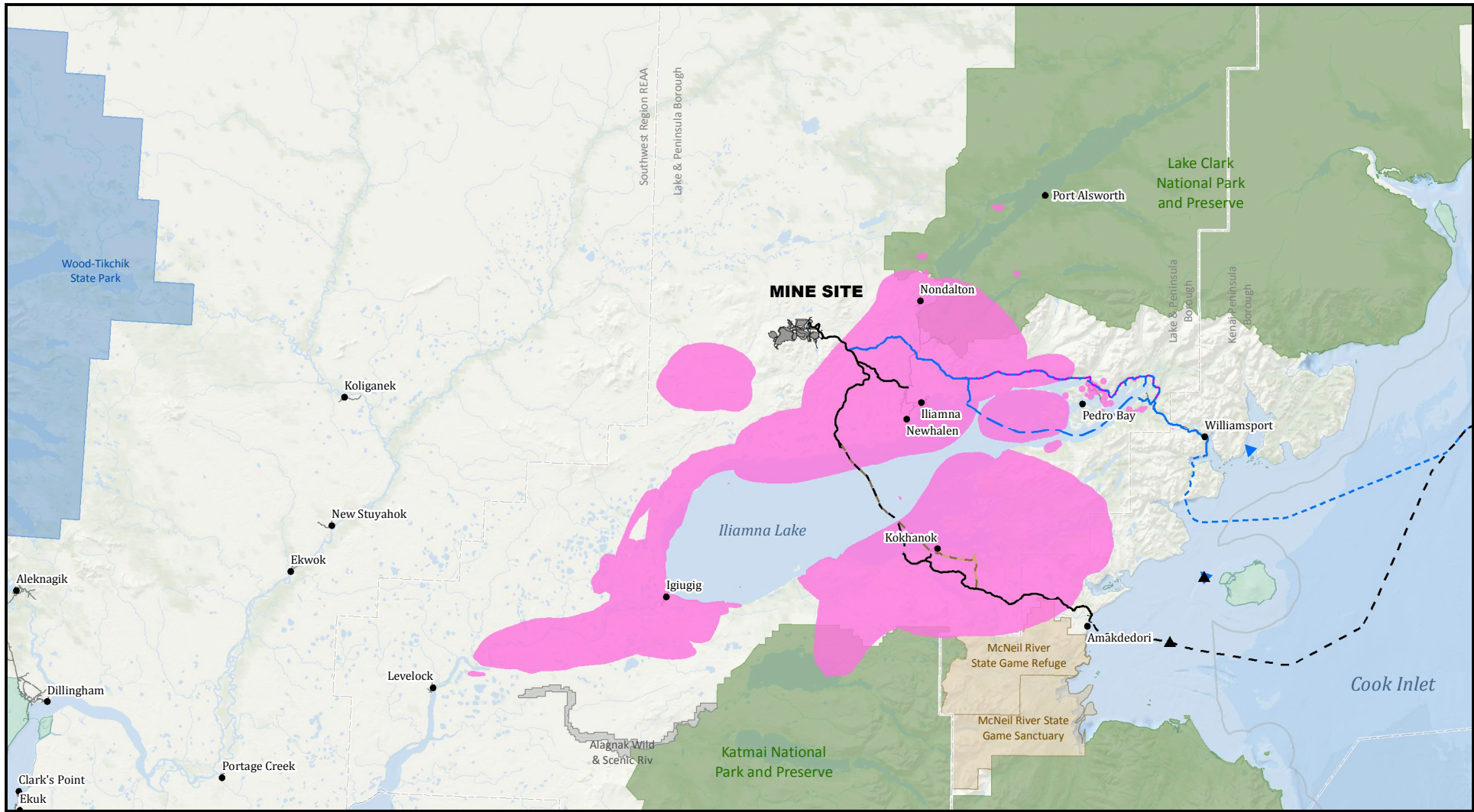
National Park

- National Wildlife Refuge
- Alaska State Park
- State Game Refuge/Sanctuary

PEBBLE PROJECT EIS

**NON-SALMON HARVEST AREAS:
ILIAMNA, NEWHALEN,
PEDRO BAY, NONDALTON,
IGIUGIG, AND KOKHANOK**

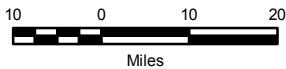
FIGURE K3.9-3



Sources: PLP 2018; Fall et al. 2006; Krieg et al. 2009; (Study years 2004 and 2005)



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Vegetation Harvest Areas

Plants, Wood, Berries, and Fungi

Alternative 1

▲ Lightering Locations

■ Mine Site

— Transportation Corridor

- - Natural Gas Pipeline

Kokhanok East Ferry Terminal Variant

— Transportation Corridor

- - Natural Gas Pipeline

Alternative 2

— Transportation Corridor

— Ferry Route

Alternative 2/3

▲ Lightering Location

- - Natural Gas Pipeline

Alternative 3

— Transportation Corridor

Other Features

— Local Roads

— Three Nautical Mile Line

— Borough Boundary

● Locality

■ National Park

■ National Wildlife Refuge

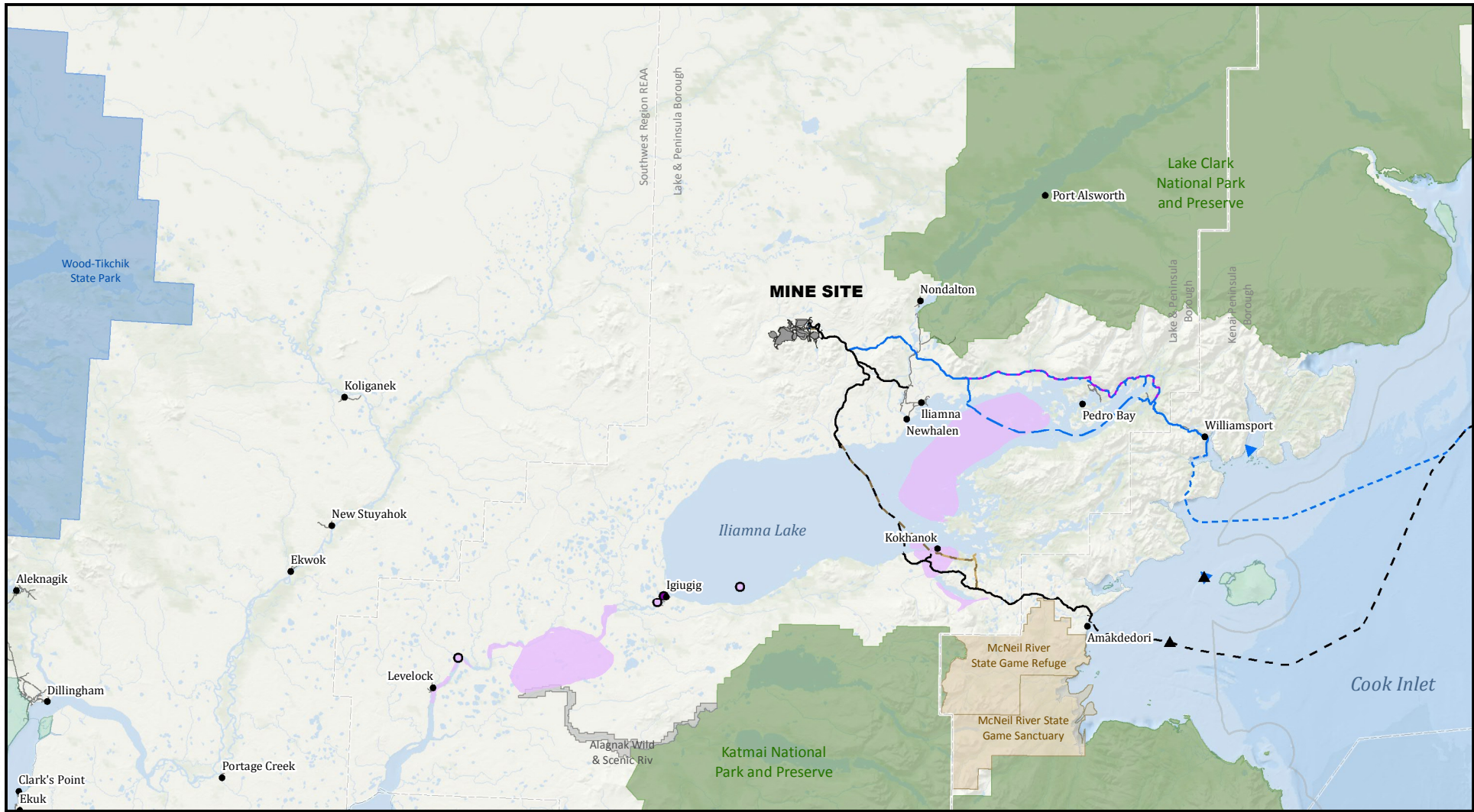
■ Alaska State Park

■ State Game Refuge/Sanctuary

PEBBLE PROJECT EIS

VEGETATION HARVEST AREAS (PLANTS, WOOD, BERRIES, FUNGI): ILIAMNA, NEWHALEN, PEDRO BAY, NONDALTON, IGIUGIG, AND KOKHANOK

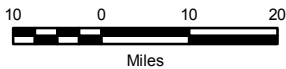
FIGURE K3.9-4



Sources: PLP 2018; Fall et al. 2006; Krieg et al. 2009; (Study years 2004 and 2005)



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Marine Mammal and Marine Invertebrate Harvest Areas

- Marine Invertebrates (Point)
- Marine Mammals (Point)
- Marine Mammals

Alternative 1

- ▲ Lightering Locations
- Mine Site
- Transportation Corridor

Kokhanok East Ferry Terminal Variant

- Natural Gas Pipeline
- Transportation Corridor
- Natural Gas Pipeline

Alternative 2

- Transportation Corridor
- Ferry Route

Alternative 2/3

- ▲ Lightering Location
- Natural Gas Pipeline
- Transportation Corridor

Alternative 3

- Transportation Corridor

Other Features

- Local Roads
- Three Nautical Mile Line

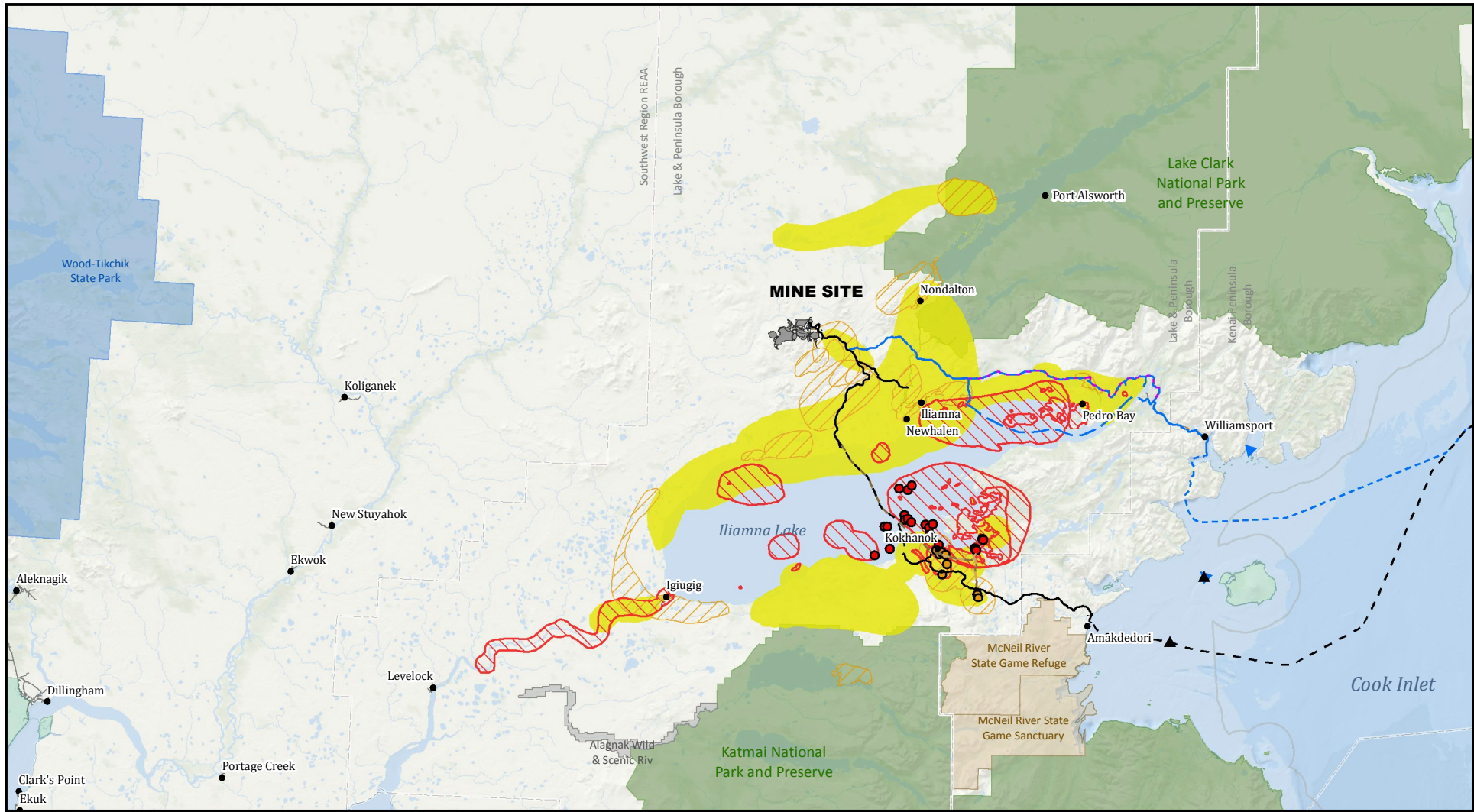
Borough Boundary

- Locality
- National Park
- National Wildlife Refuge
- Alaska State Park
- State Game Refuge/Sanctuary

MARINE MAMMAL AND MARINE INVERTEBRATE HARVEST AREAS: ILIAMNA, NEWHALEN, PEDRO BAY, NONDALTON, IGIUGIG, AND KOKHANOK

FIGURE K3.9-5

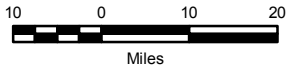
PEBBLE PROJECT EIS



Sources: PLP 2018; Fall et al. 2006; Krieg et al. 2009; (Study years 2004 and 2005)



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Avian Harvest Areas

- Eggs (Point)
- Upland Game Birds (Point)
- ☞ Eggs
- ☞ Upland Game Birds
- ☞ Waterfowl (Ducks/Geese)
- ▲ Lightening Locations

Mine Site

- Transportation Corridor
- · Natural Gas Pipeline
- Kokhanok East Ferry Terminal Variant**
- Transportation Corridor
- · Natural Gas Pipeline

Alternative 2

- Transportation Corridor
- Ferry Route

Alternative 2/3

- ▲ Lightening Location
- · Natural Gas Pipeline

Alternative 3

- Transportation Corridor

Other Features

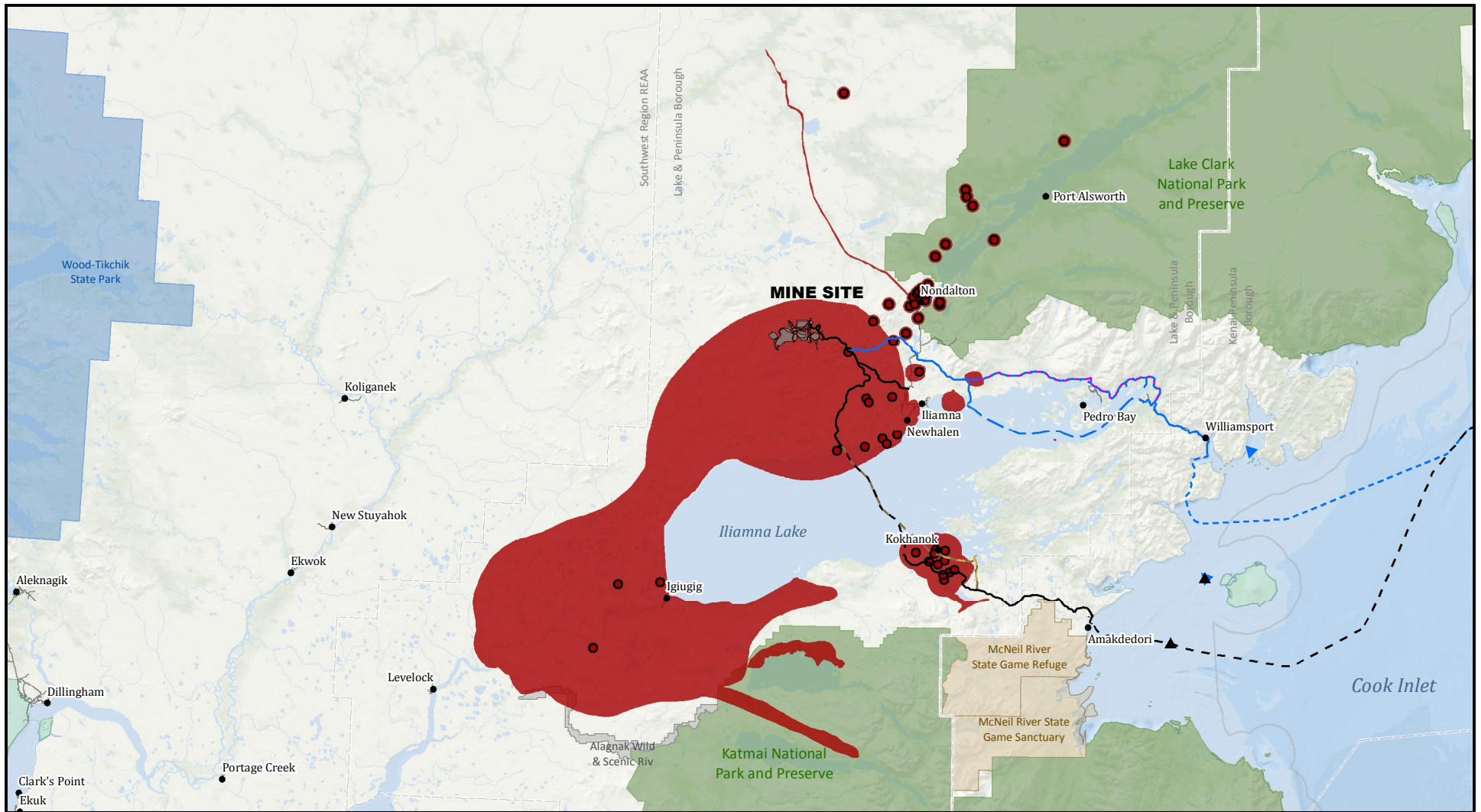
- Local Roads
- Three Nautical Mile Line
- Borough Boundary
- Locality
- National Park
- National Wildlife Refuge
- Alaska State Park

State Game Refuge/Sanctuary

PEBBLE PROJECT EIS

**AVIAN HARVEST AREAS:
ILIAMNA, NEWHALEN,
PEDRO BAY, NONDALTON,
IGIUGIG, AND KOKHANOK**

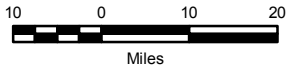
FIGURE K3.9-6



Sources: PLP 2018; Fall et al. 2006; Krieg et al. 2009; (Study years 2004 and 2005)



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Harvest Areas

- Small Land Mammals (Point)
- Small Land Mammals

Alternative 1

- ▲ Lightering Locations
- Mine Site
- Transportation Corridor

Kokhanok East Ferry Terminal Variant

- Natural Gas Pipeline
- Transportation Corridor
- Natural Gas Pipeline

Alternative 2

- Transportation Corridor
- Ferry Route

Alternative 2/3

- ▲ Lightering Location
- Natural Gas Pipeline

Alternative 3

- Transportation Corridor

Other Features

- Local Roads

Three Nautical Mile Line

- Borough Boundary

- Locality

- National Park

- National Wildlife Refuge

- Alaska State Park

- State Game Refuge/Sanctuary

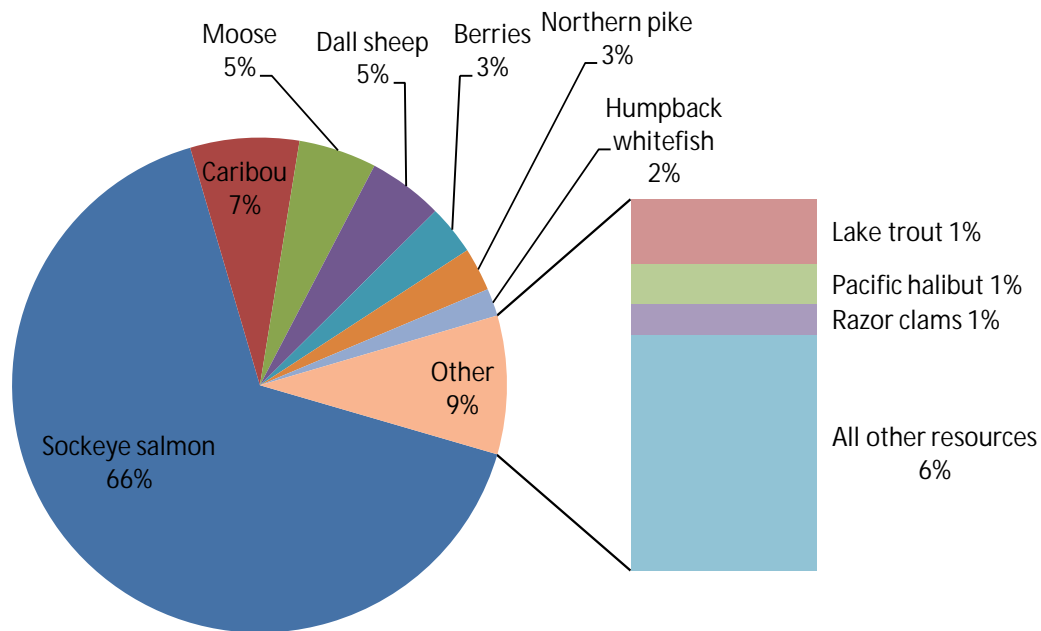
SMALL LAND MAMMAL HARVEST AREAS: ILIAMNA, NEWHALEN, PEDRO BAY, NONDALTON, IGIUGIG, AND KOKHANOK

FIGURE K3.9-7

K3.9.1 Port Alsworth

Port Alsworth is a majority Euro-American community on Lake Clark. It is the location of the Lake Clark National Park and Preserve headquarters and is also home to many hunting and fishing guide services and lodges. In 2004, Port Alsworth had an estimated year-round population of 109 people in 30 households. Port Alsworth residents harvested an estimated 14,489 pounds of wild food (133 pounds per capita) in 2004 a lower total compared to the Iliamna Lake area communities. See Section 3.9, Subsistence, for per capita harvests by resource category. The top 10 resources harvested by Port Alsworth residents in 2004 in terms of edible weight are shown in Figure K3.9-8. Port Alsworth households reported high levels of participation in subsistence activities. Salmon was the most widely used resource category (100 percent of households) followed by large land mammals (91 percent), plants and fungi (86 percent), non-salmon fish (73 percent), marine invertebrates (50 percent), birds and eggs (46 percent), and small land mammals (41 percent). Sharing and distribution of subsistence foods was widespread. In 2004, 91 percent of Port Alsworth households received wild resources and 73 percent of households gave resources away. Some of the resources received by Port Alsworth residents came from non-local hunters who dropped off meat for people in the community (Fall et al. 2006).

Figure K3.9-8: Composition of Port Alsworth Subsistence Harvest by Estimated Edible Weight, 2004

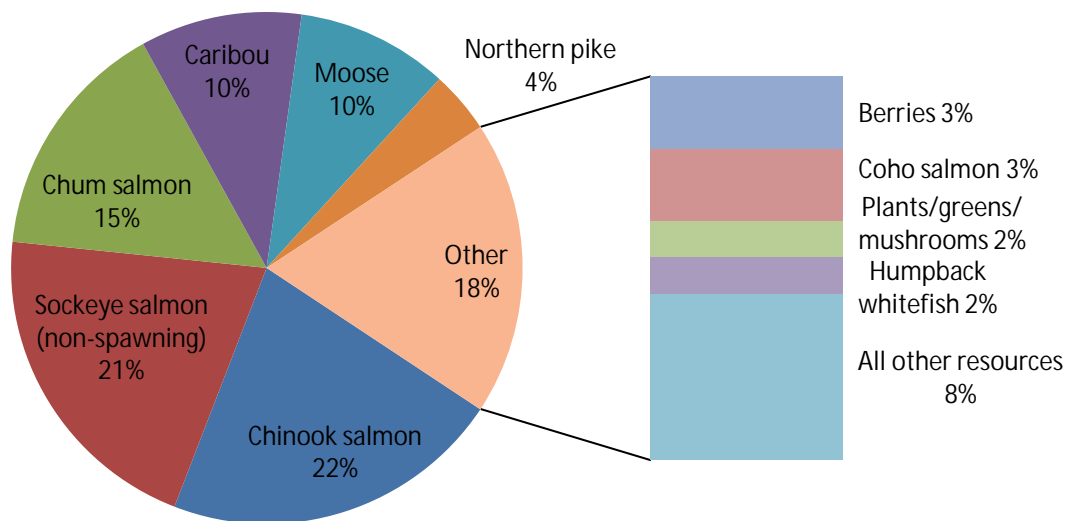


Source: Fall et al. 2006

K3.9.2 Koliganek

Koliganek is a primarily Yup'ik community on the Nushagak River 65 miles northeast of Dillingham. In 2005, Koliganek had an estimated year-round population of 150 people in 42 households. Koliganek residents harvested an estimated total of 134,779 pounds of wild food (899 pounds per capita) in 2005, a notably high level of food production among communities in the project area. See Section 3.9, Subsistence, for per capita harvests by resource category. The top 10 resources harvested by Koliganek residents in 2005 in terms of edible weight are shown in Figure K3.9-9. Koliganek households reported high levels of participation in subsistence activities. Salmon was the most widely used resource category (100 percent of households) followed by plants and fungi (96 percent), non-salmon fish (96 percent), large land mammals (96 percent), birds and eggs (93 percent), small land mammals (64 percent), and marine mammal (64 percent). Sharing and distribution of subsistence foods was widespread. In 2005, 89 percent of Koliganek households received at least one subsistence resource and 93 percent gave away at least one resource (Krieg et al. 2009).

Figure K3.9-9: Composition of Koliganek Subsistence Harvest by Estimated Edible Weight, 2005



Notes:

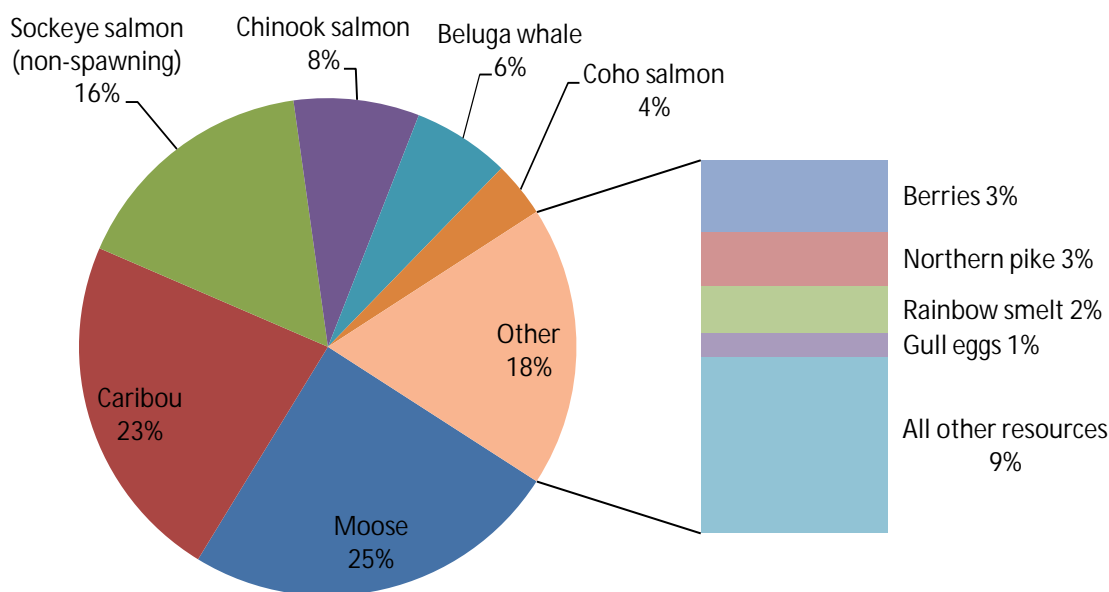
The term "spawning sockeye" refers to late-run sockeye salmon that have a distinctive red color and white meat, and are harvested in the fall.

Source: Krieg et al. 2009

K3.9.3 Levelock

Levelock is a mixed Alutiiq and Yup'ik community on the Kvichak River. In 2005, Levelock had an estimated year-round population of 34 people in 19 households. Levelock residents harvested an estimated total of 17,871 pounds of wild foods (527 pounds per capita) in 2005. See Section 3.9, Subsistence, for per capita harvests by resource category. The top 10 resources harvested by Levelock residents in 2005 in terms of edible weight are shown in Figure K3.9-10, with a distinctively high level of reliance on large land mammals. Levelock households reported high levels of participation in subsistence activities. Large land mammals were the most widely used resource category (100 percent of households) followed by plants and fungi (93 percent), salmon (93 percent), birds and eggs (88 percent), non-salmon fish (86 percent), small land mammals (57 percent), and marine mammals (50 percent). Sharing and distribution of subsistence foods was widespread. In 2005, 93 percent of Levelock households received at least one subsistence resource and 86 percent of households gave away at least one resource (Krieg et al. 2009).

Figure K3.9-10: Composition of Levelock Subsistence Harvest by Estimated Edible Weight, 2005



Notes:

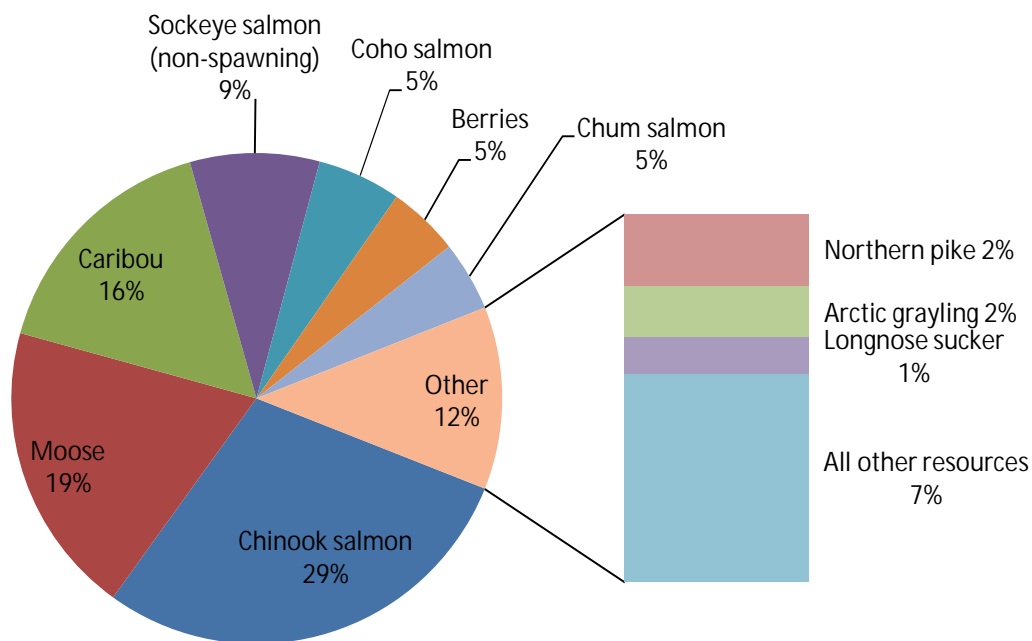
The term "spawning sockeye" refers to late-run sockeye salmon that have a distinctive red color and white meat, and are harvested in the fall.

Source: Krieg et al. 2009

K3.9.4 New Stuyahok

New Stuyahok is a Yup'ik community on the Nushagak River 52 miles northeast of Dillingham. In 2005, New Stuyahok had an estimated year-round population of 421 people in 96 households. New Stuyahok residents harvested an estimated total of 163,927 pounds of wild foods (389 pounds per capita) in 2005. See Section 3.9, Subsistence, for per capita harvests by resource category. The top 10 resources harvested by New Stuyahok residents in 2005 in terms of edible weight are shown in Figure K3.9-11, with characteristically high level of reliance on salmon, but also on large land mammals. New Stuyahok households reported high levels of participation in subsistence activities. In 2005, all New Stuyahok households used plants and fungi, as well as large land mammals. Other widely used resource categories included salmon (90 percent of households), birds and eggs (90 percent), non-salmon fish (88 percent), small land mammals (59 percent), and marine mammals (51 percent). Sharing and distribution of subsistence foods was widespread. In 2005, 98 percent of households received at least one subsistence resource and 74 percent gave away at least one resource (Krieg et al. 2009).

Figure K3.9-11: Composition of New Stuyahok Subsistence Harvest by Estimated Edible Weight, 2005

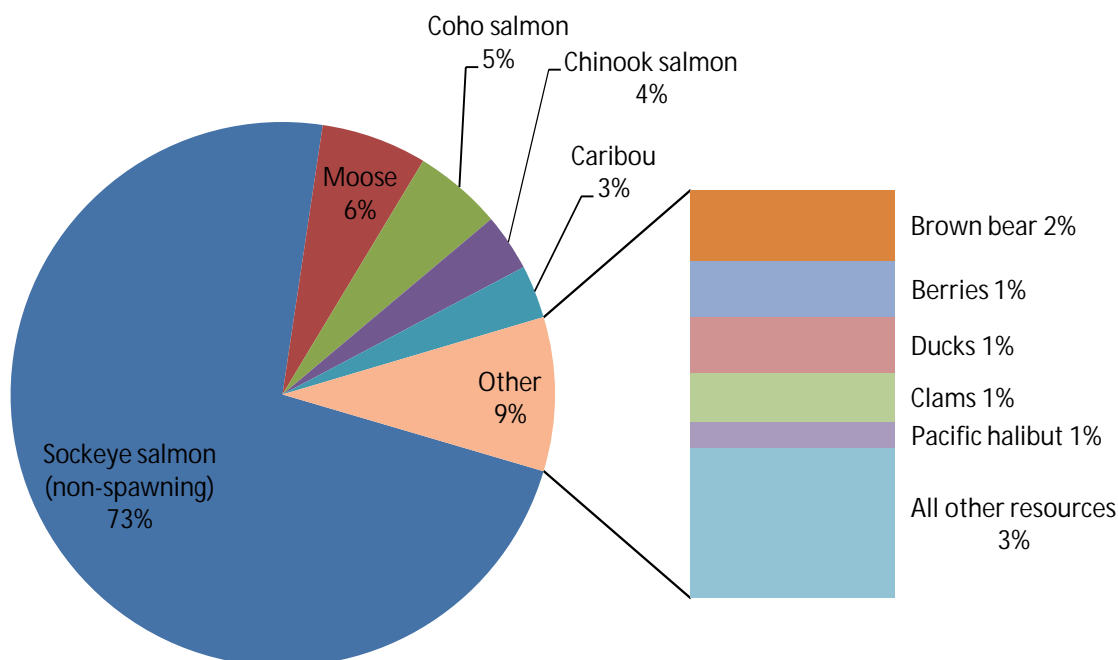


Notes:
 The term "spawning sockeye" refers to late-run sockeye salmon that have a distinctive red color and white meat, and are harvested in the fall.
 Source: Krieg et al. 2009

K3.9.5 King Salmon

King Salmon is a predominantly Euro-American community on the Naknek River. King Salmon’s Alaska Native population is a mix of Alutiiq, Yup’ik, and Dena’ina people. In 2007, King Salmon had an estimated year-round population of 246 people in 88 households. Holen et al. (2011) surveyed residents about their 2007 subsistence activities and found that King Salmon residents harvested an estimated total of 77,020 pounds of wild foods (313 pounds per capita), with very high reliance on salmon. See Section 3.9, Subsistence, for per capita harvests by resource category. The top 10 resources harvested by King Salmon residents in 2007 in terms of edible weight are shown in Figure K3.9-12. King Salmon households reported high levels of participation in subsistence activities. Salmon was the most widely used resource category (86 percent of households) followed by plants and fungi (78 percent), non-salmon fish (57 percent), and large land mammals (47 percent). Sharing and distribution of subsistence foods was less widespread than in most communities within the project area. In 2007, 59 percent of households received at least one subsistence resource and 53 percent gave away at least one resource (Holen et al. 2011).

Figure K3.9-12: Composition of King Salmon Subsistence Harvest by Estimated Edible Weight, 2007

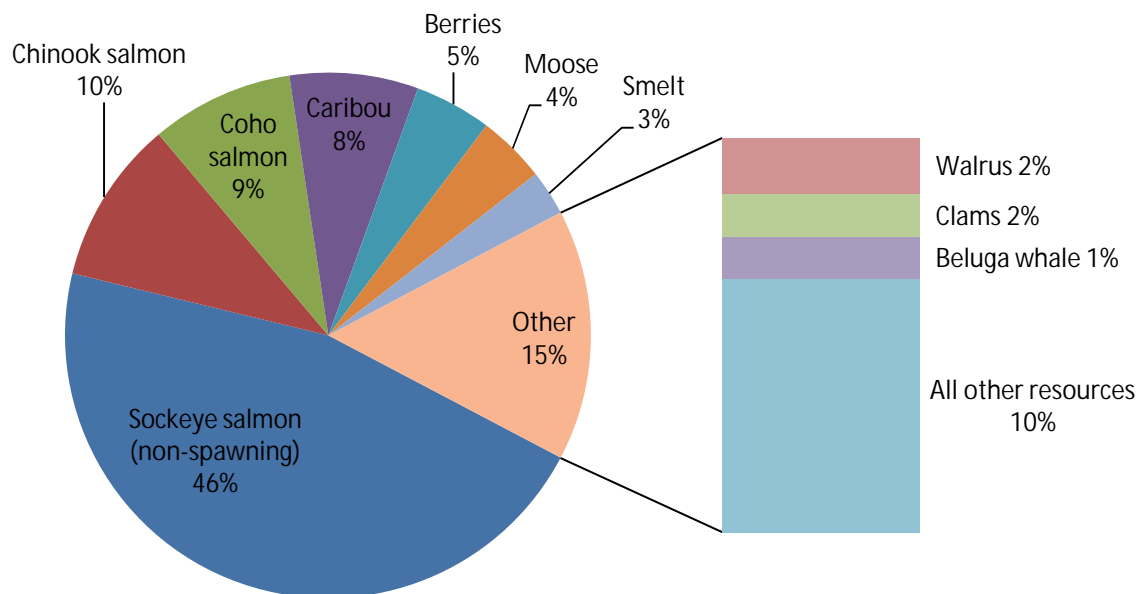


Notes:
 The term “spawning sockeye” refers to late-run sockeye salmon that have a distinctive red color and white meat, and are harvested in the fall.
 Source: Holen et al. 2011

K3.9.6 Naknek

Naknek is located on the northern bank of the Naknek River and is a mix of Yup'ik, Alutiiq, Dena'ina, and non-Native people. Naknek's economy is largely driven by the salmon industry (Deur 2008). In 2007, Naknek had an estimated year-round population of 533 people in 206 households. Just over half of the population was Alaska Native. Naknek residents harvested an estimated total of 140,757 pounds of wild foods (264 pounds per capita) in 2007. See Section 3.9, Subsistence, for per capita harvests by resource category. The top 10 resources harvested by Naknek residents in 2007 in terms of edible weight are shown in Figure K3.9-13. Naknek households reported high levels of participation in subsistence activities. Salmon was the most widely used resource category (93 percent of households) followed by plants and fungi (92 percent), non-salmon fish (76 percent), large land mammals (60 percent), birds and eggs (57 percent), and marine invertebrates (51 percent). Sharing and distribution of subsistence foods was widespread. In 2007, 91 percent of households received at least one subsistence resource and 73 percent gave away at least one resource (Holen et al. 2011).

Figure K3.9-13: Composition of Naknek Subsistence Harvest by Estimated Edible Weight, 2007

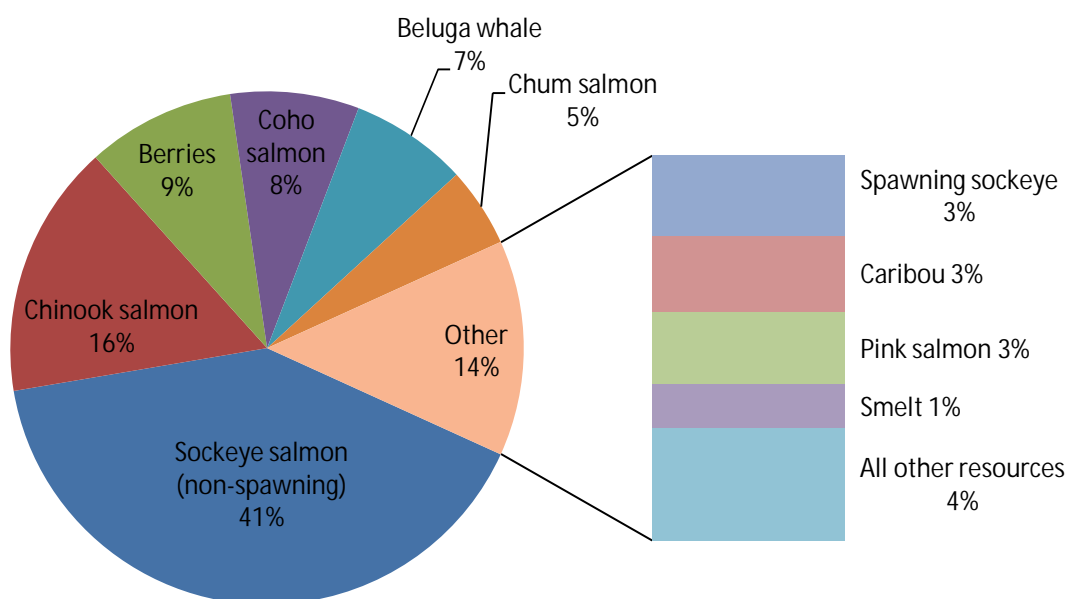


Notes:
 The term "spawning sockeye" refers to late-run sockeye salmon that have a distinctive red color and white meat, and are harvested in the fall.
 Source: Holen et al. 2011

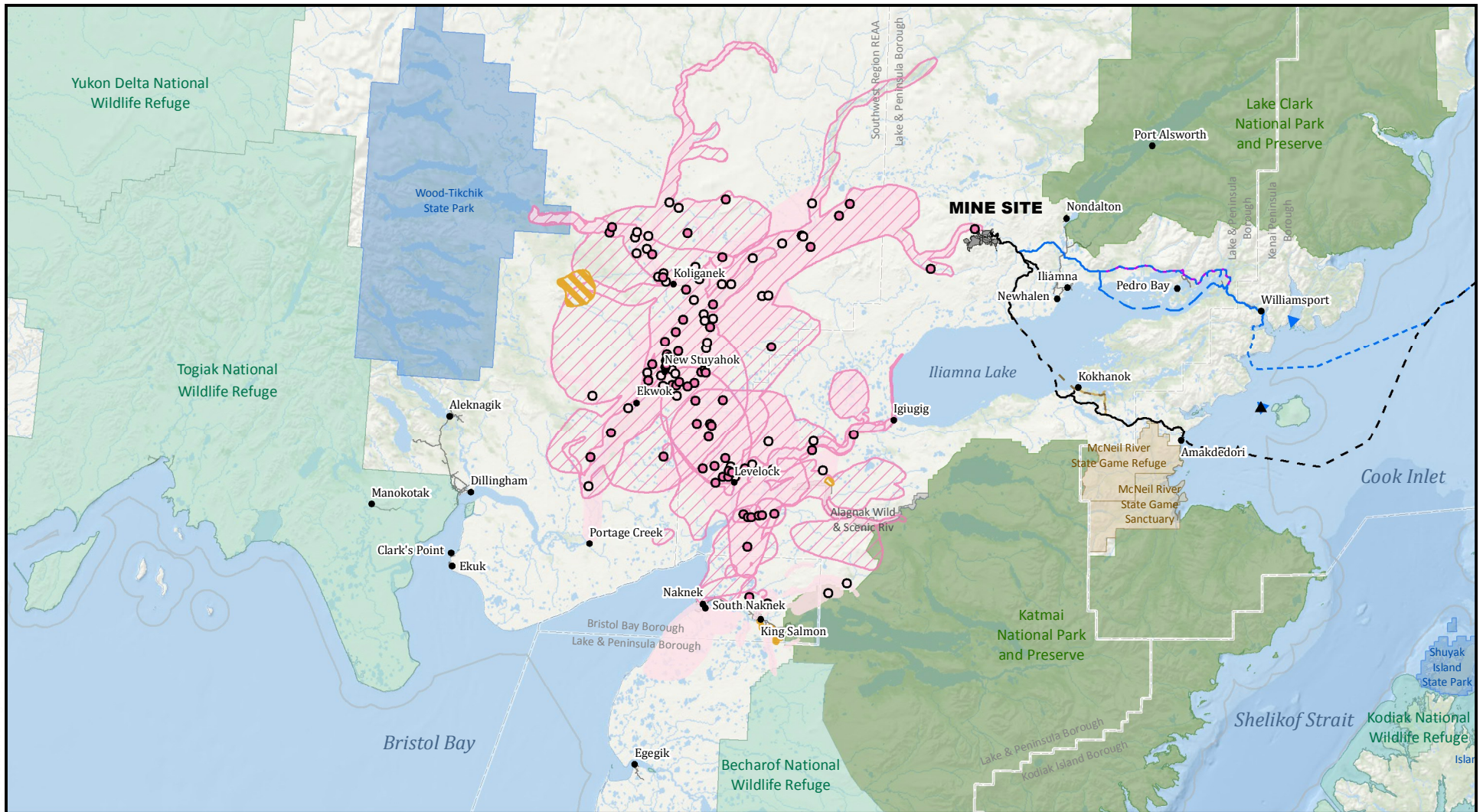
K3.9.7 South Naknek

South Naknek is located on the southern bank of the Naknek River across from the community of Naknek. South Naknek is predominantly a mixture of Alutiiq and Yup'ik people. Today, many of the Alutiiq people who reside in South Naknek are descendants of people displaced by the Mount Katmai and Novarupta volcanic eruptions of 1912. In 2007, South Naknek had an estimated year-round population of 52 people in 26 households. South Naknek residents harvested an estimated total of 13,909 pounds of wild foods (278 pounds per capita) in 2007, with characteristically high reliance on salmon, but a distinctive level of reliance on beluga whales. See Section 3.9, Subsistence, for per capita harvests by resource category. The top 10 resources harvested by South Naknek residents in 2007 in terms of edible weight are shown in Figure K3.9-14. South Naknek households reported high levels of participation in subsistence activities. Salmon was the most widely used resource category (95 percent of households) followed by plants and fungi (91 percent), non-salmon fish (86 percent), large land mammals (67 percent), and marine mammals (48 percent). Sharing and distribution of subsistence foods was widespread. In 2007, 91 percent of households received at least one subsistence resource and 76 percent of households gave away at least one resource (Holen et al. 2011).

Figure K3.9-14: Composition of South Naknek Subsistence Harvest by Estimated Edible Weight, 2007



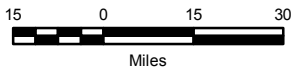
Notes:
 The term "spawning sockeye" refers to late-run sockeye salmon that have a distinctive red color and white meat, and are harvested in the fall.
 Source: Holen et al. 2011



Sources: PLP 2018; Krieg et al. 2009; Holen et al. 2011 (Study years 2005 and 2007)



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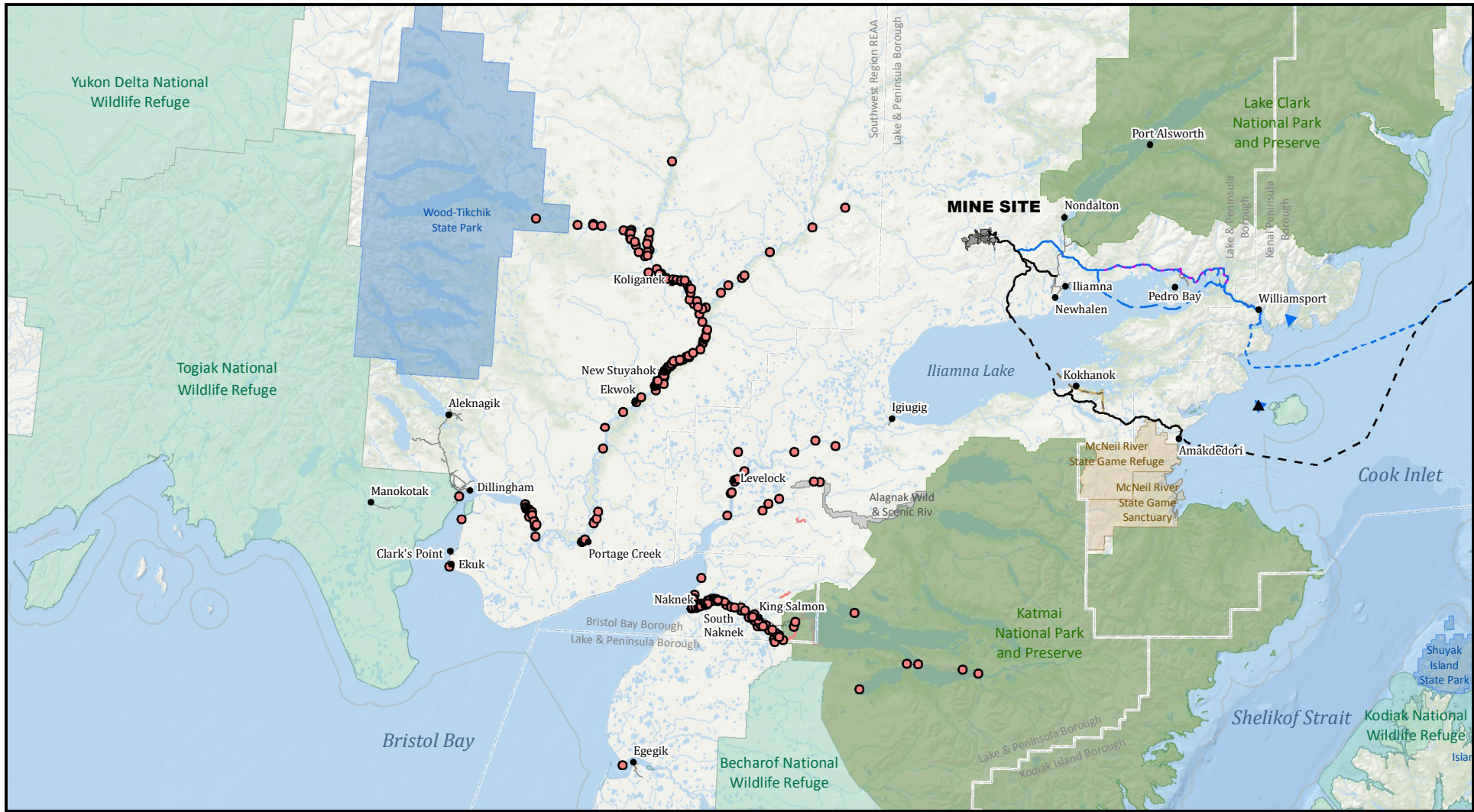


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|---|---|--|---|
| <p>Large Land Mammal Harvest Areas</p> <ul style="list-style-type: none"> ● Caribou (Point) ○ Moose (Point) 🐻 Brown bear 🐻 Caribou 🐻 Moose <p>Alternative 1</p> <ul style="list-style-type: none"> ▲ Lightening Locations | <p>● Mine Site</p> <ul style="list-style-type: none"> — Transportation Corridor - · - Natural Gas Pipeline <p>Kokhanok East Ferry Terminal Variant</p> <ul style="list-style-type: none"> — Transportation Corridor - · - Natural Gas Pipeline <p>Alternative 2</p> <ul style="list-style-type: none"> — Transportation Corridor | <ul style="list-style-type: none"> — Ferry Route <p>Alternative 2/3</p> <ul style="list-style-type: none"> ▲ Lightening Location - · - Natural Gas Pipeline <p>Alternative 3</p> <ul style="list-style-type: none"> — Transportation Corridor <p>Other Features</p> <ul style="list-style-type: none"> — Local Roads | <ul style="list-style-type: none"> — Three Nautical Mile Line — Borough Boundary ● Locality ■ National Park ■ National Wildlife Refuge ■ Alaska State Park ■ State Game Refuge/Sanctuary |
|---|---|--|---|

PEBBLE PROJECT EIS

LARGE LAND MAMMAL HARVEST AREAS: KOLIGANEK, LEVELLOCK, NEW STUYAHOK, KING SALMON, NAKNEK, AND SOUTH NAKNEK

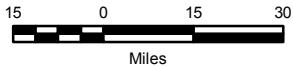
FIGURE K3.9-15



Sources: PLP 2018; Krieg et al. 2009; Holen et al. 2011 (Study years 2005 and 2007)



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Salmon Harvest Areas

- Salmon (Point)
- Salmon (Line)

Alternative 1

- ▲ Lightering Locations
- ⊕ Mine Site

Alternative 2/3

- Transportation Corridor
- · Natural Gas Pipeline

Kokhanok East Ferry Terminal Variant

- Transportation Corridor
- · Natural Gas Pipeline

Alternative 2

- Transportation Corridor
- Ferry Route

Alternative 2/3

- ▲ Lightering Location

Alternative 3

- Transportation Corridor
- Natural Gas Pipeline

Other Features

- Local Roads
- Three Nautical Mile Line
- Borough Boundary
- Locality

Natural Gas Pipeline

- Natural Gas Pipeline

National Park

- National Wildlife Refuge

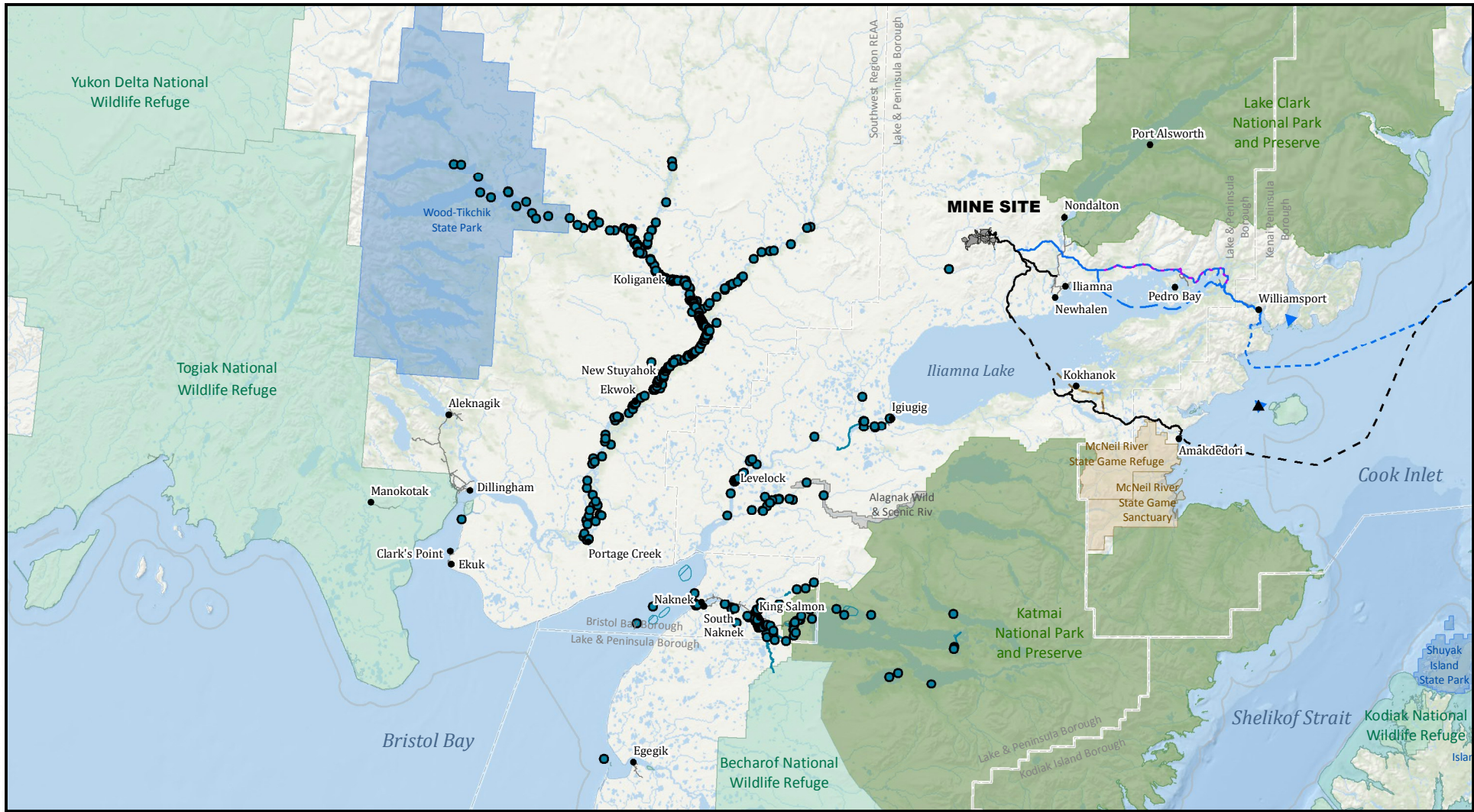
Alaska State Park

- State Game Refuge/Sanctuary

PEBBLE PROJECT EIS

**SALMON HARVEST AREAS:
KOLIGANEK, LEVELOCK, NEW
STUYAHOK, KING SALMON,
NAKNEK, AND SOUTH NAKNEK**

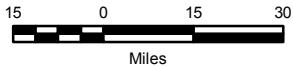
FIGURE K3.9-16



Sources: PLP 2018; Krieg et al. 2009; Holen et al. 2011 (Study years 2005 and 2007)



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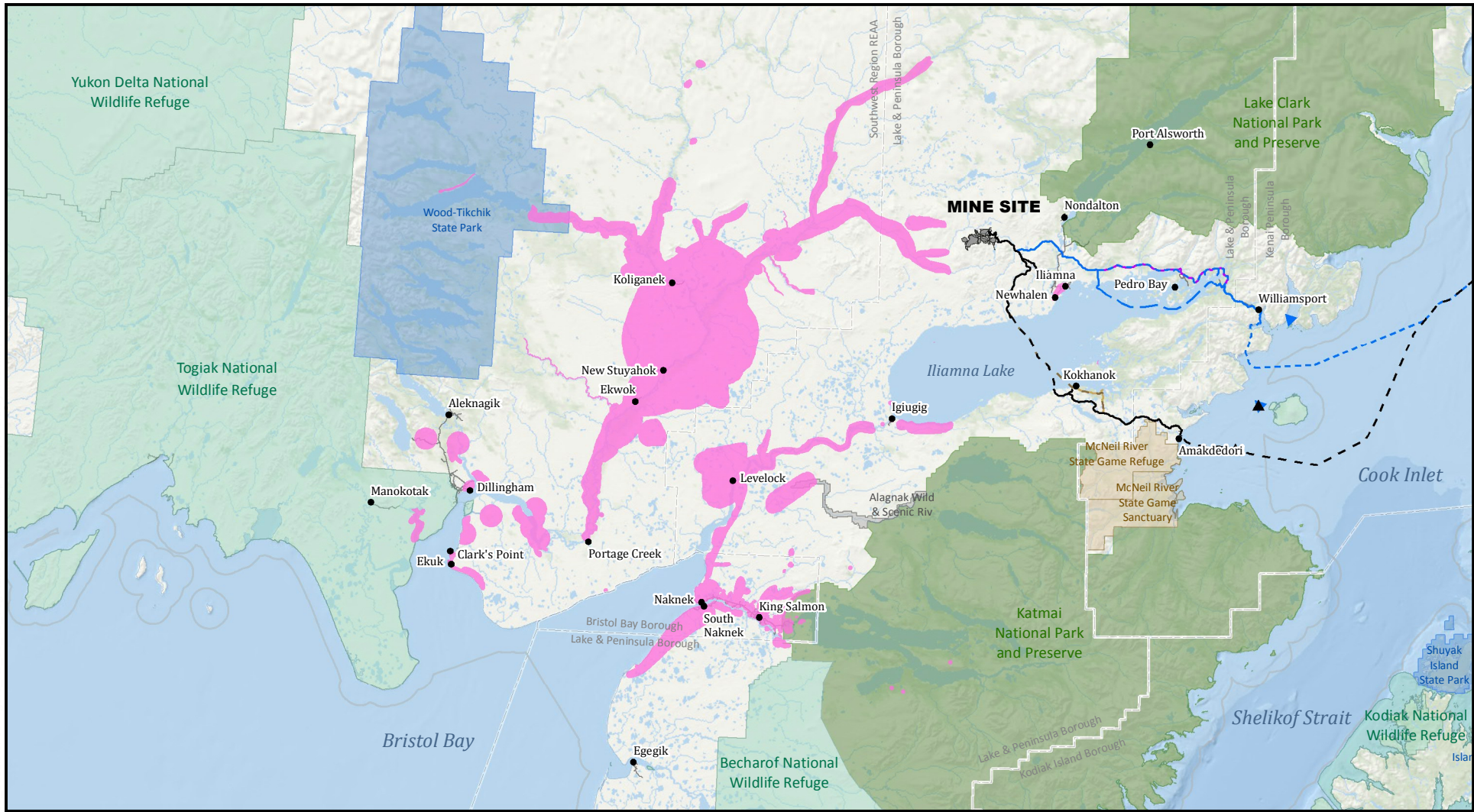


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|--|---|---|---|
| <ul style="list-style-type: none"> ● Non-Salmon Fish (Point) — Non-Salmon Fish (Line) ○ Non-Salmon Fish ▲ Lightering Locations ■ Mine Site — Transportation Corridor | <ul style="list-style-type: none"> — Natural Gas Pipeline — Transportation Corridor — Natural Gas Pipeline — Transportation Corridor — Ferry Route | <ul style="list-style-type: none"> ▲ Lightering Location — Natural Gas Pipeline — Transportation Corridor — Local Roads — Three Nautical Mile Line | <ul style="list-style-type: none"> — Borough Boundary ● Locality ■ National Park ■ National Wildlife Refuge ■ Alaska State Park ■ State Game Refuge/Sanctuary |
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PEBBLE PROJECT EIS

**NON-SALMON HARVEST AREAS:
KOLIGANEK, LEVELOCK, NEW
STUYAHOK, KING SALMON,
NAKNEK, AND SOUTH NAKNEK**

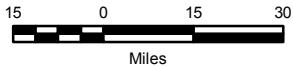
FIGURE K3.9-17



Sources: PLP 2018; Krieg et al. 2009; Holen et al. 2011 (Study years 2005 and 2007)



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Vegetation Harvest Areas

Plants, Wood, Berries, and Fungi

Alternative 1

▲ Lightering Locations

● Mine Site

— Transportation Corridor

- - Natural Gas Pipeline

Kokhanok East Ferry Terminal Variant

— Transportation Corridor

- - Natural Gas Pipeline

Alternative 2

— Transportation Corridor

— Ferry Route

Alternative 2/3

▲ Lightering Location

- - Natural Gas Pipeline

Alternative 3

— Transportation Corridor

Other Features

— Local Roads

— Three Nautical Mile Line

— Borough Boundary

● Locality

■ National Park

■ National Wildlife Refuge

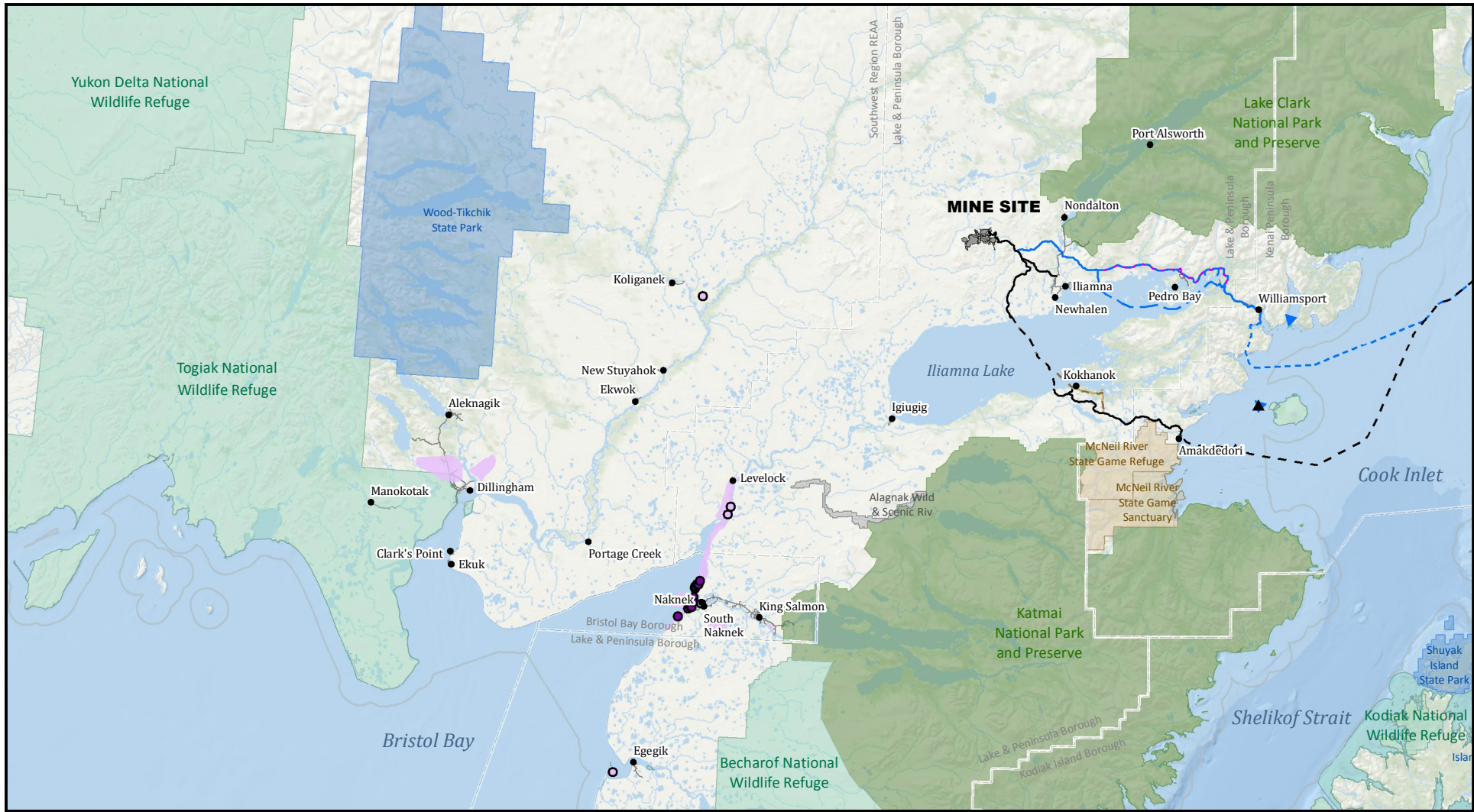
■ Alaska State Park

■ State Game Refuge/Sanctuary

PEBBLE PROJECT EIS

VEGETATION HARVEST AREAS (PLANTS, WOOD, BERRIES, FUNGI): KOLIGANEK, LEVELOCK, NEW STUYAHOK, KING SALMON, NAKNEK, AND SOUTH NAKNEK

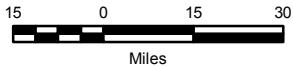
FIGURE K3.9-18



Sources: PLP 2018; Krieg et al. 2009; Holen et al. 2011 (Study years 2005 and 2007)



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Marine Mammal and Marine Invertebrate Harvest Areas

- Marine Invertebrates (Point)
- Marine Mammals (Point)
- Marine Mammals

Alternative 1

- ▲ Lightering Locations
- Mine Site
- Transportation Corridor

Kokhanok East Ferry Terminal Variant

- Natural Gas Pipeline
- Transportation Corridor
- Natural Gas Pipeline

Alternative 2

- Transportation Corridor
- Ferry Route

Alternative 2/3

- ▲ Lightering Location
- Natural Gas Pipeline
- Transportation Corridor

Alternative 3

- Local Roads
- Three Nautical Mile Line

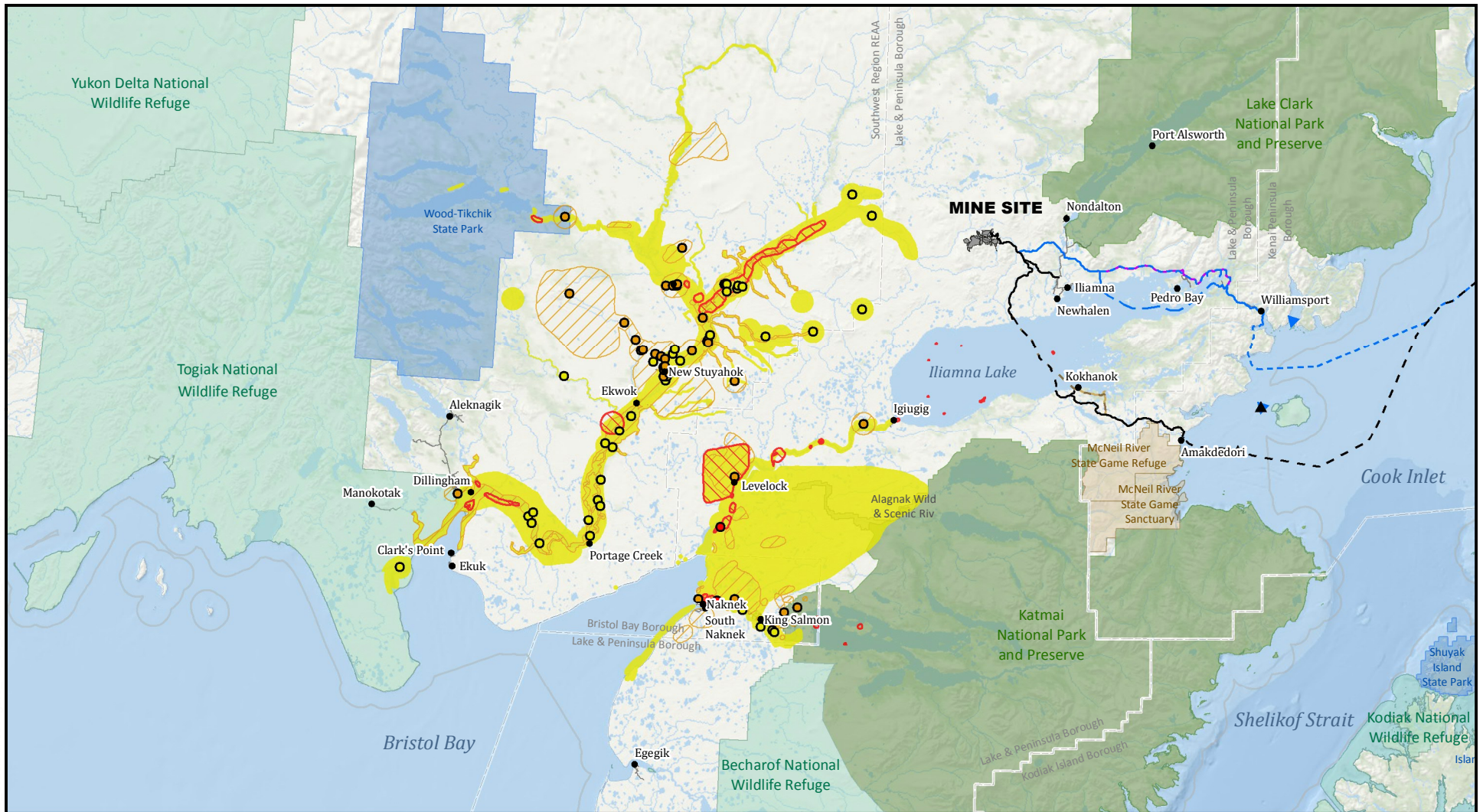
Other Features

- Borough Boundary
- Locality
- National Park
- National Wildlife Refuge
- Alaska State Park
- State Game Refuge/Sanctuary

PEBBLE PROJECT EIS

MARINE MAMMAL AND MARINE INVERTEBRATE HARVEST AREAS: KOLIGANEK, LEVELOCK, NEW STUYAHOK, KING SALMON, NAKNEK, AND SOUTH NAKNEK

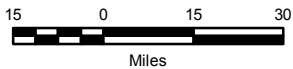
FIGURE K3.9-19



Sources: PLP 2018; Krieg et al. 2009; Holen et al. 2011 (Study years 2005 and 2007)



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Avian Harvest Areas

- Eggs (Point)
- Upland Game Birds (Point)
- Waterfowl (Ducks/Geese) (Point)
- Eggs
- Upland Game Birds
- Waterfowl (Ducks/Geese)

Alternative 1

- ▲ Lightering Locations
- Mine Site
- Transportation Corridor
- Natural Gas Pipeline

Kokhanok East Ferry Terminal Variant

- Transportation Corridor

- Natural Gas Pipeline
- Alternative 2**
- Transportation Corridor
- Ferry Route
- Alternative 2/3**
- ▲ Lightering Location
- Natural Gas Pipeline

Alternative 3

- Transportation Corridor
- Other Features**
- Local Roads
- Three Nautical Mile Line
- Borough Boundary

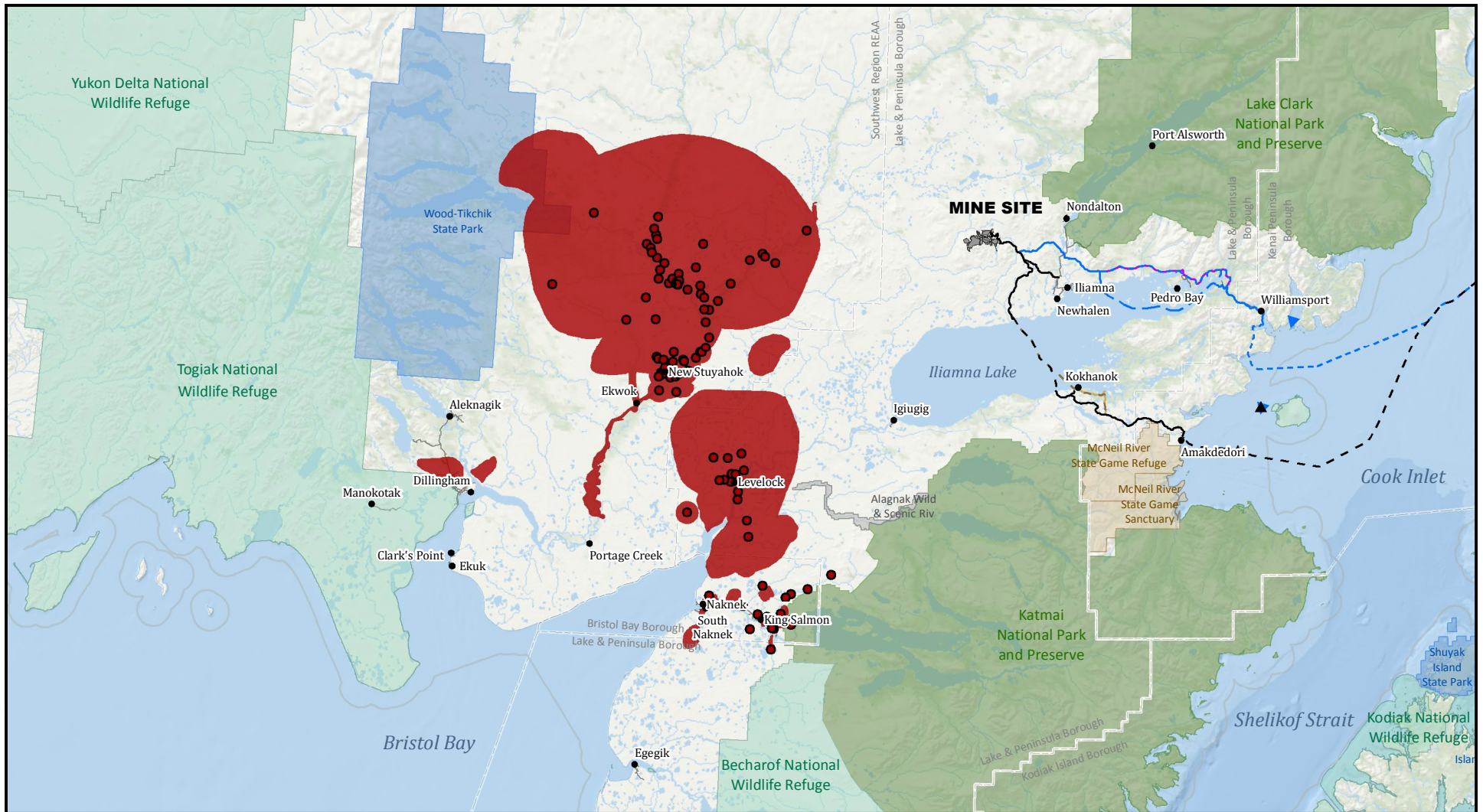
- National Wildlife Refuge
- Alaska State Park
- State Game Refuge/Sanctuary

- Locality
- National Park

PEBBLE PROJECT EIS

**AVIAN HARVEST AREAS:
KOLIGANEK, LEVELOCK,
NEW STUYAHOK, KING SALMON,
NAKNEK, AND SOUTH NAKNEK**

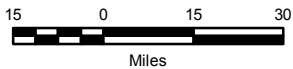
FIGURE K3.9-20



Sources: PLP 2018; Krieg et al. 2009; Holen et al. 2011 (Study years 2005 and 2007)



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Harvest Areas

- Small Land Mammals (Point)
- Small Land Mammals

Alternative 1

- ▲ Lightering Locations
- Mine Site
- Transportation Corridor

Kokhanok East Ferry Terminal Variant

- Natural Gas Pipeline
- Transportation Corridor
- Natural Gas Pipeline

Alternative 2

- Transportation Corridor
- Ferry Route

Alternative 2/3

- ▲ Lightering Location
- Natural Gas Pipeline

Alternative 3

- Transportation Corridor

Other Features

- Local Roads

Three Nautical Mile Line

- Borough Boundary

- Locality

- National Park

- National Wildlife Refuge

- Alaska State Park

- State Game Refuge/Sanctuary

PEBBLE PROJECT EIS

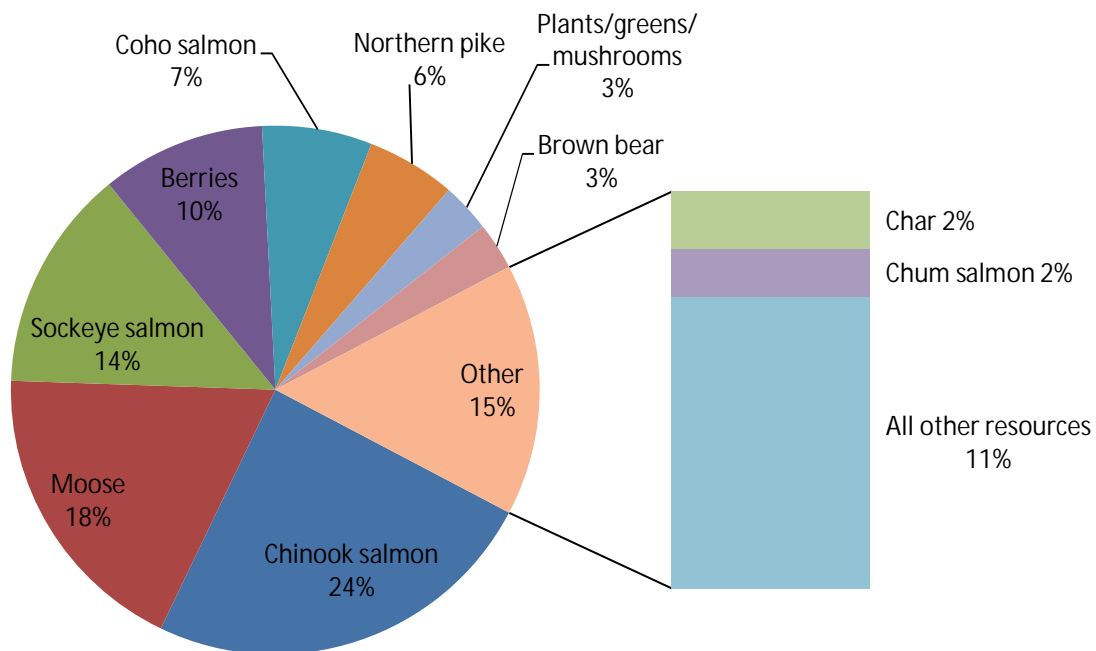
SMALL LAND MAMMAL HARVEST AREAS: KOLIGANEK, LEVELOCK, NEW STUYAHOK, KING SALMON, NAKNEK, AND SOUTH NAKNEK

FIGURE K3.9-21

K3.9.8 Aleknagik

Aleknagik is a predominantly Yup'ik community at the head of the Wood River on the southeast end of Aleknagik Lake. In 2008, Aleknagik had an estimated year-round population of 175 people in 47 households. Holen et al. (2012) surveyed residents about their 2008 subsistence activities and found that Aleknagik residents harvested an estimated total of 51,738 pounds of wild foods (296 pounds per capita). See Section 3.9, Subsistence, for per capita harvests by resource category. The top 10 resources harvested by Aleknagik residents in 2008 in terms of edible weight are shown in Figure K3.9-22. Aleknagik households reported high levels of participation in subsistence activities. Plants and fungi, as well as salmon, were used by every household in Aleknagik. Other widely used resource categories included large land mammals (94 percent of households), birds and eggs (88 percent), non-salmon fish (78 percent), and marine mammals (56 percent). Sharing and distribution of subsistence foods was widespread. In 2007, 97 percent of households received at least one subsistence resource and 84 percent gave away at least one resource (Holen et al. 2012).

Figure K3.9-22: Composition of Aleknagik Subsistence Harvest by Estimated Edible Weight, 2008

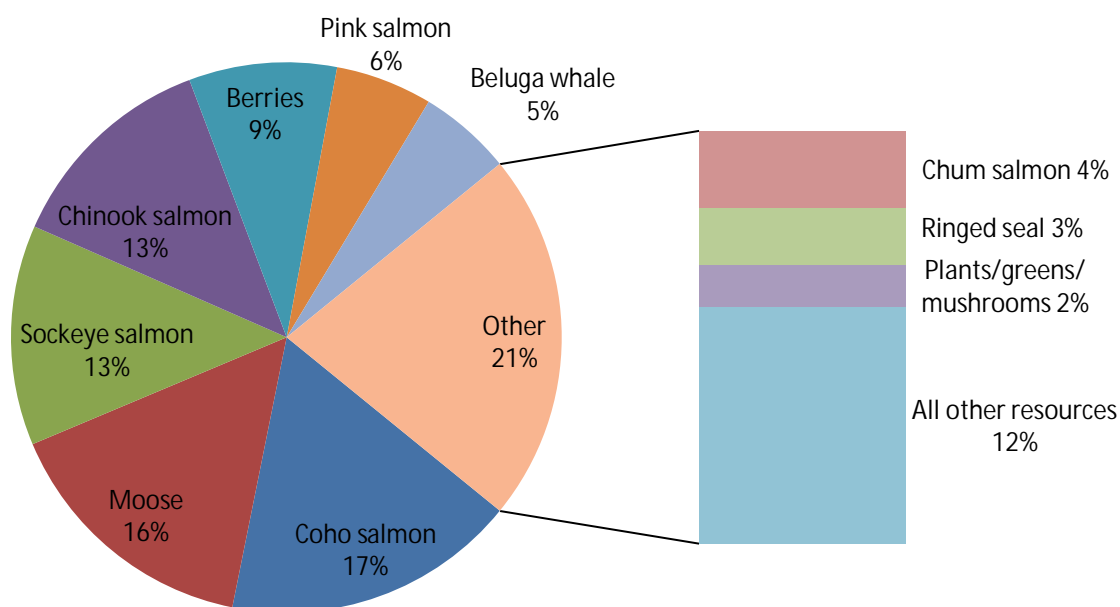


Source: Holen et al. 2012

K3.9.9 Clark’s Point

Clark’s Point is a predominantly Yup’ik community on Nushagak Bay, 15 miles from Dillingham. In 2008, Clark’s Point had an estimated year-round population of 38 people in 18 households. Clark’s Point residents harvested an estimated total of 45,543 pounds of wild foods (1,210 pounds per capita) in 2008, a notably high level of subsistence food production among communities in the project area. See Section 3.9, Subsistence, for per capita harvests by resource category. The top 10 resources harvested by Clark’s Point residents in 2008 in terms of edible weight are shown in Figure K3.9-23. Clark’s Point households reported high levels of participation in subsistence activities. All households in Clark’s point used salmon, non-salmon fish, birds and eggs, and large land mammals. Other widely used resource categories included plants and fungi (91 percent of households), small land mammals (82 percent), marine mammals (73 percent), and marine invertebrates (46 percent). Sharing and distribution of subsistence foods was widespread. Every household received and gave away at least one subsistence resource (Holen et al. 2012).

Figure K3.9-23: Composition of Clark’s Point Subsistence Harvest by Estimated Edible Weight, 2008

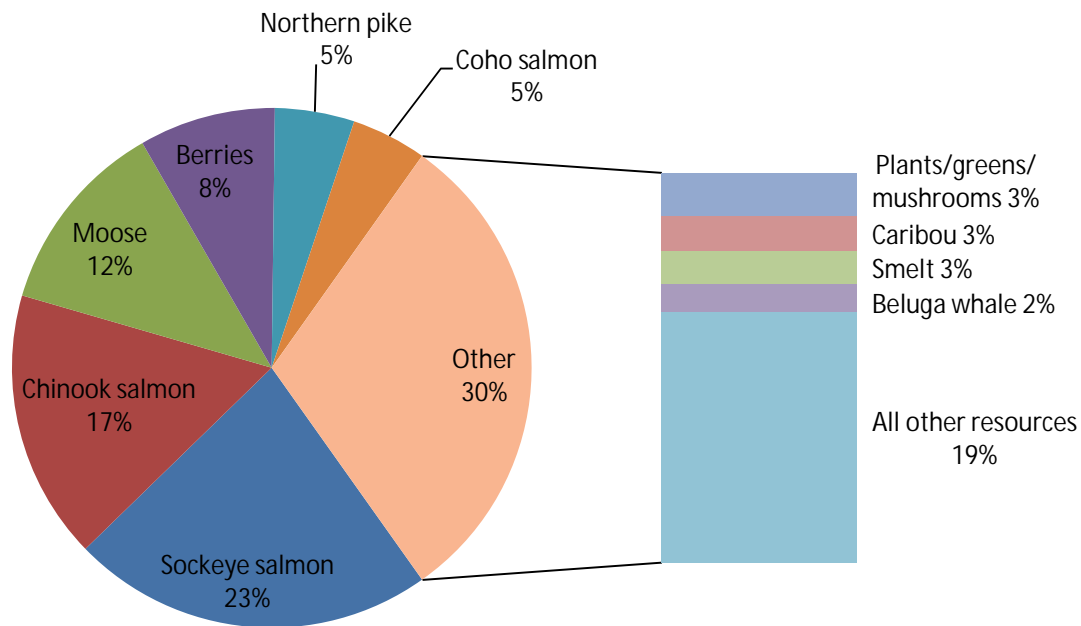


Source: Holen et al. 2012

K3.9.10 Manokotak

Manokotak is a Yup'ik community on the Igushik River. In 2008, Manokotak had an estimated year-round population of 379 people in 96 households. Manokotak residents harvested an estimated total of 113,196 pounds of wild foods (298 pounds per capita) in 2008. See Section 3.9, Subsistence, for per capita harvests by resource category. The top 10 resources harvested by Manokotak residents in 2008 in terms of edible weight are shown in Figure K3.9-24. Manokotak households reported high levels of participation in subsistence activities. Salmon was the most widely used resource category (97 percent of households), followed by plants and fungi (95 percent), birds and eggs (95 percent), non-salmon fish (93 percent), large land mammals (87 percent), marine invertebrates (82 percent), marine mammals (75 percent), and small land mammals (54 percent). Sharing and distribution of subsistence foods was widespread. In 2008, 93 percent of Manokotak households received at least one subsistence resource and 90 percent of households gave away at least one resource (Holen et al. 2012).

Figure K3.9-24: Composition of Manokotak Subsistence Harvest by Estimated Edible Weight, 2008

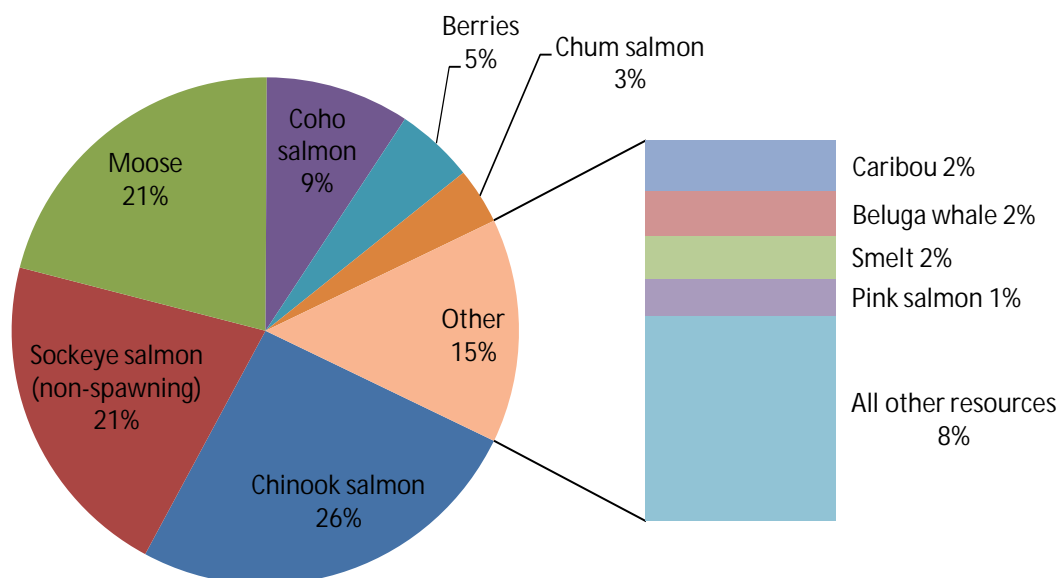


Source: Holen et al. 2012

K3.9.11 Dillingham

Dillingham is located at the northern end of Nushagak Bay at the confluence of the Wood and Nushagak rivers. Historically a Yup'ik area with Russian influences, Dillingham is now a diverse community with a mix of non-Native and Native people. In 2010, Dillingham had an estimated year-round population of 2,294 people in 726 households. Evans et al. (2013) surveyed residents about their 2010 subsistence activities and found that Dillingham households harvested an estimated total of 486,533 pounds of wild foods (212 pounds per capita). See Section 3.9, Subsistence, for per capita harvests by resource category. The top 10 resources harvested by Dillingham residents in 2010 in terms of edible weight are shown in Figure K3.9-25. Dillingham households reported high levels of participation in subsistence activities. Salmon was the most widely used resource category (91 percent of households) followed by plants and fungi (89 percent), large land mammals (77 percent), birds and eggs (73 percent), and non-salmon fish (69 percent). Sharing and distribution of subsistence foods was widespread. In 2010, 91 percent of Dillingham households received at least one subsistence resource and 79 percent of households gave away at least one resource (Evans et al. 2013).

Figure K3.9-25: Composition of Dillingham Subsistence Harvest by Estimated Edible Weight, 2010

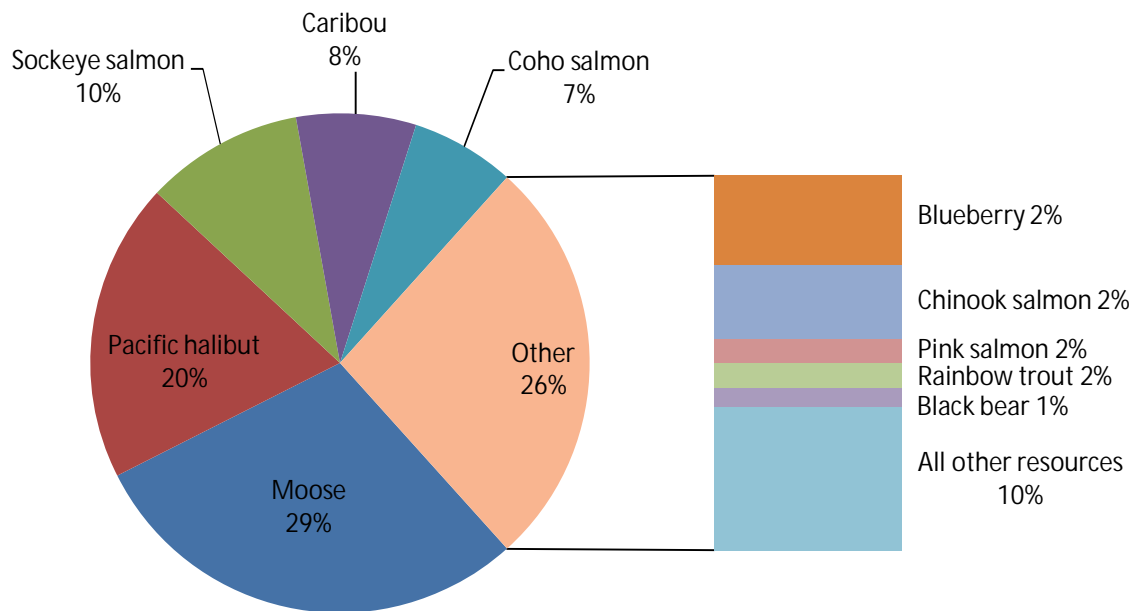


Notes:
 The term "spawning sockeye" refers to late-run sockeye salmon that have a distinctive red color and white meat, and are harvested in the fall.
 Source: Evans et al. 2013

K3.9.12 Niniilchik

Niniilchik is a predominately Euro-American community that lies on the eastern shore of Cook Inlet on the Sterling Highway. The Alaska Native population of Niniilchik is a mix of Alutiiq, Aleut, and Dena'ina people. Recent data is limited for this community (a comprehensive harvest survey has not been conducted since 1998) (Fall et al. 2000). In 1998, Niniilchik had an estimated population of 1,075 people in 400 households. Niniilchik residents harvested an estimated total of 175,817 pounds of wild foods (164 pounds per capita) in 1998. See Section 3.9, Subsistence, for per capita harvest by resource category. The top 10 resources harvested by Niniilchik residents in 1998 in terms of edible weight are shown in Figure K3.9-26. Non-salmon fish was the most widely used resource category (92 percent of households), followed by salmon (90 percent), plants and fungi (83 percent), marine invertebrates (78 percent), and large land mammals (63 percent). Sharing and distribution of subsistence foods was widespread. In 1998, 92 percent of households received at least one subsistence resource and 73 percent of households gave away at least one resource (Fall et al. 2000).

Figure K3.9-26: Composition of Niniilchik Subsistence Harvest by Estimated Edible Weight, 1998

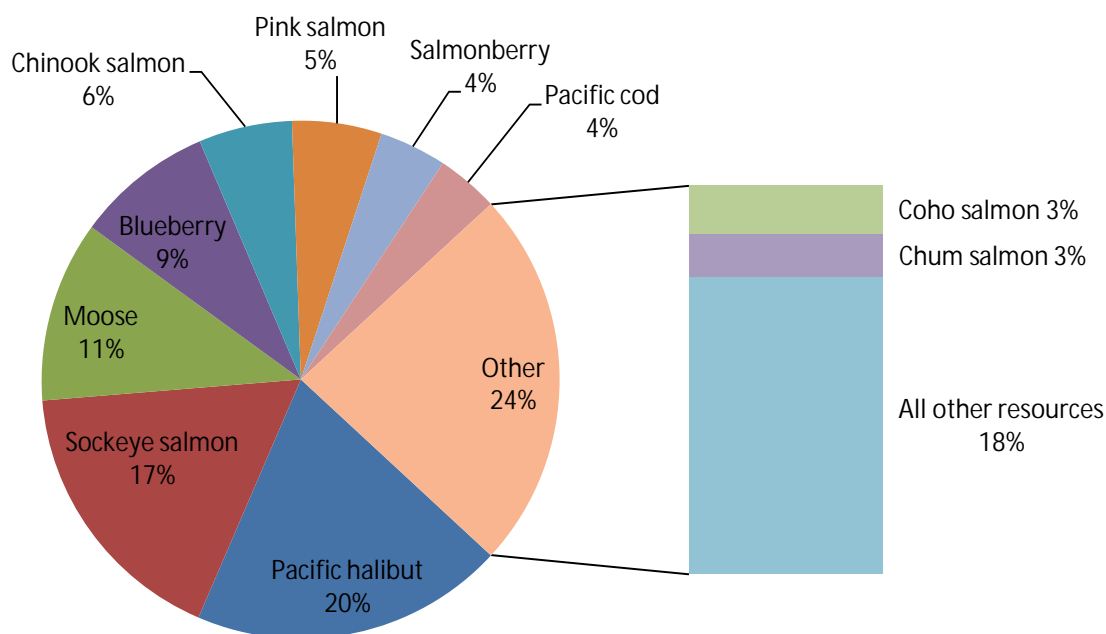


Source: ADF&G 2018I

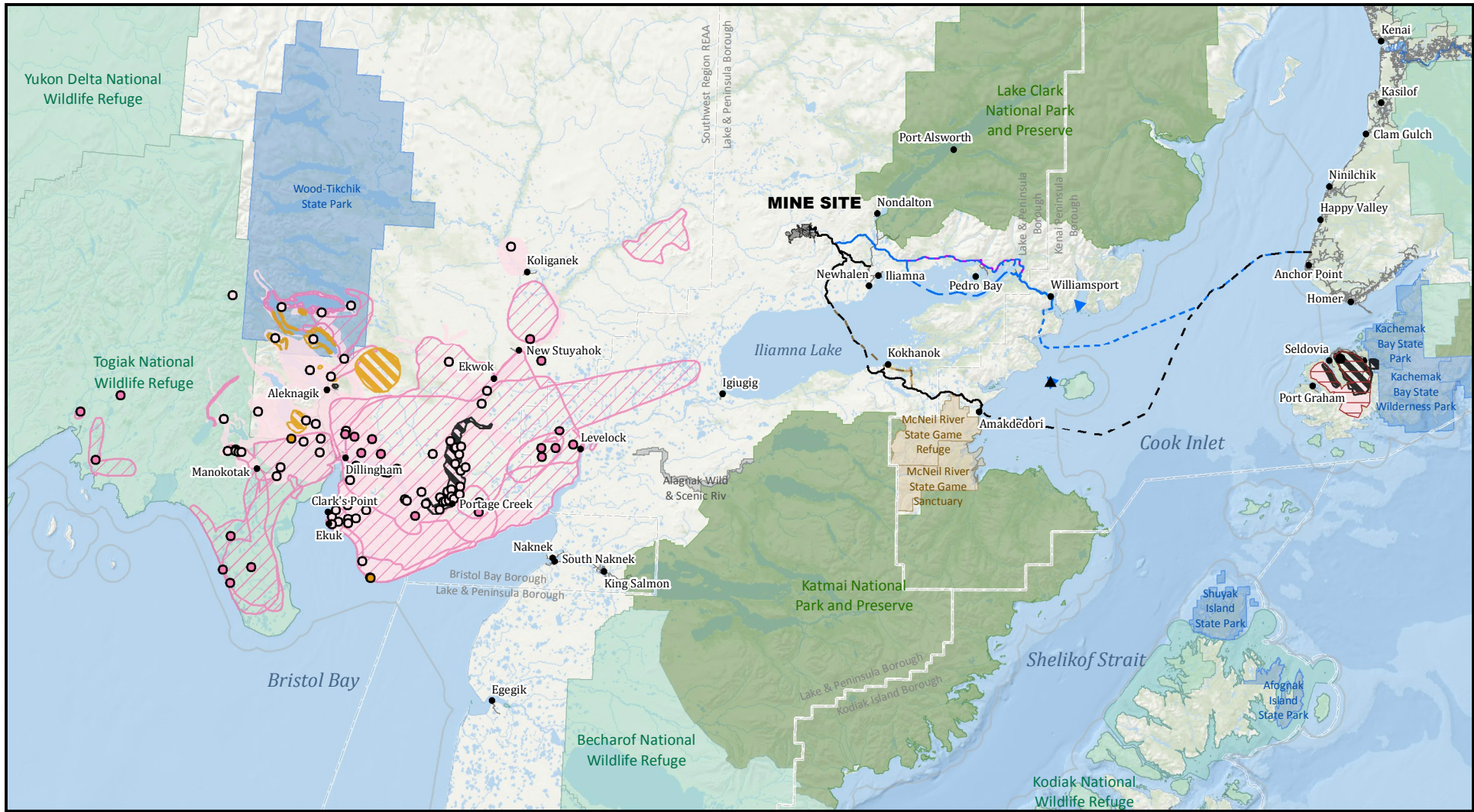
K3.9.13 Seldovia

Seldovia is a majority Euro-American community located on the Kenai Peninsula on the south shore of Kachemak Bay. The Alaska Native population of Seldovia is a mix of Alutiiq, Dena'ina, and Aleut people. In 2014, Seldovia (including Seldovia city and Seldovia Village) had an estimated year-round population of 278 people in 126 households. Seldovia residents harvested an estimated total of 38,455 pounds of wild foods (138 pounds per capita) in 2014, a comparatively low level among communities in the project area. See Section 3.9, Subsistence, for per capita harvests by resource category. The top 10 resources harvested by Seldovia residents in 2014 in terms of edible weight are shown in Figure K3.9-27. Seldovia households reported high levels of participation in subsistence activities. Plants and fungi were the most widely harvested resource category (95 percent of households) followed by salmon (94 percent), non-salmon fish (90 percent), marine invertebrates (68 percent), and large land mammals (61 percent). Sharing and distribution of subsistence foods was widespread. In 2014, 97 percent of Seldovia households received at least one subsistence resource and 76 percent of households gave away at least one resource (Jones and Kostick 2016). Although located on the Kenai Peninsula, harvest areas of the Seldovia Village Tribe greater traditional use area include Kachemak Bay, Chinitna Bay, Tuxedni Bay, and the western side of Cook Inlet including Kamishak Bay.

Figure K3.9-27: Composition of Seldovia Subsistence Harvest by Estimated Edible Weight, 2014



Source: Jones and Kostick 2016



Sources: PLP 2018; Hoen et al. 2012; Evans et al. 2013; Jones and Kostick 2016 (Study years 2008, 2010, and 2014)

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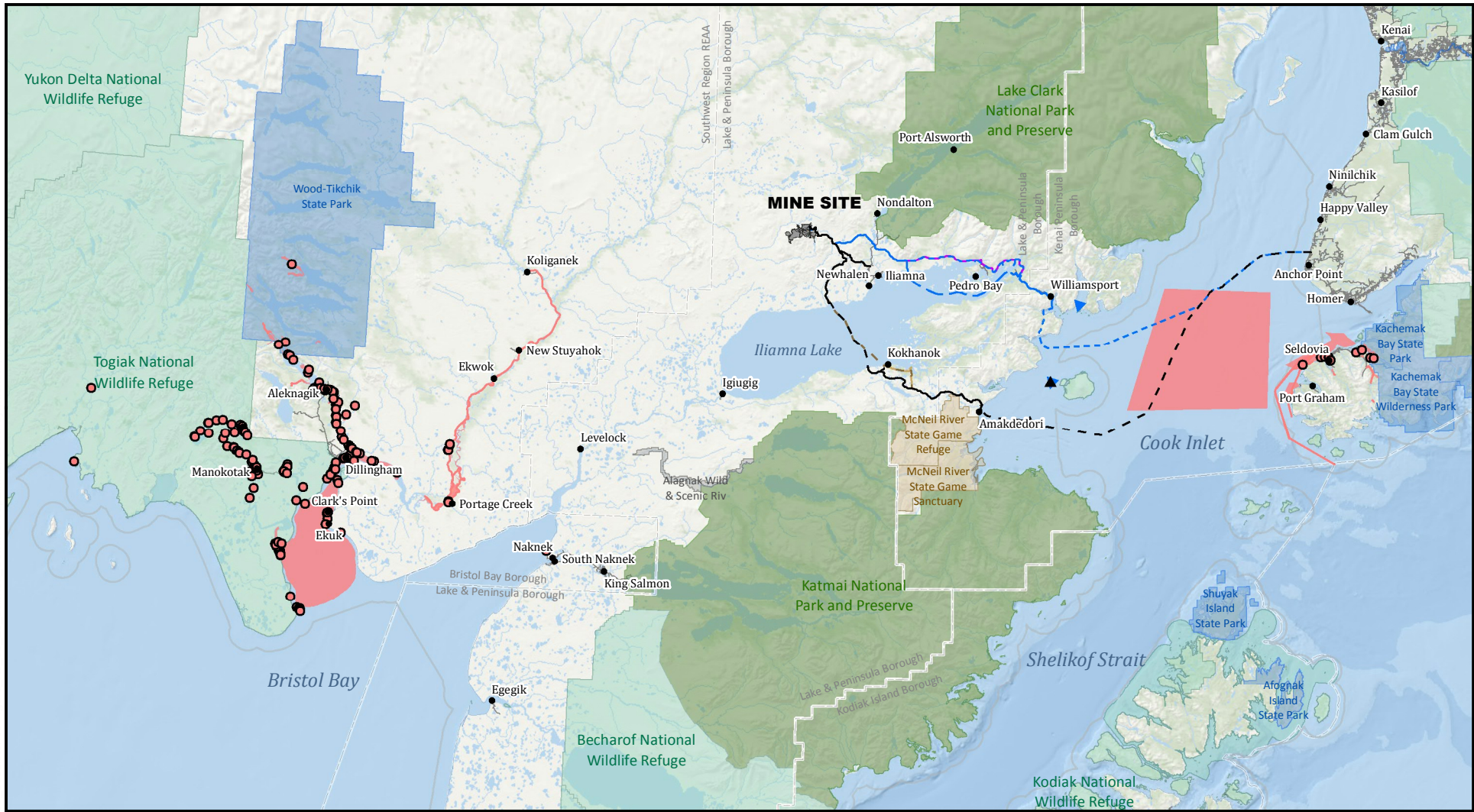
15 0 15 30
Miles

- | | | | | |
|---|---|---|--|--|
| <ul style="list-style-type: none"> ● Black bear (Point) ● Brown bear (Point) ● Caribou (Point) ○ Moose (Point) — Black bear (Line) — Black bear — Brown bear | <ul style="list-style-type: none"> — Caribou — Moose — Sheep or goats <p>Alternative 1</p> <ul style="list-style-type: none"> ▲ Lightering Locations ● Mine Site — Transportation Corridor — Natural Gas Pipeline | <p>Kokhanok East Ferry Terminal Variant</p> <ul style="list-style-type: none"> — Transportation Corridor — Natural Gas Pipeline <p>Alternative 2</p> <ul style="list-style-type: none"> — Transportation Corridor — Ferry Route | <p>Alternative 2/3</p> <ul style="list-style-type: none"> ▲ Lightering Location — Natural Gas Pipeline <p>Alternative 3</p> <ul style="list-style-type: none"> — Alternative 3 <p>Other Features</p> <ul style="list-style-type: none"> — Local Roads — Three Nautical Mile Line | <ul style="list-style-type: none"> — Borough Boundary ● Locality ■ National Park ■ National Wildlife Refuge ■ Alaska State Park |
|---|---|---|--|--|


PEBBLE PROJECT EIS

LARGE LAND MAMMAL HARVEST AREAS: ALEKNAGIK, CLARK'S POINT, MANOKOTAK, DILLINGHAM, AND SELDOVIA



FIGURE K3.9-28



Sources: PLP 2018; Holen et al. 2012; Evans et al. 2013; Jones and Kostick 2016 (Study years 2008, 2010, and 2014)



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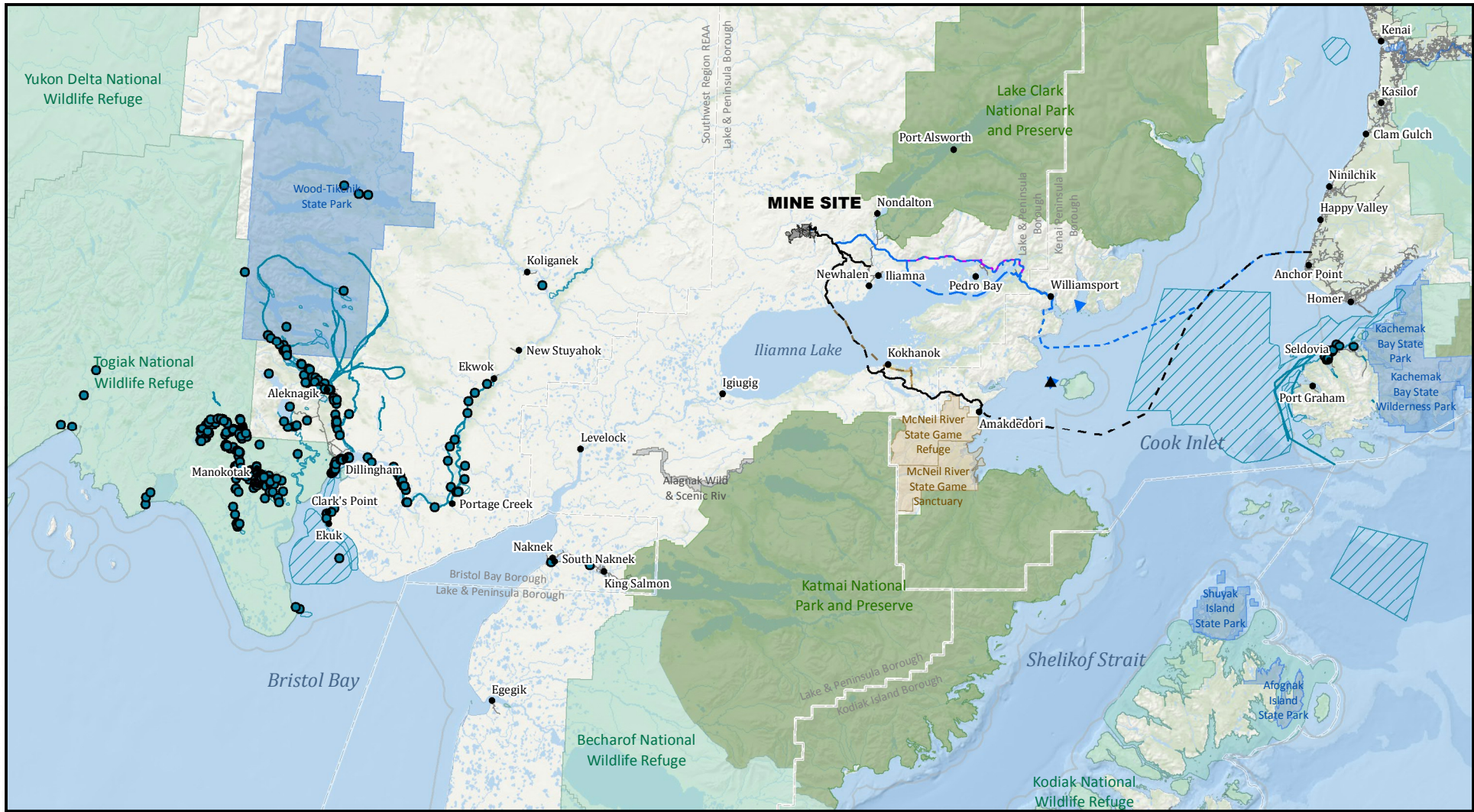
Miles

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|---|---|--|---|
| <p>Salmon Harvest Areas</p> <ul style="list-style-type: none"> ● Salmon (Point) — Salmon (Line) 🐟 Salmon <p>Alternative 1</p> <ul style="list-style-type: none"> ▲ Lightening Locations 🏠 Mine Site — Transportation Corridor | <p>— Natural Gas Pipeline</p> <p>Kokhanok East Ferry Terminal Variant</p> <ul style="list-style-type: none"> — Transportation Corridor — Natural Gas Pipeline <p>Alternative 2</p> <ul style="list-style-type: none"> — Transportation Corridor — Ferry Route | <p>Alternative 2/3</p> <ul style="list-style-type: none"> ▲ Lightening Location — Natural Gas Pipeline <p>Alternative 3</p> <ul style="list-style-type: none"> — Transportation Corridor <p>Other Features</p> <ul style="list-style-type: none"> — Local Roads — Three Nautical Mile Line | <p>— Borough Boundary</p> <ul style="list-style-type: none"> ● Locality 🌳 National Park 🌿 National Wildlife Refuge 🏰 Alaska State Park 🏠 State Game Refuge/Sanctuary |
|---|---|--|---|

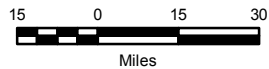
PEBBLE PROJECT EIS

**SALMON HARVEST AREAS:
ALEKNAGIK, CLARK'S POINT,
MANOKOTAK, DILLINGHAM,
AND SELDOVIA**

FIGURE K3.9-29



Sources: PLP 2018; Hoen et al. 2012; Evans et al. 2013; Jones and Kostick 2016 (Study years 2008, 2010, and 2014)

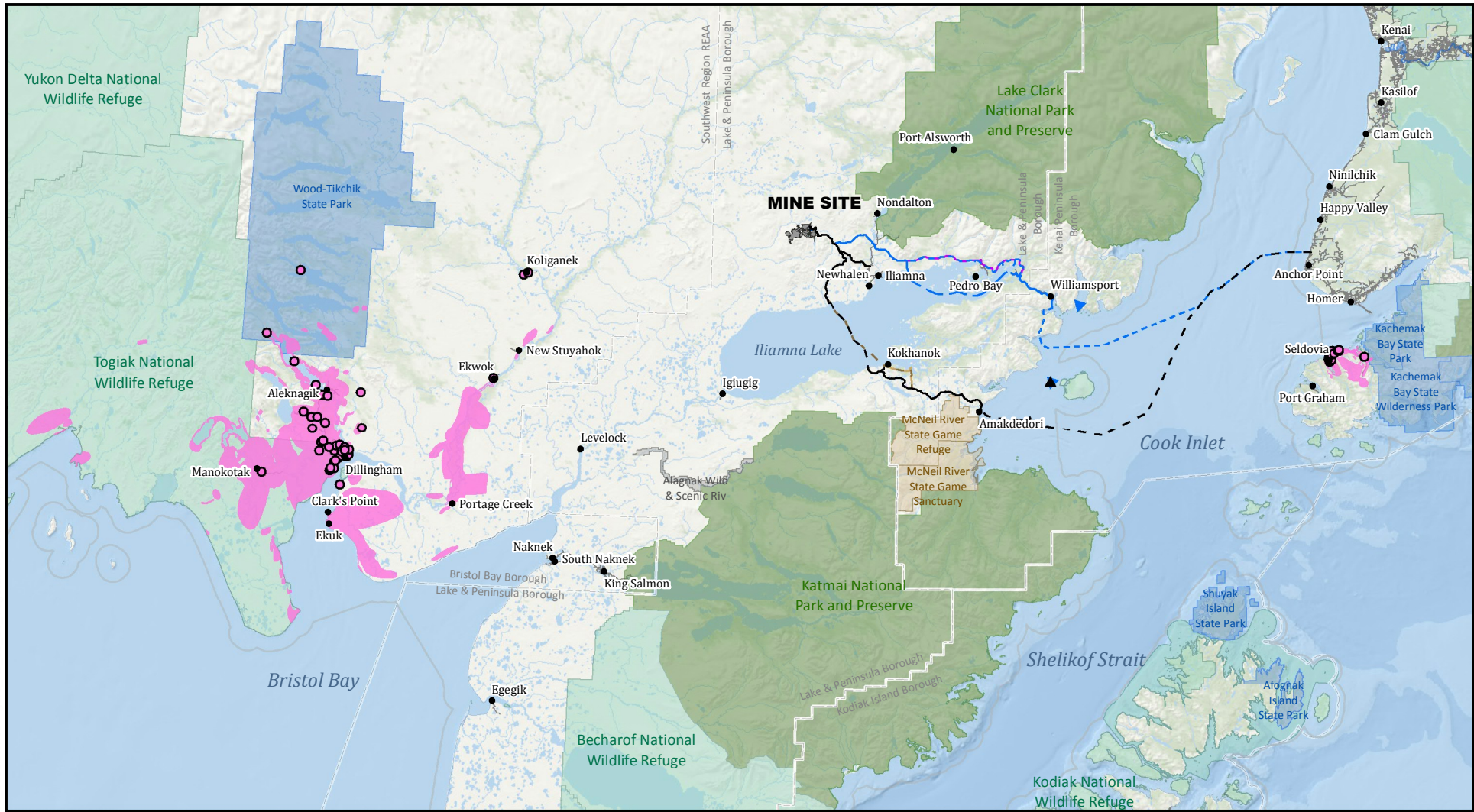


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| <ul style="list-style-type: none"> ● Non-Salmon Fish (Point) — Non-Salmon Fish (Line) ○ Non-Salmon Fish ▲ Lightening Locations ■ Mine Site — Transportation Corridor | <ul style="list-style-type: none"> — Natural Gas Pipeline — Transportation Corridor — Natural Gas Pipeline — Transportation Corridor — Ferry Route | <ul style="list-style-type: none"> ▲ Lightening Location — Natural Gas Pipeline — Transportation Corridor — Local Roads — Three Nautical Mile Line | <ul style="list-style-type: none"> — Borough Boundary ● Locality ■ National Park ■ National Wildlife Refuge ■ Alaska State Park ■ State Game Refuge/Sanctuary |
|--|---|---|---|

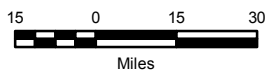
PEBBLE PROJECT EIS

**NON-SALMON HARVEST AREAS:
ALEKNAGIK, CLARK'S POINT,
MANOKOTAK, DILLINGHAM,
AND SELDOVIA**

FIGURE K3.9-30



Sources: PLP 2018; Holen et al. 2012; Evans et al. 2013; Jones and Kostick 2016 (Study years 2008, 2010, and 2014)

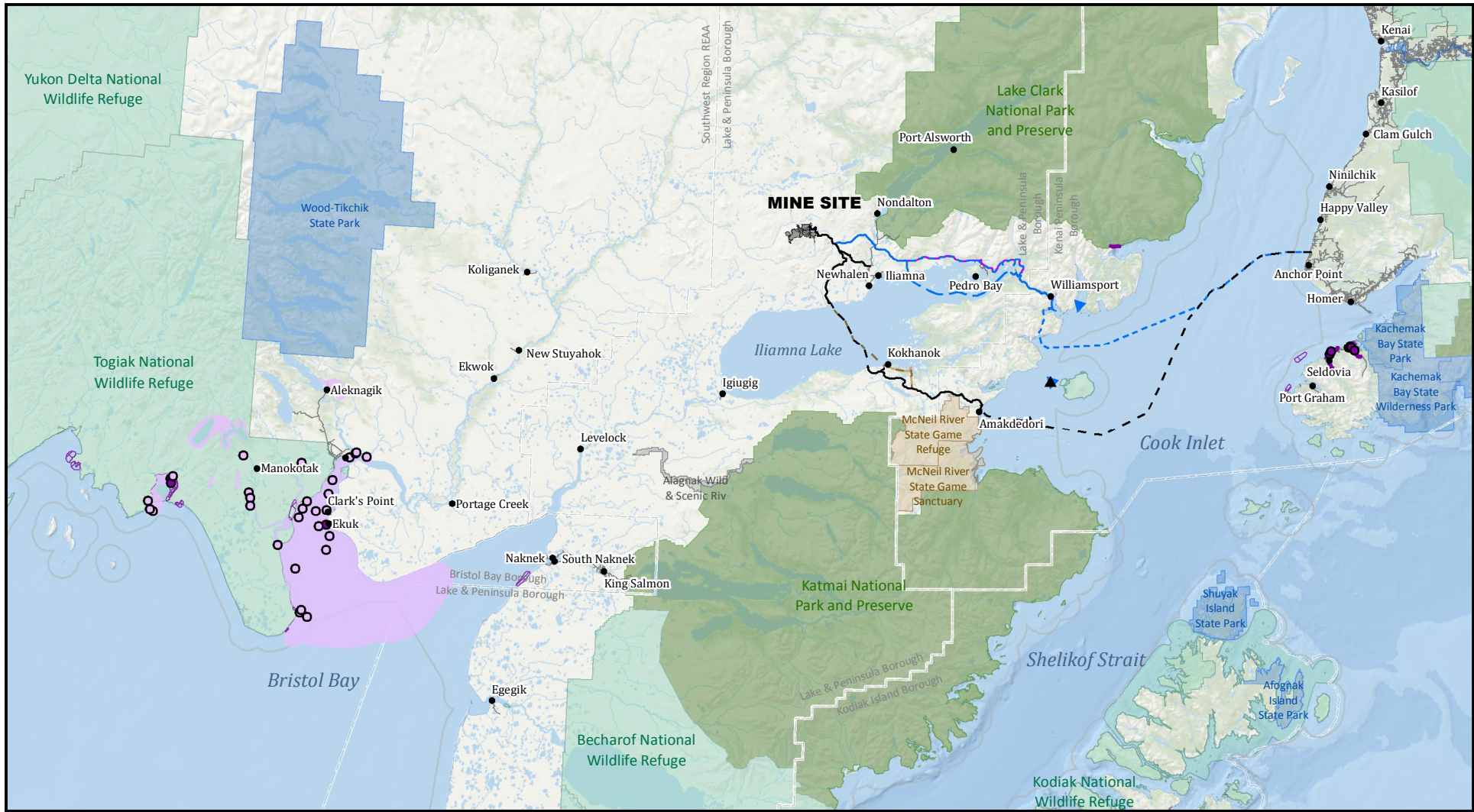


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|---|--|--|---|
| <p>Vegetation Harvest Areas</p> <ul style="list-style-type: none"> ● Plants, Wood, Berries, and Fungi (Point) — Plants, Wood, Berries, and Fungi (Line) — Plants, Wood, Berries, and Fungi <p>Alternative 1</p> <ul style="list-style-type: none"> ▲ Lightering Locations ● Mine Site — Transportation Corridor | <ul style="list-style-type: none"> — Natural Gas Pipeline — Kokhanok East Ferry Terminal Variant — Transportation Corridor — Natural Gas Pipeline <p>Alternative 2</p> <ul style="list-style-type: none"> — Transportation Corridor — Ferry Route | <p>Alternative 2/3</p> <ul style="list-style-type: none"> ▲ Lightering Location — Natural Gas Pipeline <p>Alternative 3</p> <ul style="list-style-type: none"> — Transportation Corridor <p>Other Features</p> <ul style="list-style-type: none"> — Local Roads — Three Nautical Mile Line | <ul style="list-style-type: none"> — Borough Boundary ● Locality ■ National Park ■ National Wildlife Refuge ■ Alaska State Park ■ State Game Refuge/Sanctuary |
|---|--|--|---|

**VEGETATION HARVEST AREAS
(PLANTS, WOOD, BERRIES, FUNGI):
ALEKNAGIK, CLARK'S POINT,
MANOKOTAK, DILLINGHAM,
AND SELDOVIA**

PEBBLE PROJECT EIS

FIGURE K3.9-31



Sources: PLP 2018; Hoen et al. 2012; Evans et al. 2013; Jones and Kostick 2016 (Study years 2008, 2010, and 2014)



US Army Corps of Engineers



Marine Mammal and Marine Invertebrate Harvest Areas

- Marine Invertebrates (Point)
- Marine Mammals (Point)
- Marine Invertebrates (Line)
- Marine Invertebrates
- Marine Mammals

Alternative 1

- ▲ Lightering Locations

Mine Site

- Transportation Corridor
- - Natural Gas Pipeline

Kokhanok East Ferry Terminal Variant

- Transportation Corridor
- - Natural Gas Pipeline

Alternative 2

- Transportation Corridor

Alternative 2/3

- ▲ Lightering Location
- - Natural Gas Pipeline

Alternative 3

- Transportation Corridor

Other Features

- Local Roads

Three Nautical Mile Line

- Borough Boundary

National Park

- National Wildlife Refuge

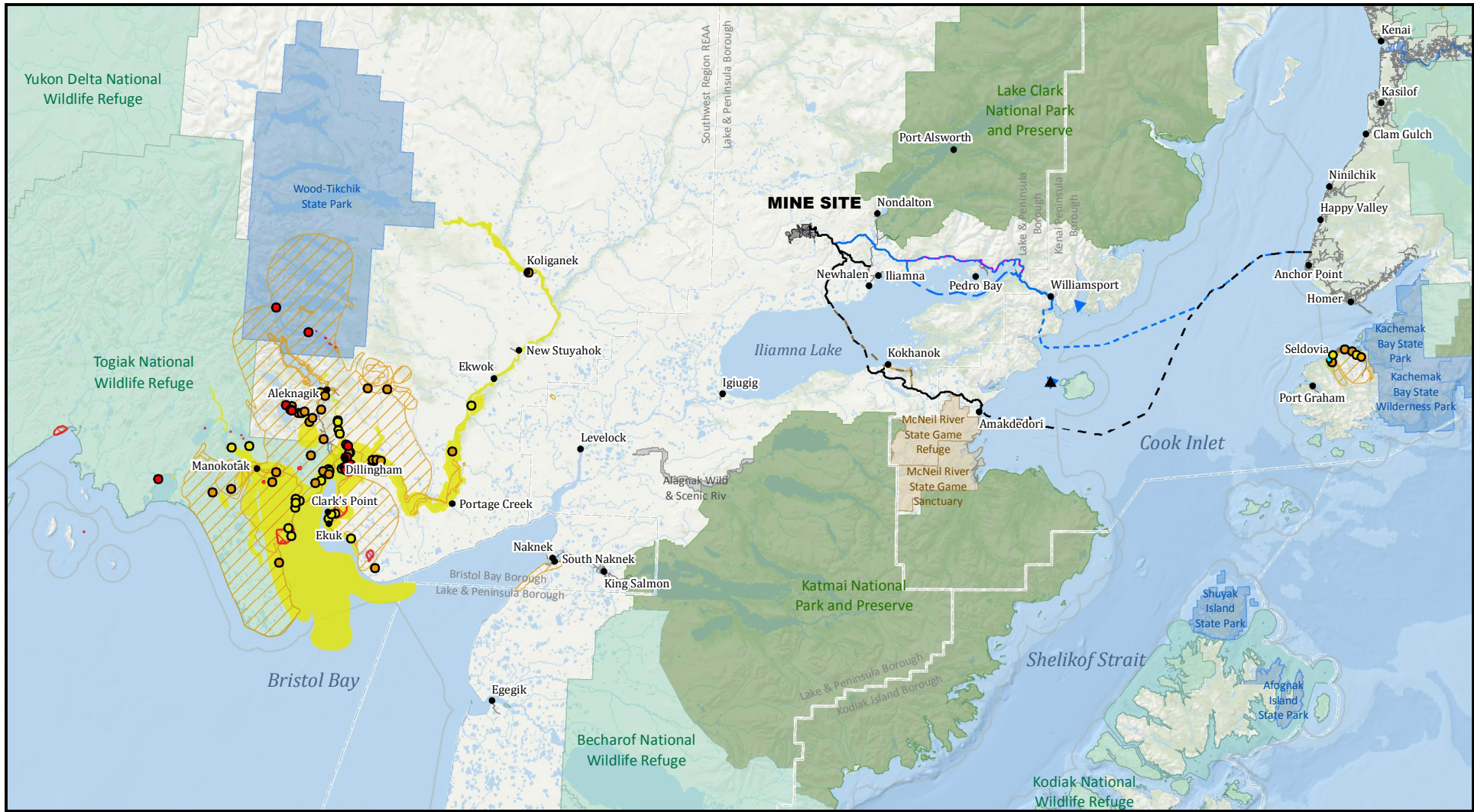
Alaska State Park

- State Game Refuge/Sanctuary

MARINE MAMMAL AND MARINE INVERTEBRATE HARVEST AREAS: ALEKNAGIK, CLARK'S POINT, MANOKOTAK, DILLINGHAM, AND SELDOVIA

FIGURE K3.9-32

PEBBLE PROJECT EIS



Sources: PLP 2018; Hoen et al. 2012; Evans et al. 2013; Jones and Kostick 2016 (Study years 2008, 2010, and 2014)

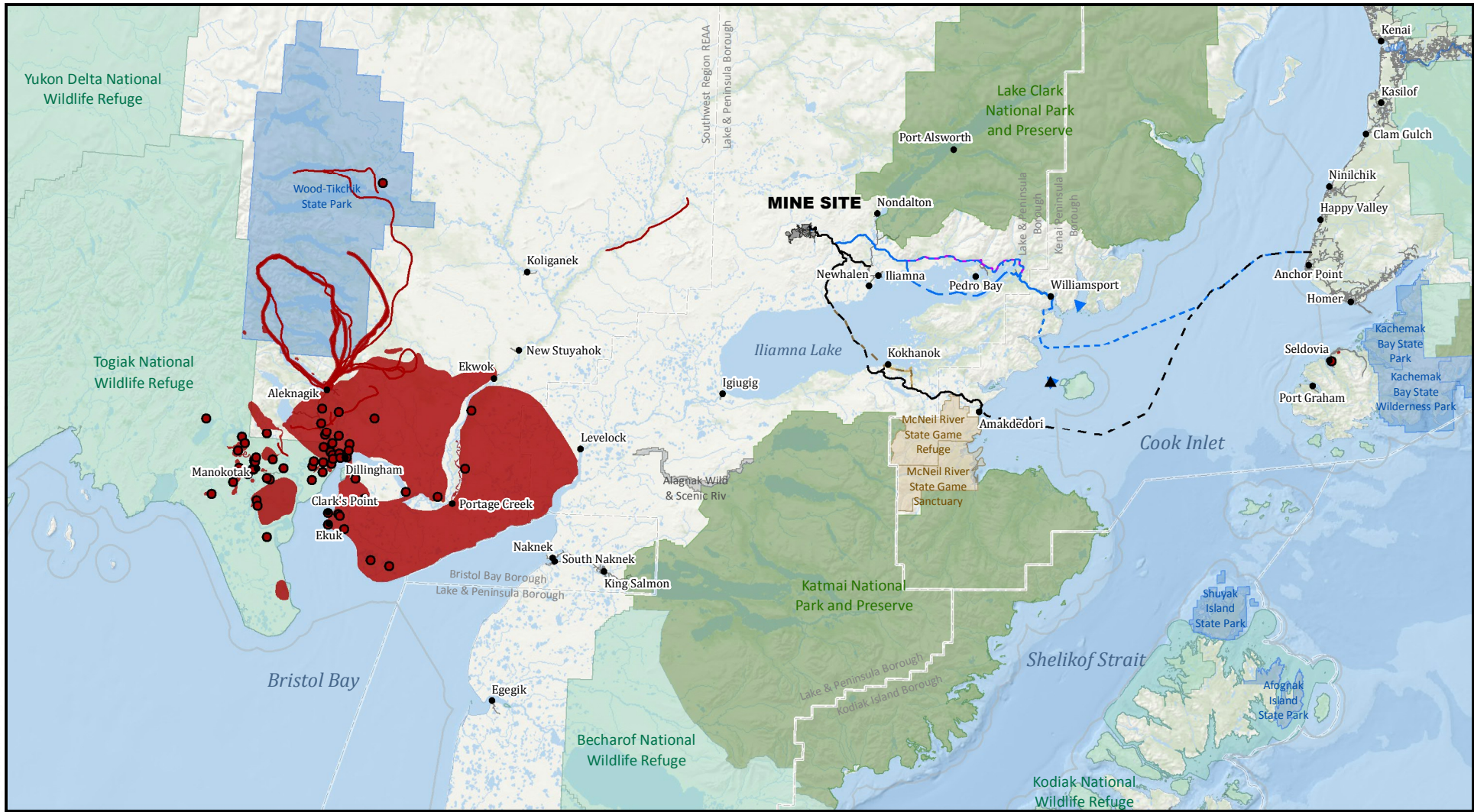
US Army Corps of Engineers

Miles

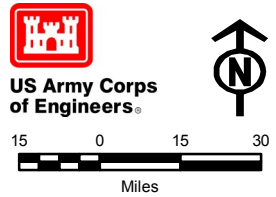
- | | | | | |
|--|---|--|---|--|
| <p>Avian Harvest Areas</p> <ul style="list-style-type: none"> ● Eggs (Point) ● Upland Game Birds (Point) ● Waterfowl (Ducks/Geese) (Point) ● Eggs ● Upland Game Birds ● Waterfowl (Ducks/Geese) | <p>Alternative 1</p> <ul style="list-style-type: none"> ▲ Lightering Locations ● Mine Site — Transportation Corridor — Natural Gas Pipeline — Kokhanok East Ferry Terminal Variant — Transportation Corridor | <p>— Natural Gas Pipeline</p> <p>Alternative 2</p> <ul style="list-style-type: none"> — Transportation Corridor — Ferry Route <p>Alternative 2/3</p> <ul style="list-style-type: none"> ▲ Lightering Location — Natural Gas Pipeline | <p>Alternative 3</p> <ul style="list-style-type: none"> — Transportation Corridor <p>Other Features</p> <ul style="list-style-type: none"> — Local Roads — Three Nautical Mile Line — Borough Boundary ● Locality ■ National Park | <ul style="list-style-type: none"> ■ National Wildlife Refuge ■ Alaska State Park ■ State Game Refuge/Sanctuary |
|--|---|--|---|--|

**AVIAN HARVEST AREAS:
ALEKNAGIK, CLARK'S POINT,
MANOKOTAK, DILLINGHAM,
AND SELDOVIA**

FIGURE K3.9-33



Sources: PLP 2018; Hoen et al. 2012; Evans et al. 2013; Jones and Kostick 2016 (Study years 2008, 2010, and 2014)



- | | | | |
|------------------------------|---|----------------------------|-------------------------------|
| Harvest Areas | — · — Natural Gas Pipeline | Alternative 2/3 | — — Borough Boundary |
| ● Small Land Mammals (Point) | Kokhanok East Ferry Terminal Variant | ▲ Lightening Location | ● Locality |
| — Small Land Mammals (Line) | — Transportation Corridor | — — Natural Gas Pipeline | ■ National Park |
| ● Small Land Mammals | — · — Natural Gas Pipeline | Alternative 3 | ■ National Wildlife Refuge |
| Alternative 1 | Alternative 2 | — Transportation Corridor | ■ Alaska State Park |
| ▲ Lightening Locations | — Transportation Corridor | — Ferry Route | ■ State Game Refuge/Sanctuary |
| ● Mine Site | | | |
| — Transportation Corridor | | | |
| | | Other Features | |
| | | — Local Roads | |
| | | — Three Nautical Mile Line | |

PEBBLE PROJECT EIS

SMALL LAND MAMMAL HARVEST AREAS: ALEKNAGIK, CLARK'S POINT, MANOKOTAK, DILLINGHAM, AND SELDOVIA

FIGURE K3.9-34