THE pebble PARTNERSHIP

Pre-Permitting Environmental / Socio-Economic Data Report Series

Report Series N-
Terrestrial Wildlife and Habitats

Report N-3
Waterbird Figures
2004-2007

Submitted to the Alaska Department of Natural Resources January 2010

Preliminary data. Do not cite or quote.

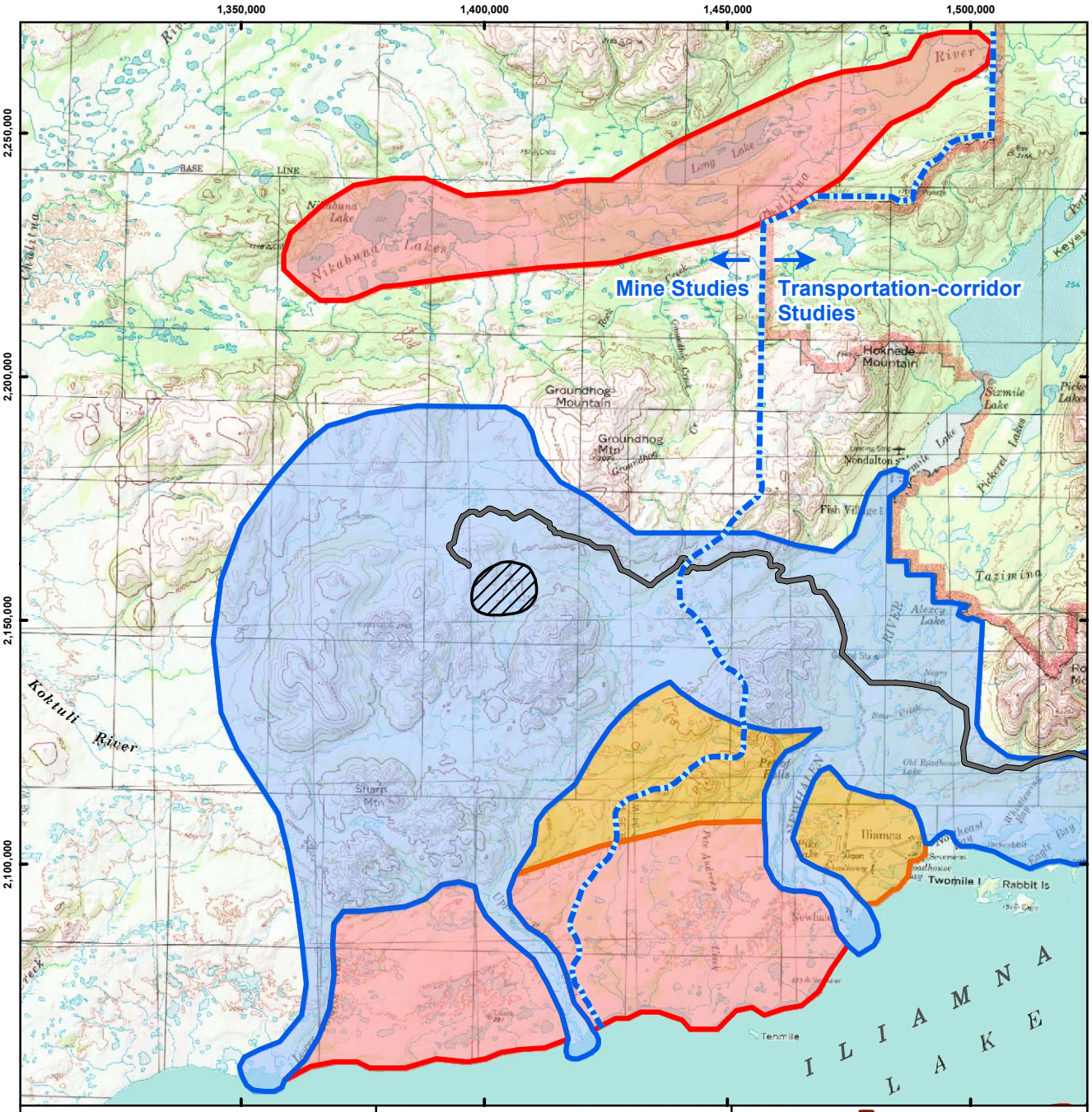
The Pebble Partnership is providing environmental and socio-economic baseline data collected to inform the development of the Pebble Project to state and federal agencies, project stakeholders and the general public prior to project permitting as part of its commitment to full and open disclosure.

A comprehensive Environmental Baseline Document (EBD) will subsequently be prepared and appended to future project permit applications. The EBD will also be made publicly available when complete.

Collected for the Pebble Partnership by:

ABR inc. environmental research & services

ABR, Inc.
P.O. Box 24068
Anchorage, AK 99524



Miles 0 2 4 6 8

Kilometers 0 2 4 6 8 10 12

Scale 1:390,000

N

Alaska State Plane Zone 5 (units feet)
1983 North American Datum

Legend

- 2004 Study Area
- 2005 Study Area
- Study Area Both Years
- General Deposit Location
- Possible Road Alignment

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Figure N-3.1
Study Area for Breeding and Staging Waterbirds, Mine Study Area, 2004 and 2005

Preliminary Data Only
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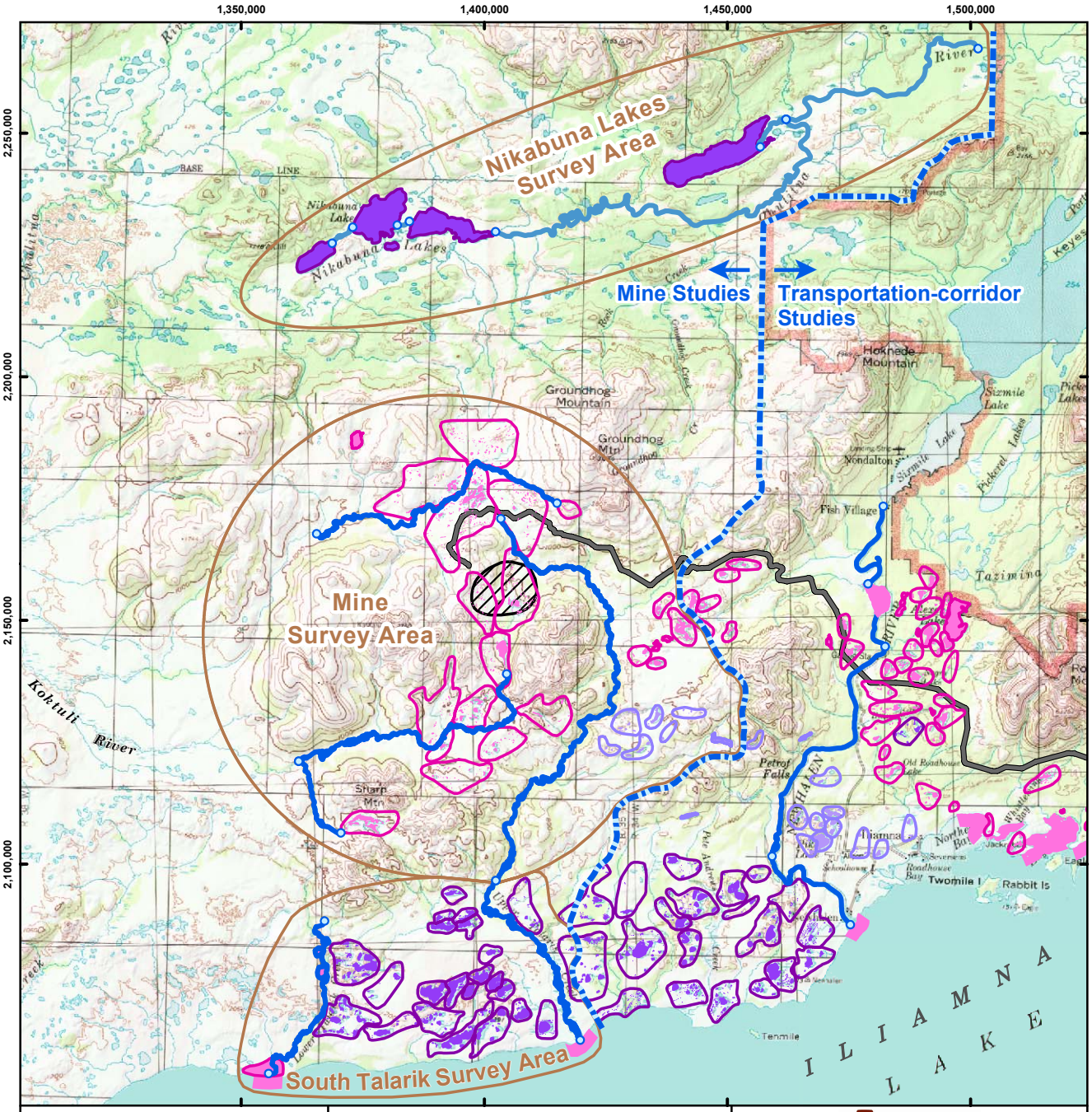

Miles 0 2 4 6 8

Kilometers 0 2 4 6 8 10 12

Scale1:390,000

N

Alaska State Plane Zone 5 (units feet)
1983 North American Datum

Legend

Year Surveyed

Lake Group	Lake and Bay	River Segment
2004	2004	Segment Endpoint
2005	2005	2005
Both Years	Both Years	Both Years

General Deposit Location

Possible Road Alignment

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Figure N-3.2
Lakes, Bays, and Rivers Surveyed for Staging Waterbirds during Spring and Fall Migration, Mine Study Area, 2004 and 2005

Preliminary Data Only
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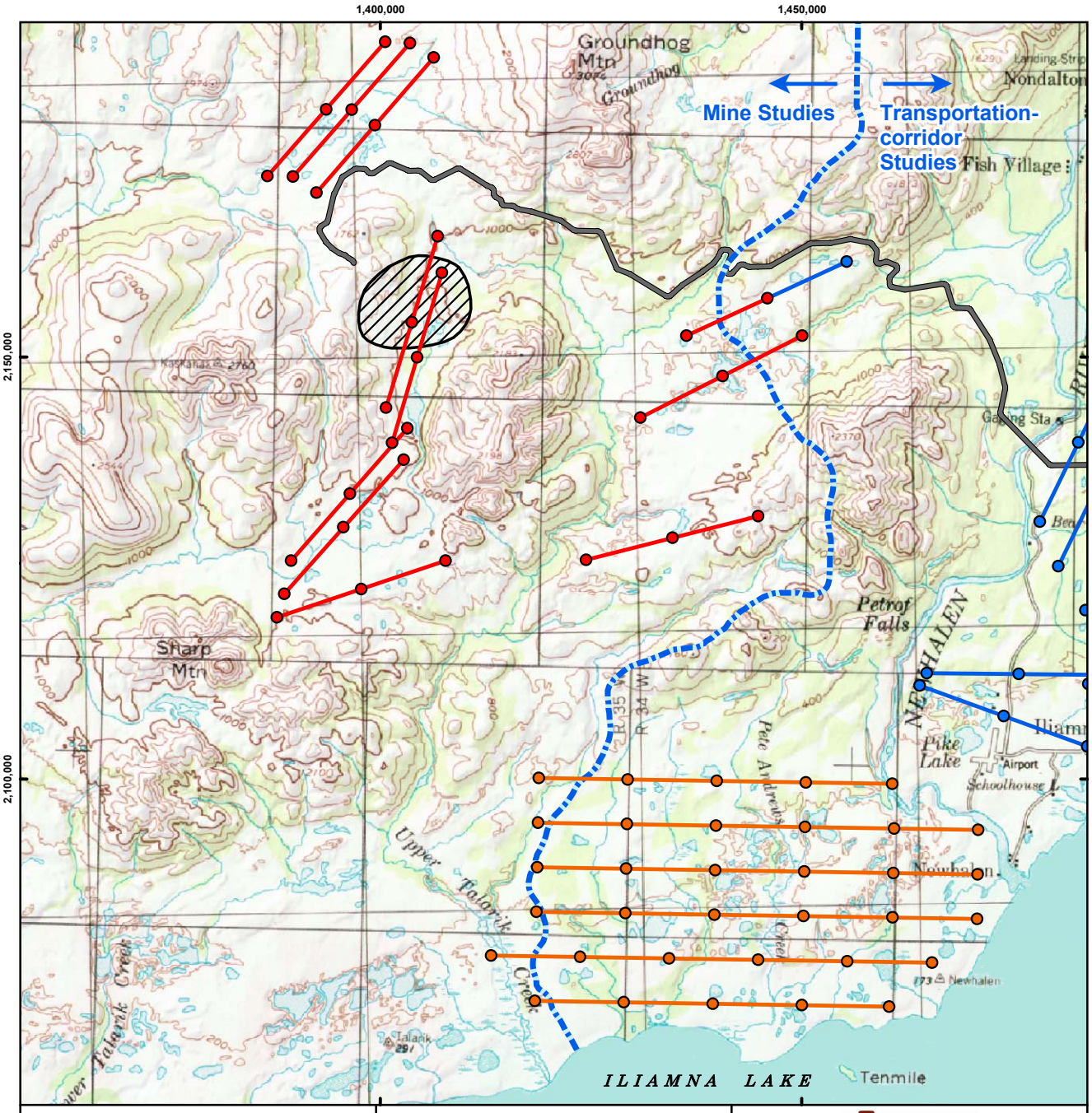

Miles 0 1 2 3 4 5

Kilometers 0 2 4 6 8

Scale 1:225,000

N

Alaska State Plane Zone 5 (units feet)
1983 North American Datum

Legend

Breeding Pair Transect

- 3.2 km — Mine Study Area, 2004 and 2005
- 3.2 km — Transportation-corridor Study Area, 2004 and 2005
- 3.2 km — Transportation-corridor Study Area, 2005 only

- General Deposit Location
- Possible Road Alignment

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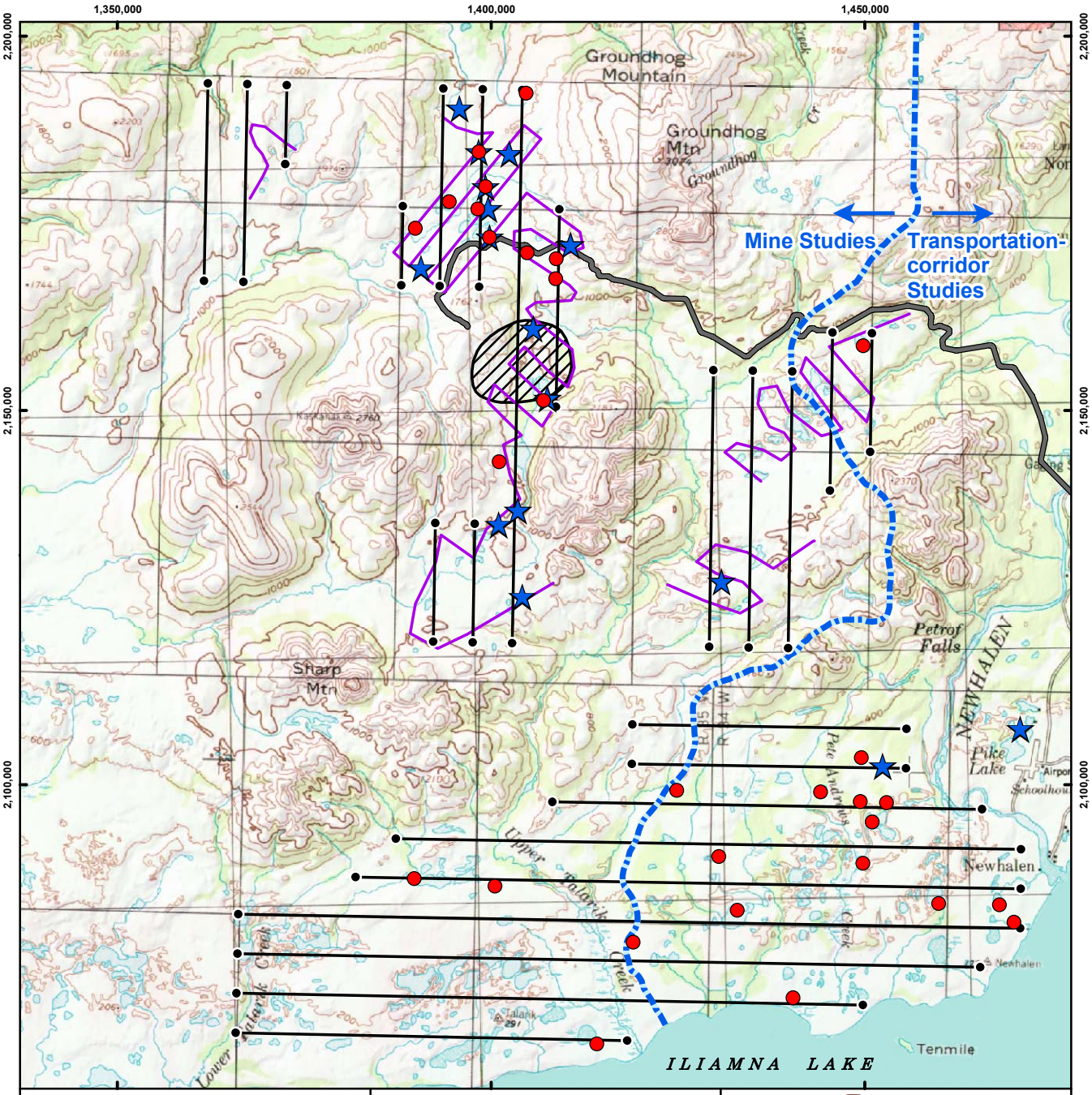
Figure N-3.3
Transects for Waterfowl Breeding-population Survey, Mine Study Area, 2004 and 2005

Preliminary Data Only
Do Not Cite or Quote



Miles 0 1 2 3 4 5
Kilometers 0 2 4 6 8
Scale1:250,000
Alaska State Plane Zone 5 (units feet)
1983 North American Datum

N

Legend

- 2004 Nest
- 2005 Nest
- 2004 Survey Transect
- 2005 Survey Transect
- General Deposit Location
- Possible Road Alignment

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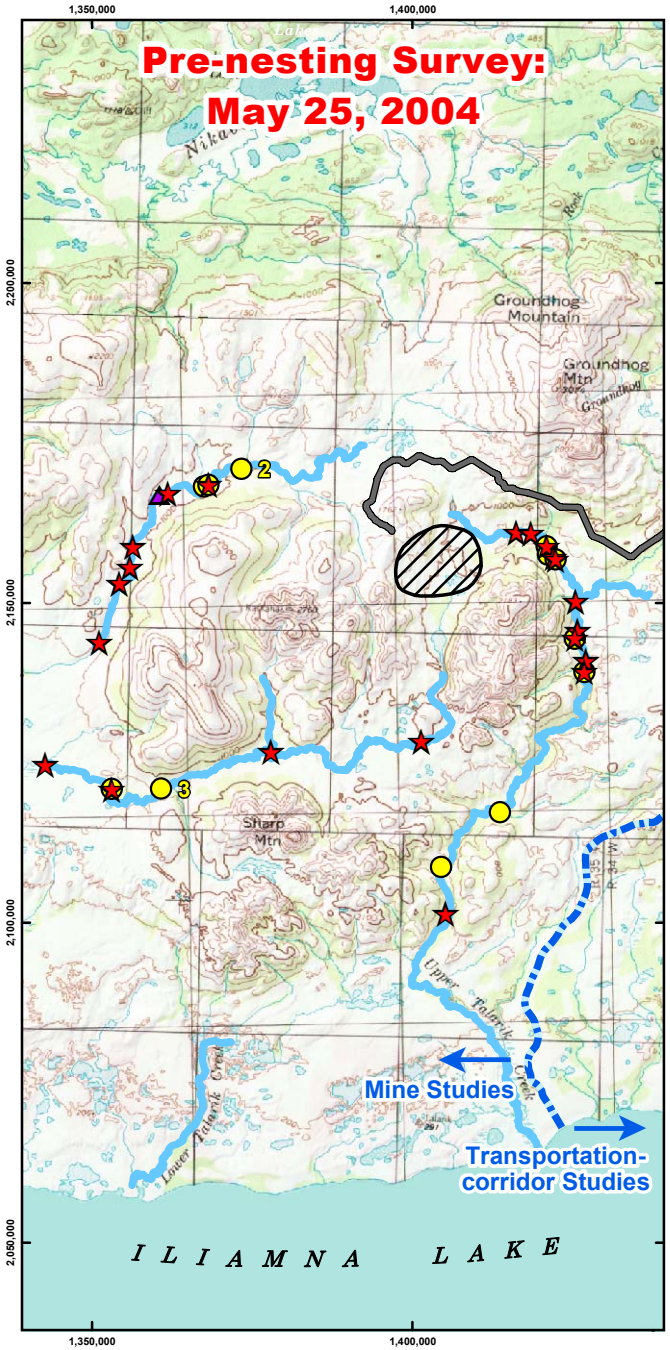
Figure N-3.4
Swan Nesting Locations, Mine Study Area, 2004 and 2005

Preliminary Data Only
Do Not Cite or Quote



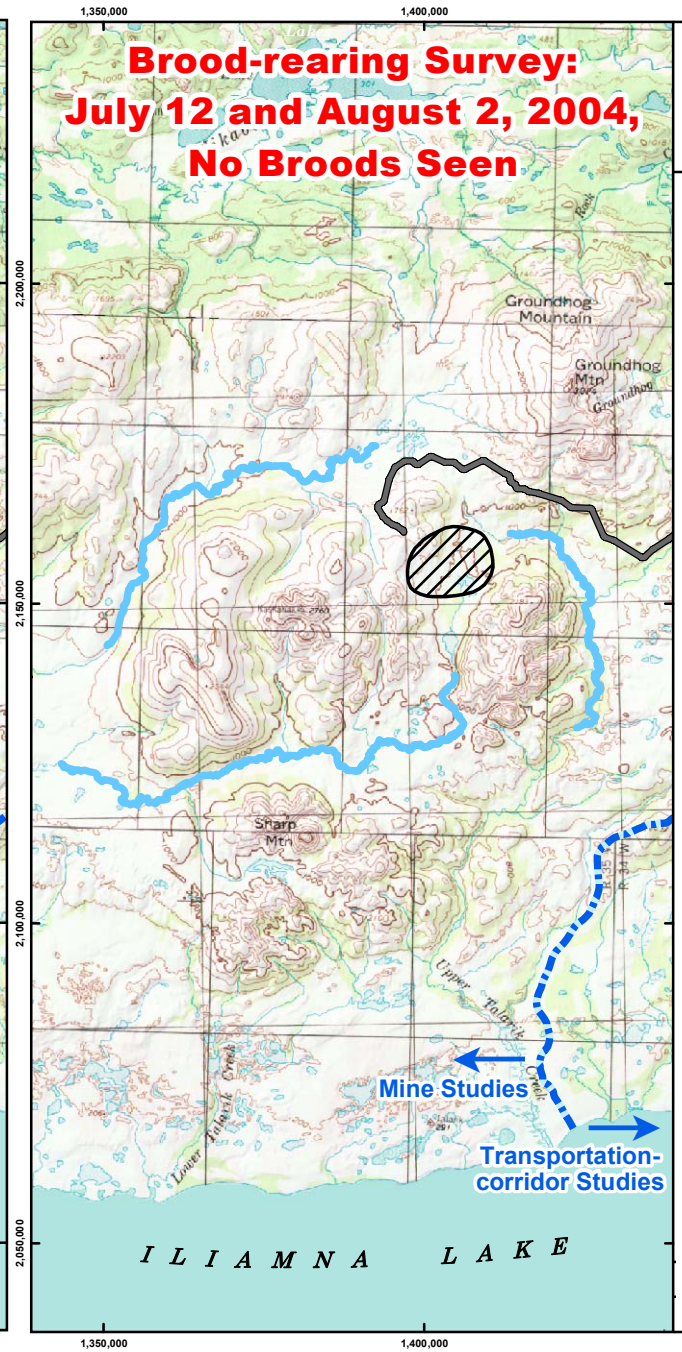


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Figure N-3.5
Harlequin Duck
Pre-nesting Locations and Brood-rearing Survey Areas, Mine Study Area, 2004

Preliminary Data Only
Do Not Cite or Quote

Legend

- Pairs
- Males (# birds >1)
- Female
- Survey Stream
- General Deposit Location
- Possible Road Alignment

Miles: 0 1 2 3 4 5 6 7 8
Kilometers: 0 2 4 6 8 10 12
Scale 1:360,000
N

Alaska State Plane Zone 5 (units feet)
1983 North American Datum

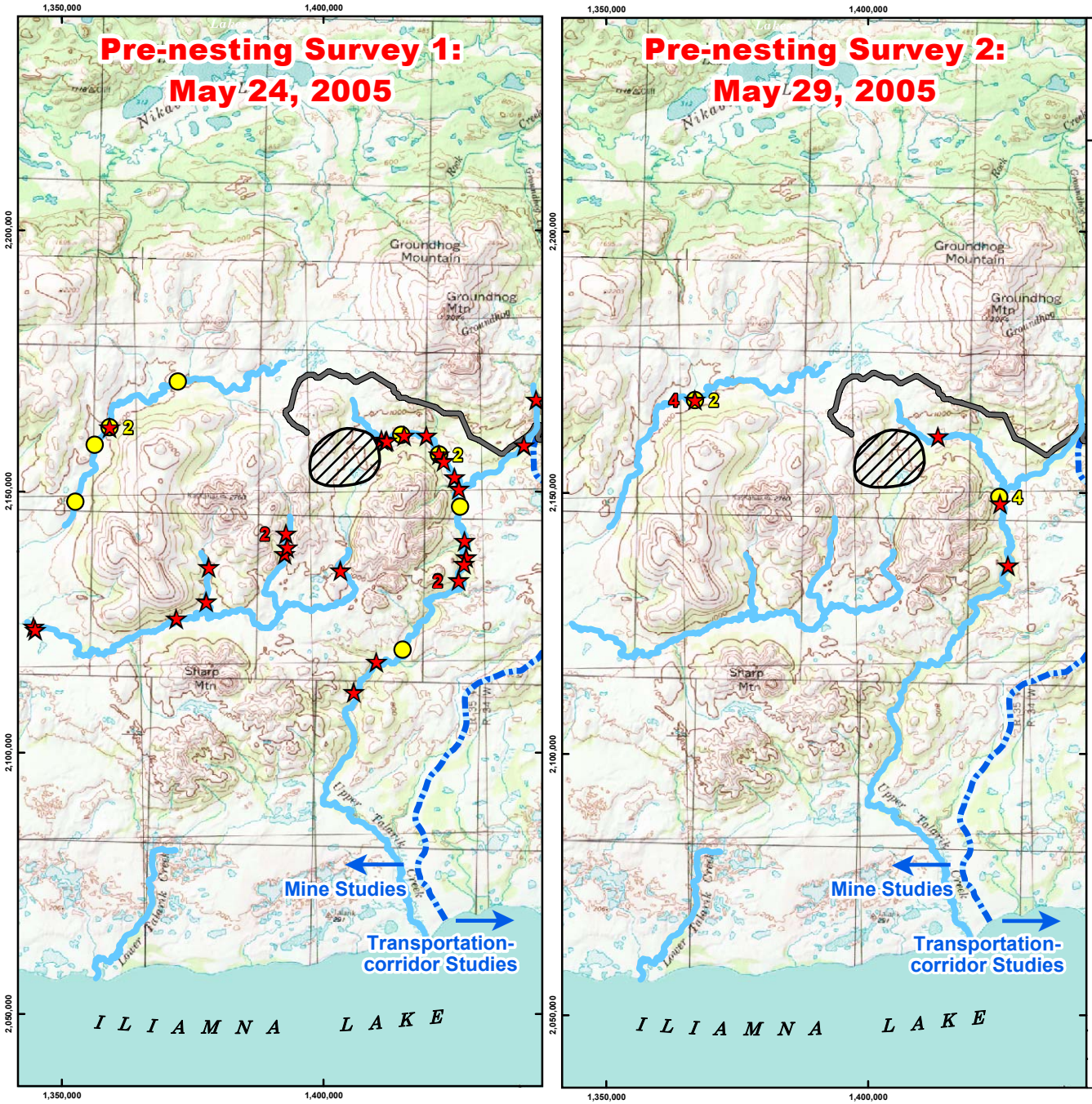

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Figure N-3.6
Harlequin Duck
Pre-nesting Locations,
Mine Study Area, 2005

Preliminary Data Only
Do Not Cite or Quote

Legend

- Pairs (# pairs >1)
- Males (# birds >1)
- Survey Stream
- General Deposit Location
- Possible Road Alignment

Miles 0 1 2 3 4 5 6 7 8
Kilometers 0 2 4 6 8 10 12
N

Scale 1:360,000

Alaska State Plane Zone 5 (units feet)
1983 North American Datum

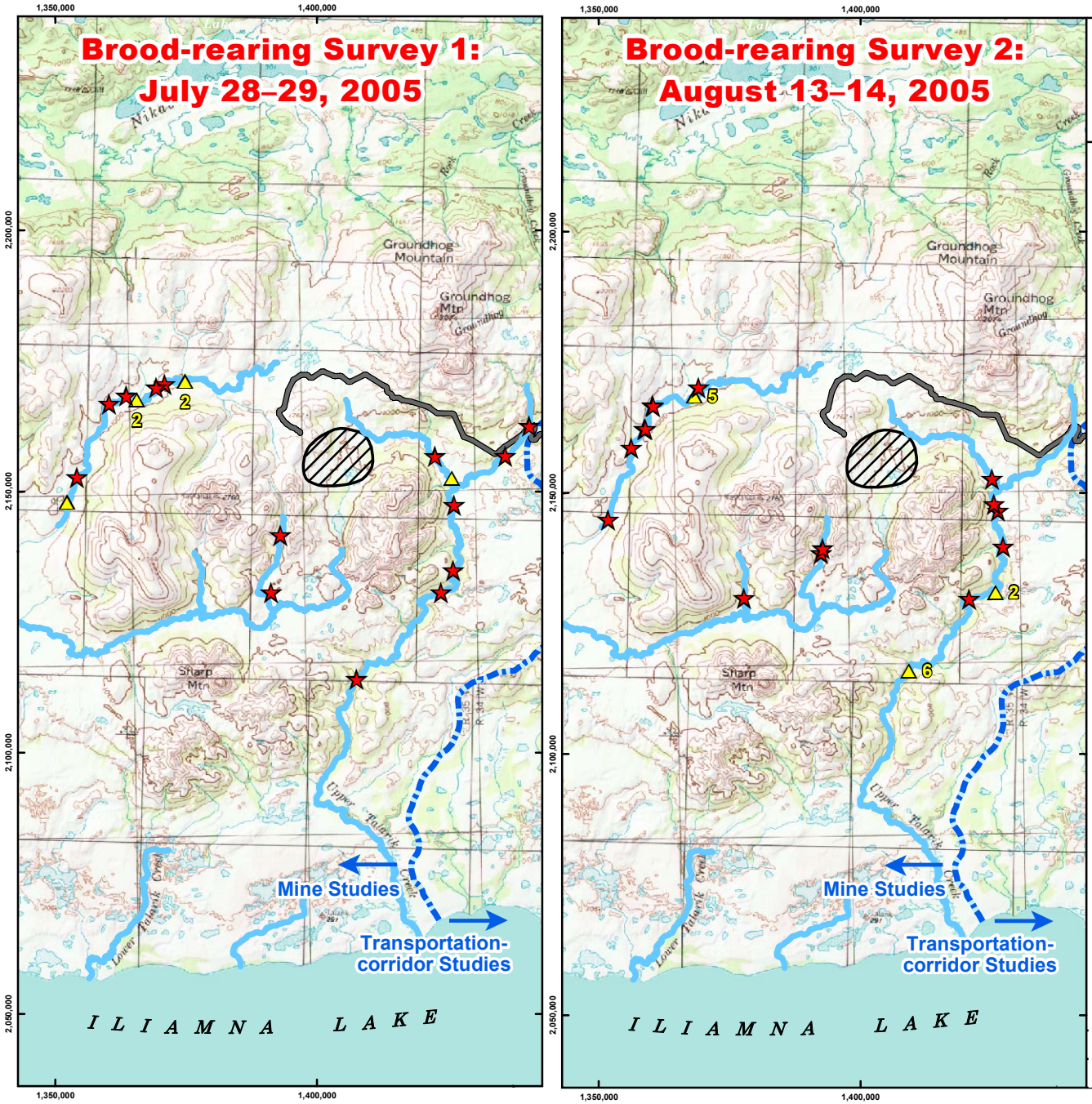

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Figure N-3.7
Harlequin Duck Brood-rearing Locations, Mine Study Area, 2005

Preliminary Data Only
Do Not Cite or Quote

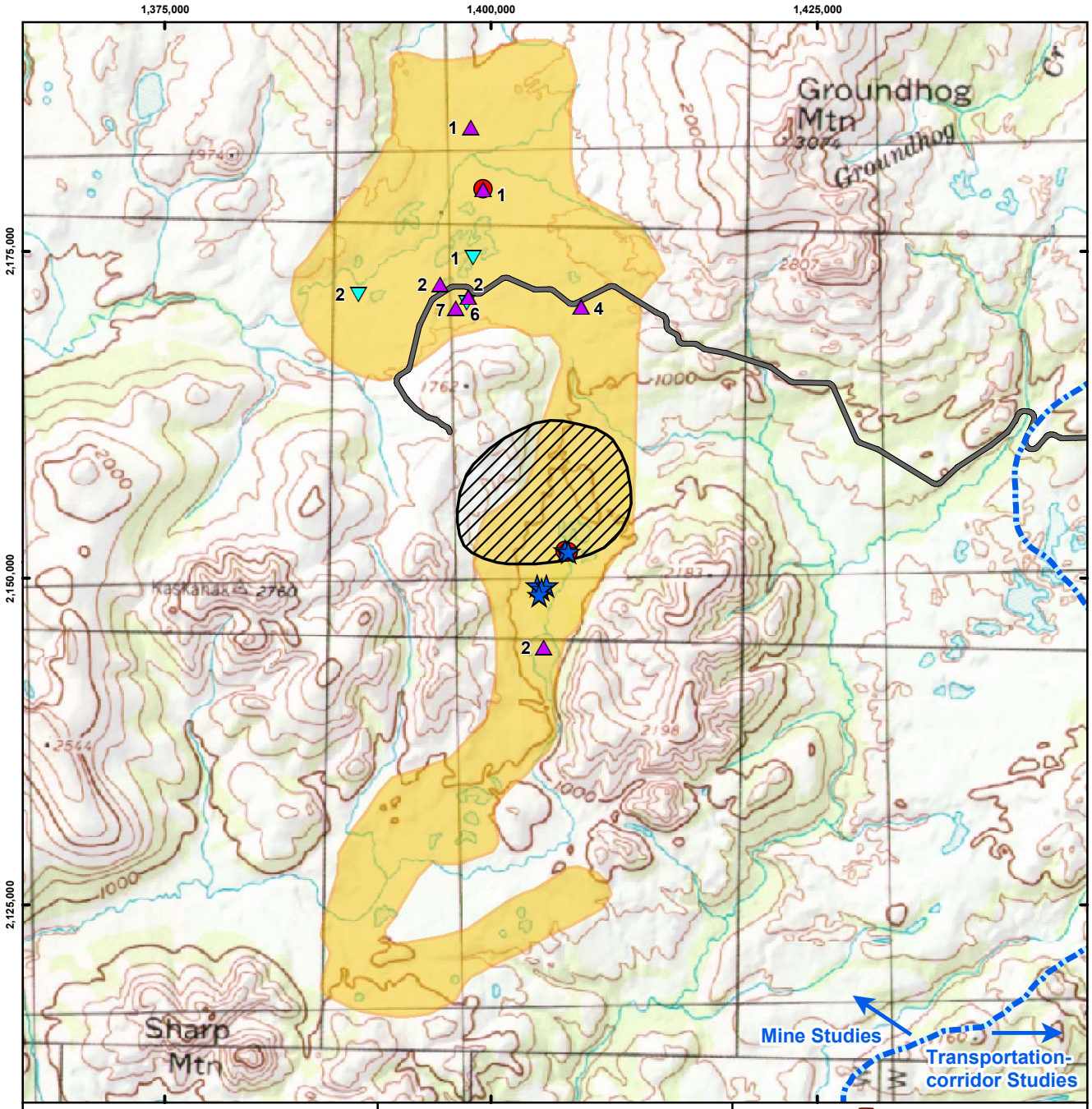
Legend

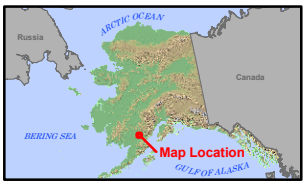
- Brood
- Females (# birds >1)
- Survey Stream
- General Deposit Location
- Possible Road Alignment

Miles: 0 1 2 3 4 5 6 7 8
Kilometers: 0 2 4 6 8 10 12
N

Scale 1:360,000

Alaska State Plane Zone 5 (units feet)
1983 North American Datum





Miles 0 1 2 3

Kilometers 0 1 2 3 4 5

Scale1:145,000

N

Alaska State Plane Zone 5 (units feet)
1983 North American Datum

Legend

- Mew Gull Nest
- Mew Gull Brood
- Mew Gull Adults (# of birds)
- Bonaparte's Gull Adults (# of birds)
- Gull Survey Area
- General Deposit Location
- Possible Road Alignment

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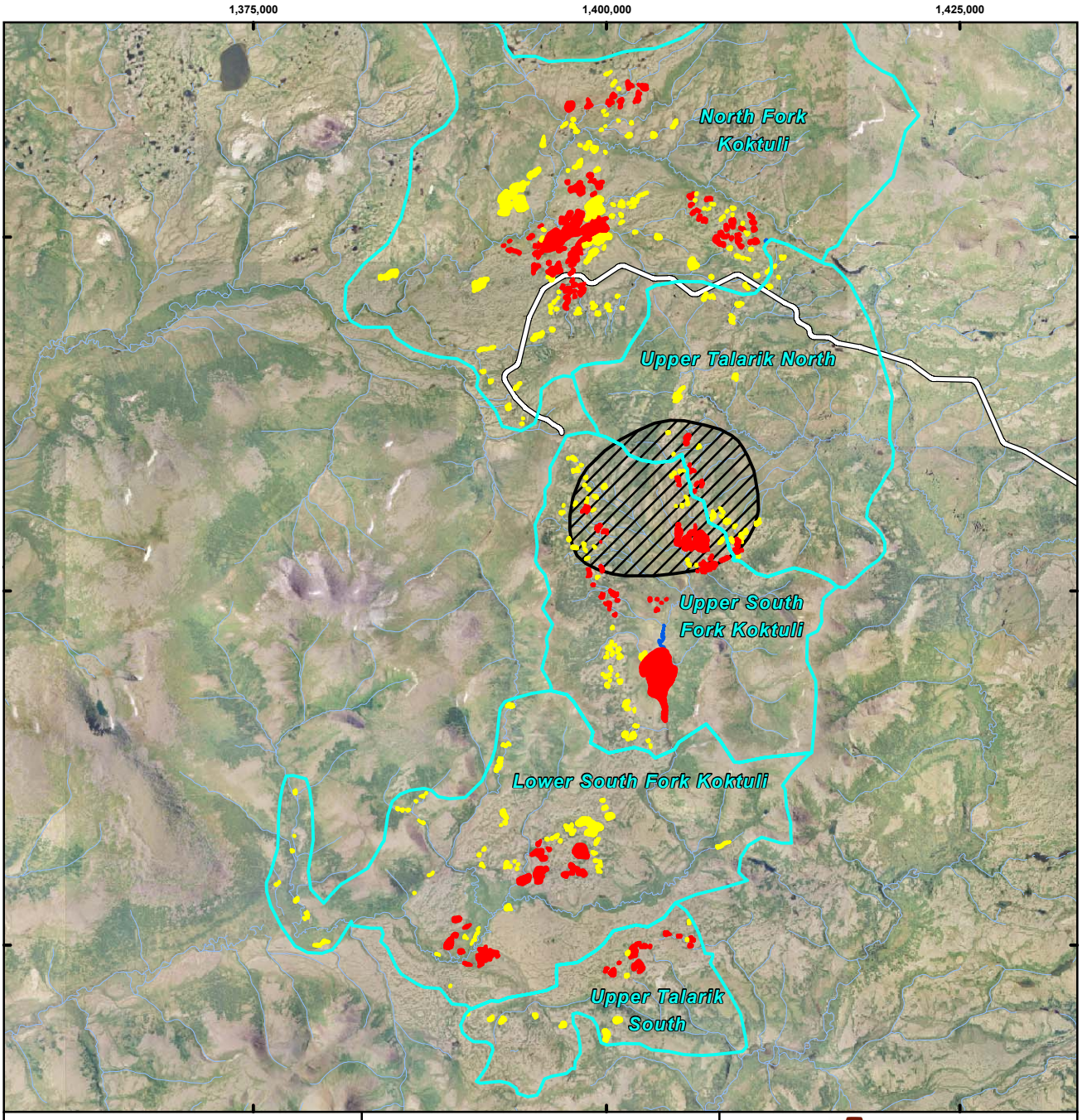
Figure N-3.8
Bonaparte's and Mew Gull Locations, Mine Study Area, 2005

Preliminary Data Only
Do Not Cite or Quote



N

Miles
0 1 2 3

Kilometers
0 1 2 3 4 5

Scale1:135,000

Alaska State Plane Zone 5 (units feet)
1983 North American Datum

Background imagery is a resampled eight foot pixel image of all Eagle orthophotography for the Pebble mine area based on July 2004 photography. Image credit: Kodiak Mapping Inc., Eagle Mapping Ltd., Resource Data, Inc.

Legend

- Suryeved 2004
- Suryeved 2005
- Suryeved Both Years
- Drainage Basin Survey Area
- General Deposit Location
- Possible Road Alignment

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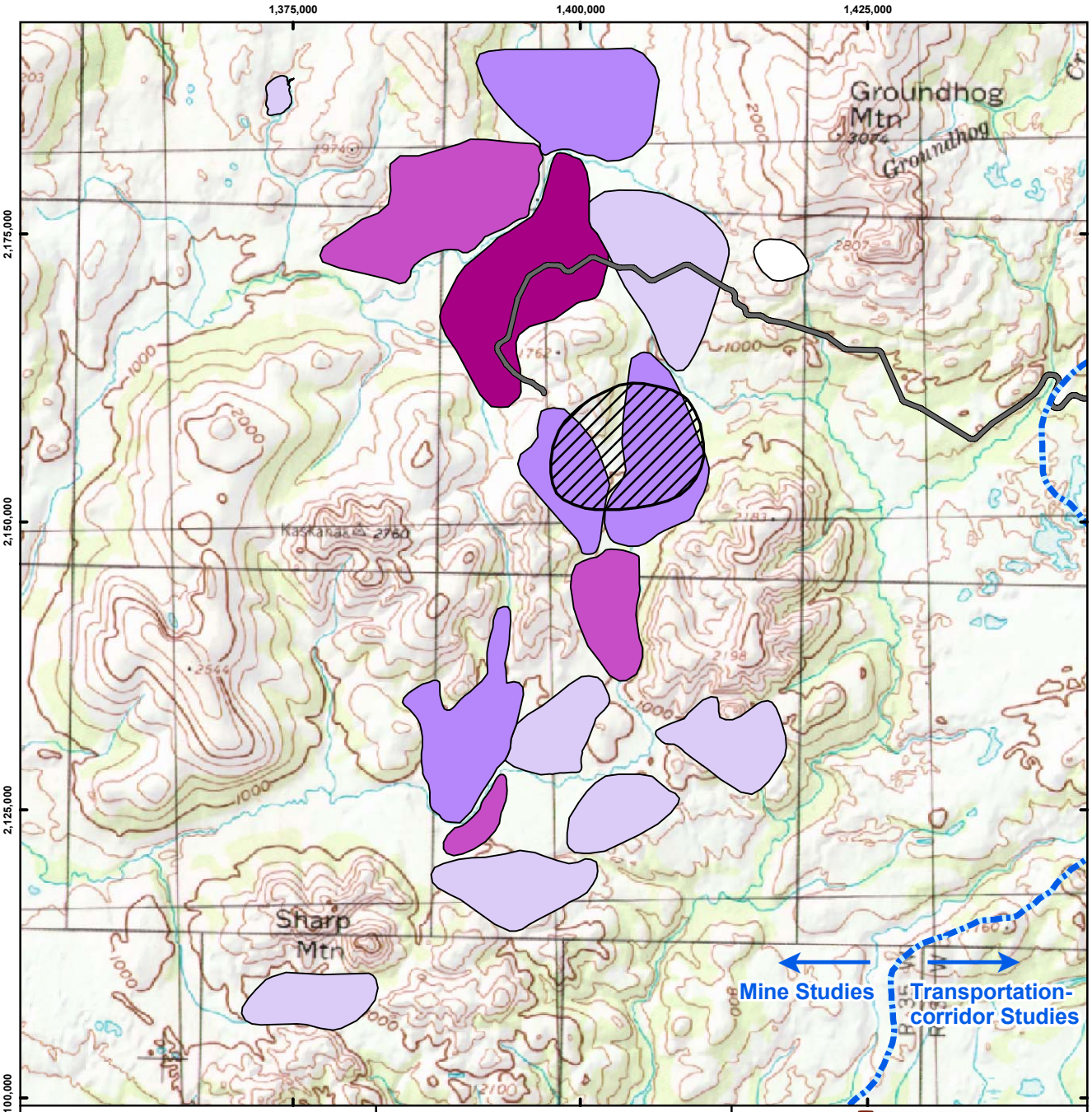
Figure N-3.9
Lakes Surveyed for Brood-rearing Waterbirds, Mine Study Area, 2004 and 2005

Preliminary Data Only
Do Not Cite or Quote



Miles 0 1 2 3

Kilometers 0 1 2 3 4 5

Scale1:165,000

Alaska State Plane Zone 5 (units feet)
1983 North American Datum

N

Legend

Maximal Number of Birds

- 0
- 1 – 25
- 26 – 50
- 51 – 100
- 101 – 150

General Deposit Location

Possible Road Alignment

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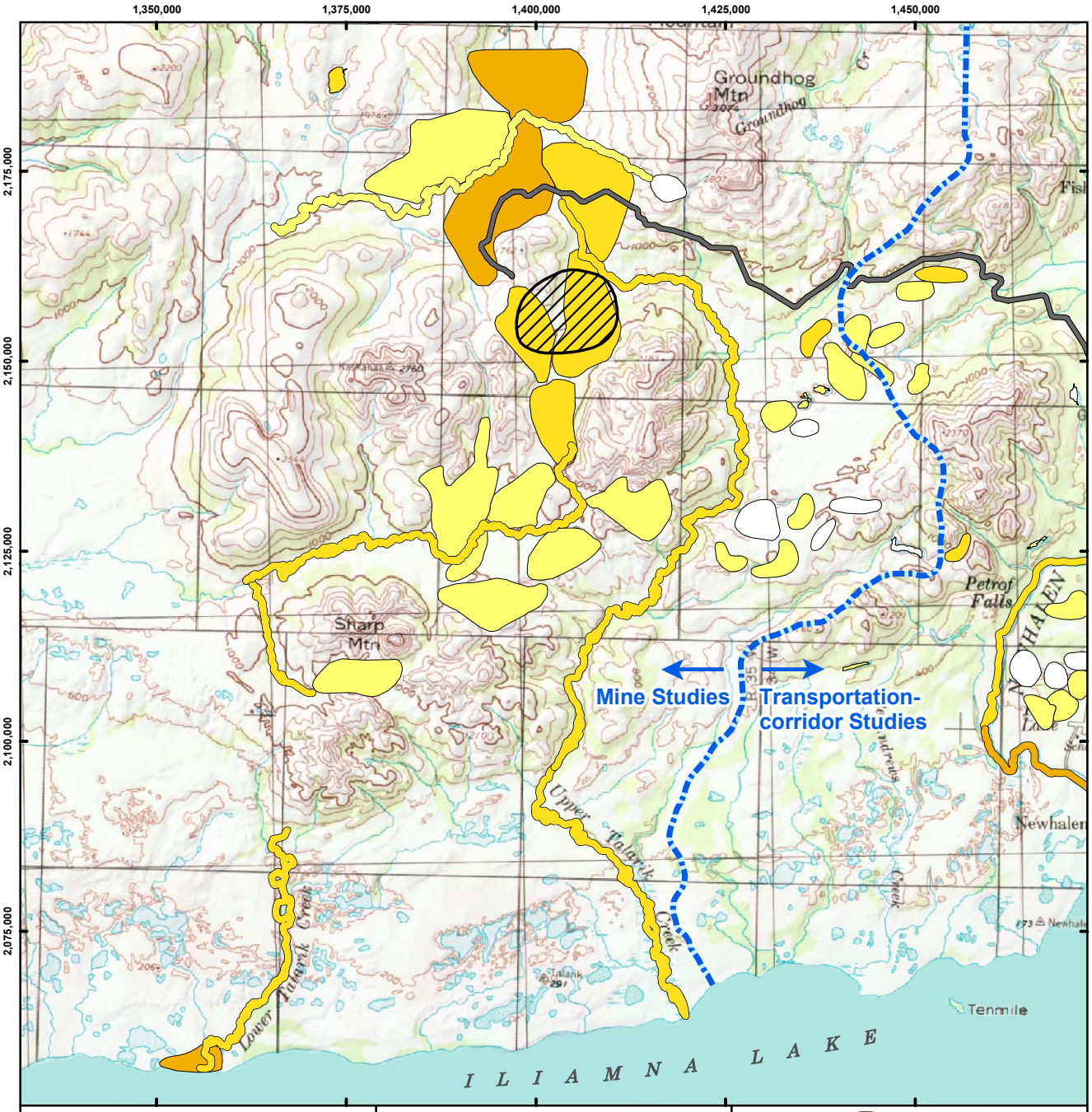
Figure N-3.10
Distribution and Abundance (Maximal Number) of Molting Waterbirds, Mine Study Area, 2005

Preliminary Data Only
Do Not Cite or Quote



Miles
0 1 2 3 4

Kilometers
0 1 2 3 4 5 6 7 8

Scale1:250,000

Alaska State Plane Zone 5 (units feet)
1983 North American Datum

N

Legend

Maximal Number of Birds

- 0
- 1 – 25
- 26 – 100
- 101 – 250

General Deposit Location

Possible Road Alignment

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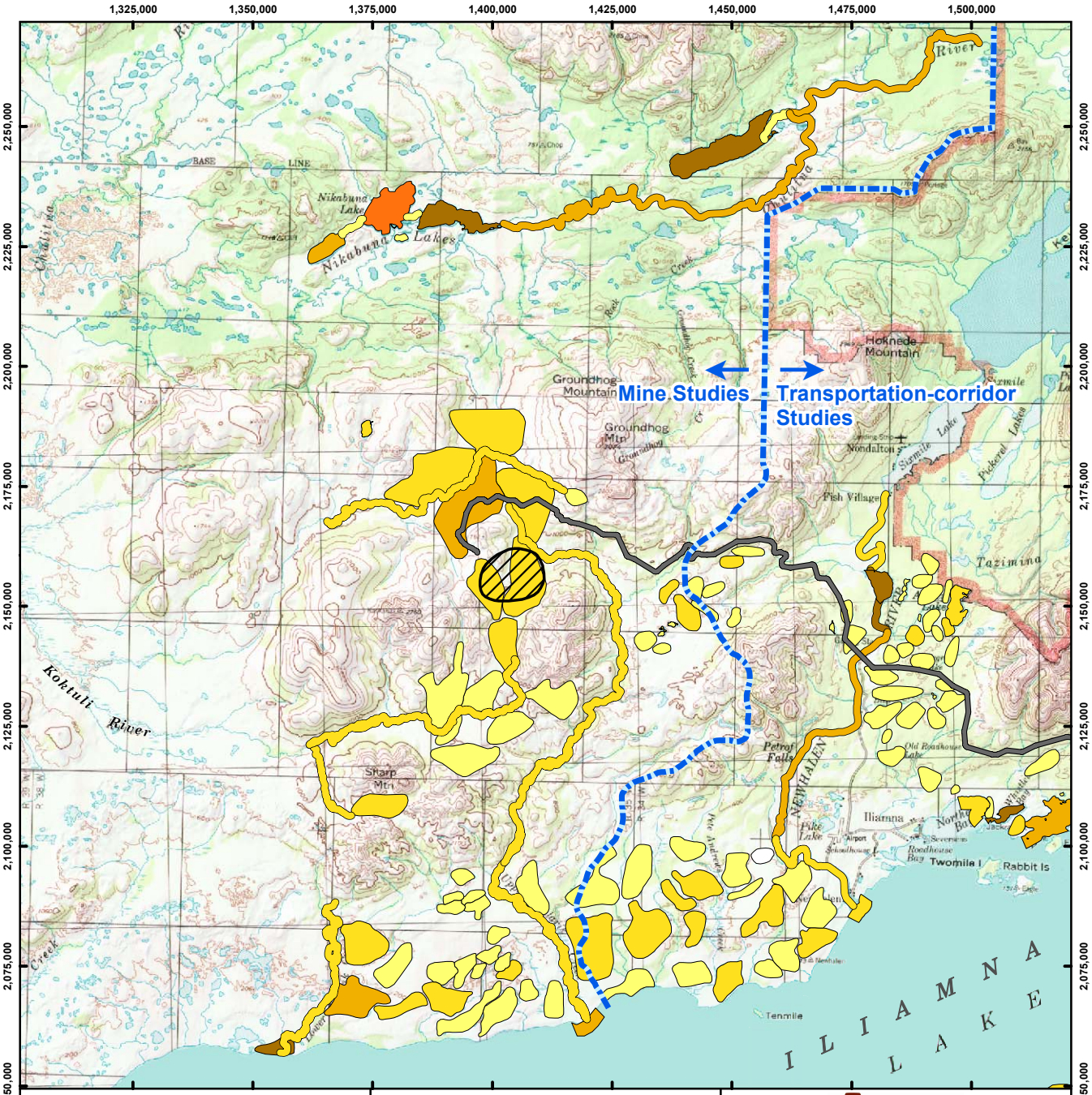
Figure N-3.11
Distribution and Abundance (Maximal Number) of Staging Waterbirds during Spring Migration, Mine Study Area, 2004

Preliminary Data Only
Do Not Cite or Quote



Miles 0 2 4 6 8

Kilometers 0 2 4 6 8 10 12

Scale 1:390,000

N

Alaska State Plane Zone 5 (units feet)
1983 North American Datum

Legend

Maximal Number of Birds

- 0
- 1 – 25
- 26 – 100
- 101 – 250
- 251 – 500
- 501 – 1000

General Deposit Location

Possible Road Alignment

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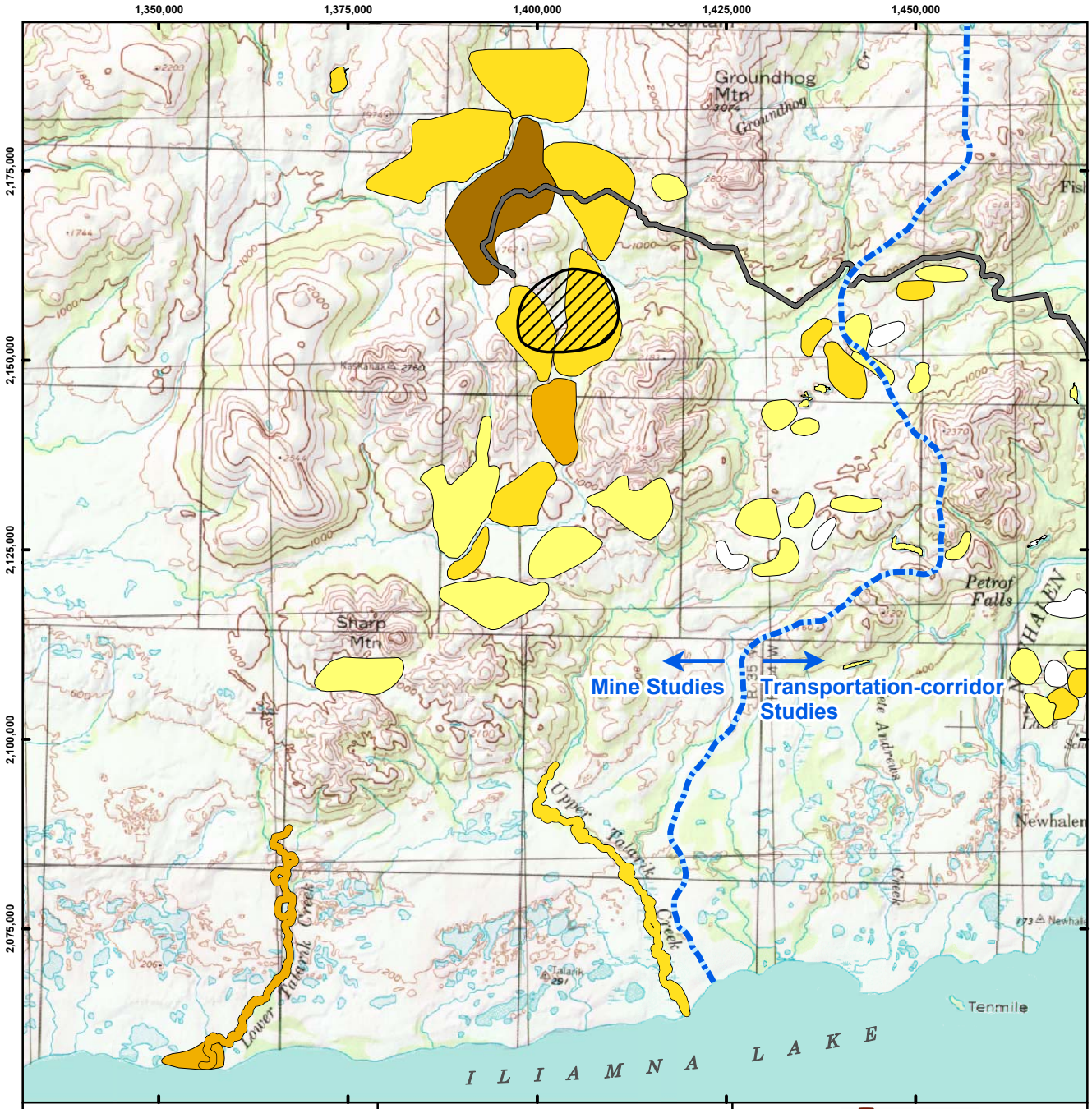
Figure N-3.12
Distribution and Abundance (Maximal Number) of Staging Waterbirds during Spring Migration, Mine Study Area, 2005

Preliminary Data Only
Do Not Cite or Quote



Miles 0 1 2 3 4 5

Kilometers 0 1 2 3 4 5 6 7 8

Scale 1:250,000

Alaska State Plane Zone 5 (units feet)
1983 North American Datum

N

Legend

Maximal Number of Birds

- 0
- 1 – 25
- 26 – 100
- 101 – 250
- 251 – 500

General Deposit Location

Possible Road Alignment

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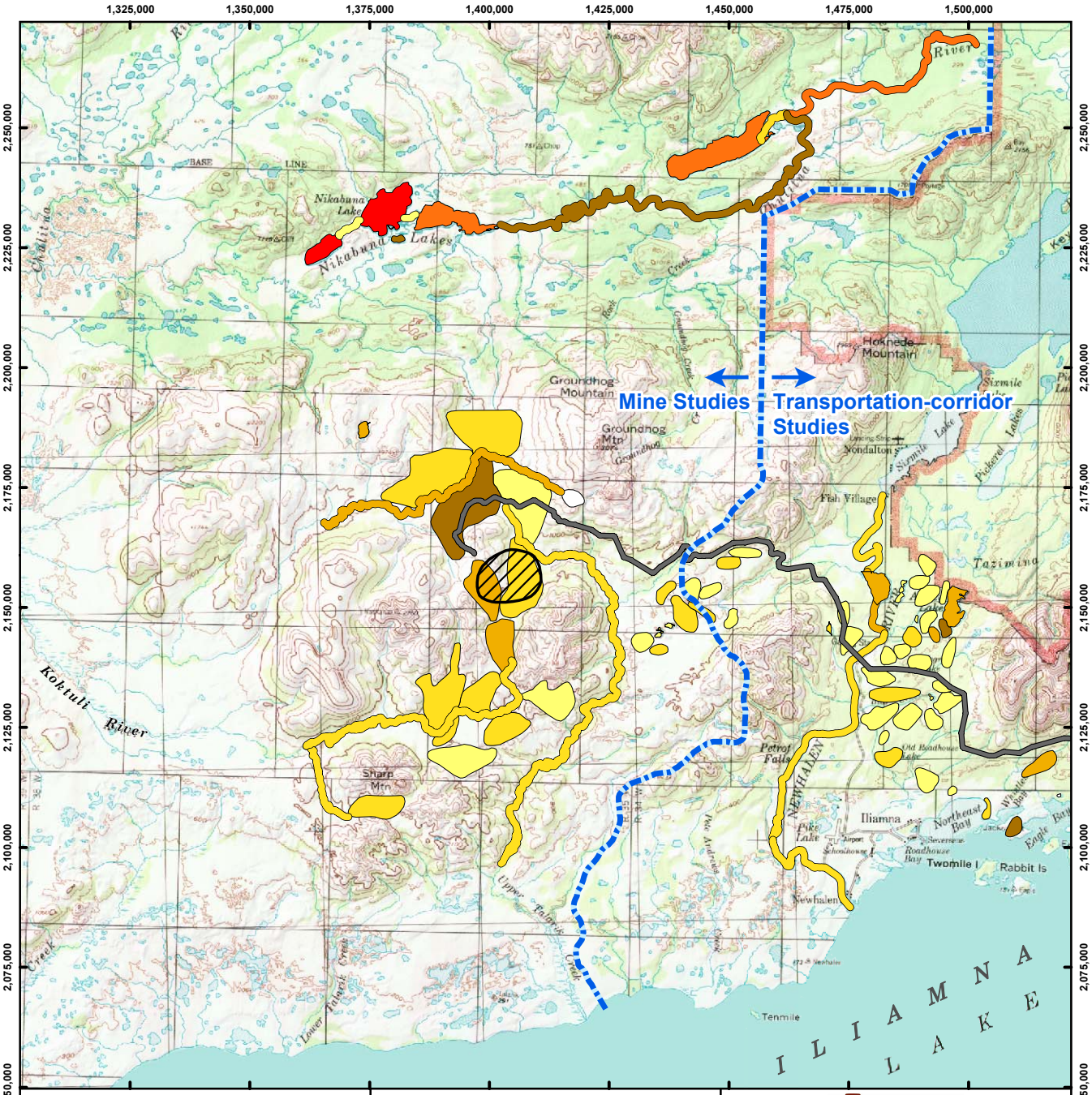
Figure N-3.13
Distribution and Abundance (Maximal Number) of Staging Waterbirds during Fall Migration, Mine Study Area, 2004

Preliminary Data Only
Do Not Cite or Quote



Miles 0 2 4 6 8

Kilometers 0 2 4 6 8 10 12

Scale 1:390,000

Alaska State Plane Zone 5 (units feet)
1983 North American Datum

N

Legend

Maximal Number of Birds

- 0
- 1 – 25
- 26 – 100
- 101 – 250
- 251 – 500
- 501 – 1000
- 1001 – 2000

General Deposit Location

Possible Road Alignment

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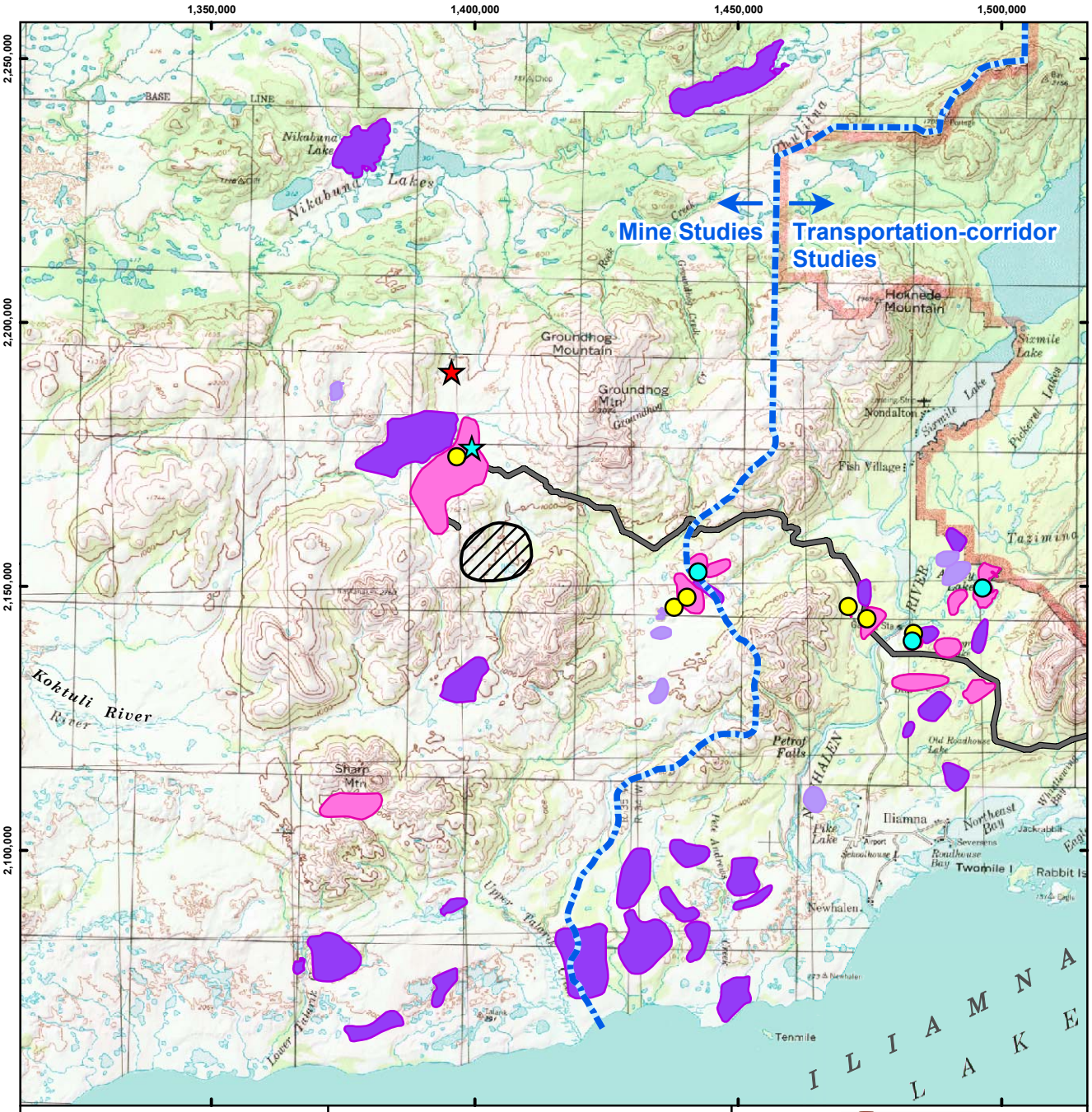
Figure N-3.14
Distribution and Abundance (Maximal Number) of Staging Waterbirds during Fall Migration, Mine Study Area, 2005

Preliminary Data Only
Do Not Cite or Quote



Miles 0 2 4 6 8

Kilometers 0 2 4 6 8 10 12

Scale1:360,000

N

Alaska State Plane Zone 5 (units feet)
1983 North American Datum

Legend

Loon Nest or Brood

- Pacific Loon Nest, 2005
- Common Loon Nest, 2005
- Common Loon Brood, 2004
- Common Loon Brood, 2005

Lake Group with Adult Common Loons

- 2004
- 2005
- Both Years

- General Deposit Location
- Possible Road Alignment

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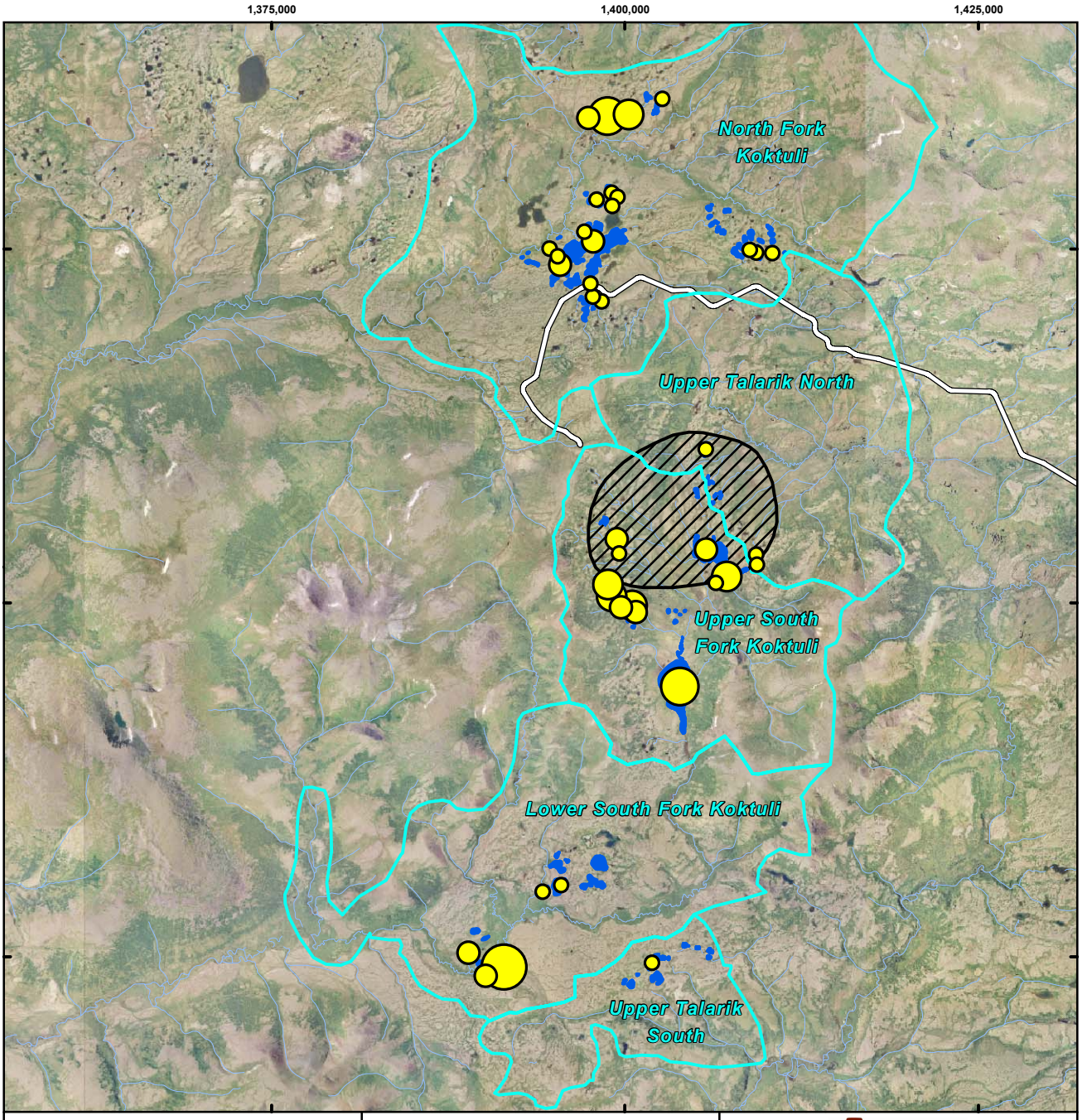
Figure N-4.15
Pacific and Common Loon Locations, Mine Study Area, 2004 and 2005

Preliminary Data Only
Do Not Cite or Quote



N

Miles
0 1 2 3

Kilometers
0 1 2 3 4 5

Scale 1:135,000

Alaska State Plane Zone 5 (units feet)
1983 North American Datum

Background imagery is a resampled eight foot pixel image of all Eagle orthophotography for the Pebble mine area based on July 2004 photography. Image credit: Kodiak Mapping Inc., Eagle Mapping Ltd., Resource Data, Inc.

Legend

Number of Broods

1 2 3 4 6

Brood Survey Lake

Drainage Basin Survey Area

General Deposit Location

Possible Road Alignment

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Figure N-4.16
Location and Number of Waterbird Broods, Mine Study Area, 2004

Preliminary Data Only
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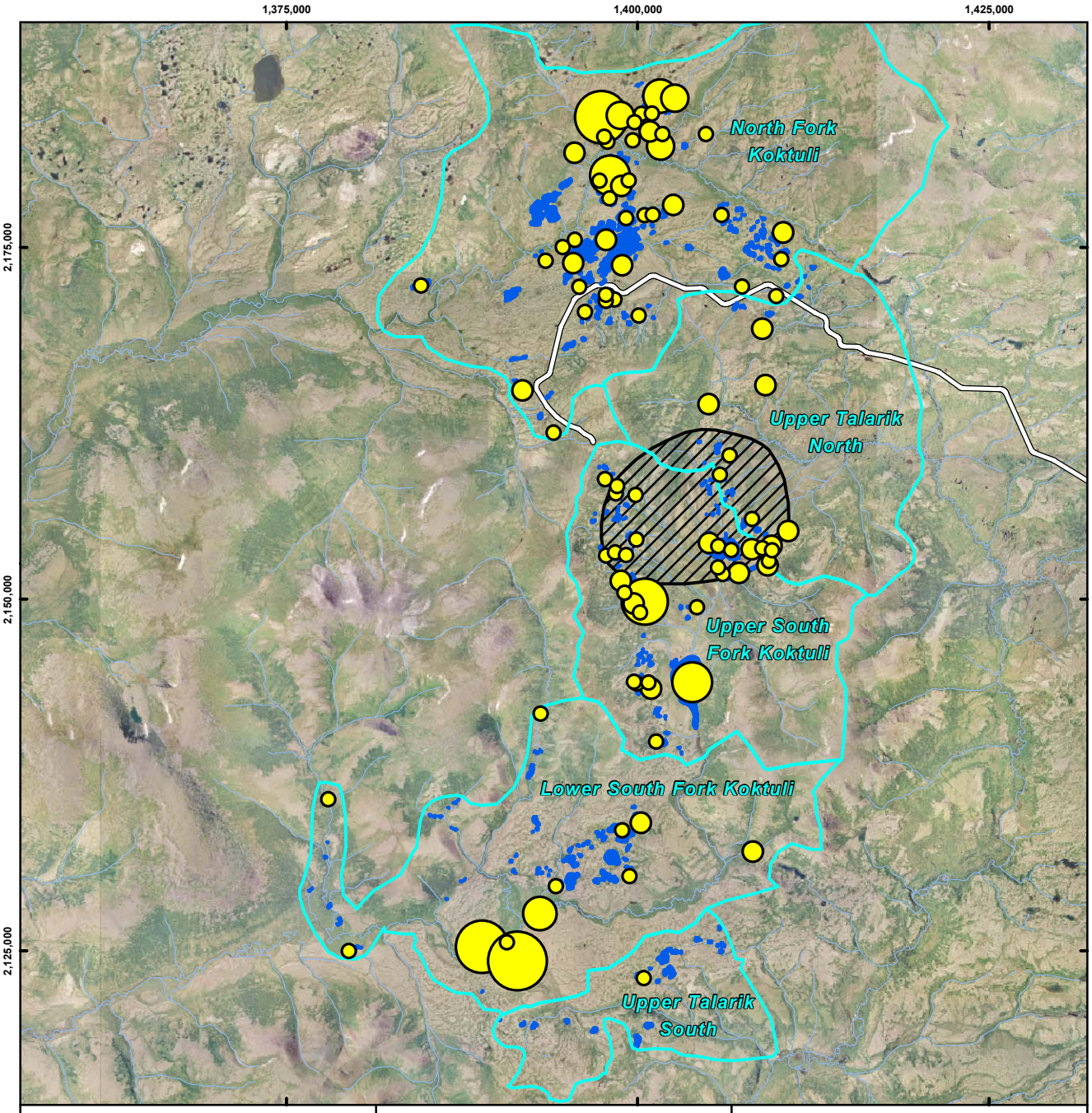

Scale 1:135,000

Alaska State Plane Zone 5 (units feet)
1983 North American Datum

Background imagery is a resampled eight foot pixel image of all Eagle orthophotography for the Pebble mine area based on July 2004 photography. Image credit: Kodiak Mapping Inc., Eagle Mapping Ltd., Resource Data, Inc.

Legend

Number of Broods

1 2 3 4 5

6 7 13

Brood Survey Lake

Drainage Basin Survey Area

General Deposit Location

Possible Road Alignment

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Figure N-4.17
Location and Number of Waterbird Broods, Mine Study Area, 2005

Preliminary Data Only
Do Not Cite or Quote

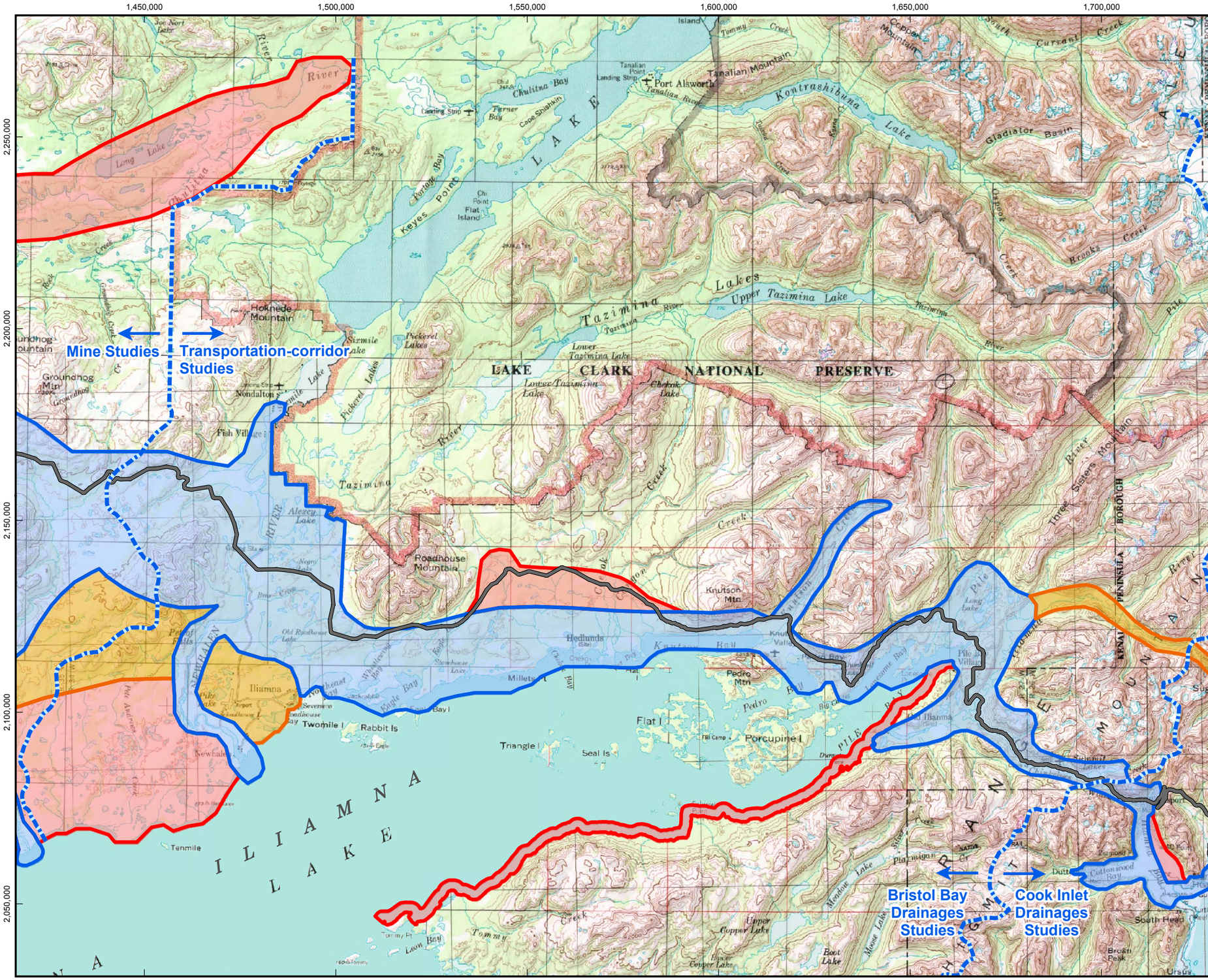

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Figure N-3.18
Survey Area for Breeding and Staging Waterbirds, Bristol Bay Drainages, Transportation-corridor Study Area, 2004 and 2005

Preliminary Data Only
Do Not Cite or Quote

Legend

- 2004 Study Area
- 2005 Study Area
- Study Area Both Years
- Possible Road Alignment

Miles: 0 2 4 6 8 10
Kilometers: 0 2 4 6 8 10 12 14
N
Scale 1:310,000

Alaska State Plane Zone 5 (units feet)
1983 North American Datum

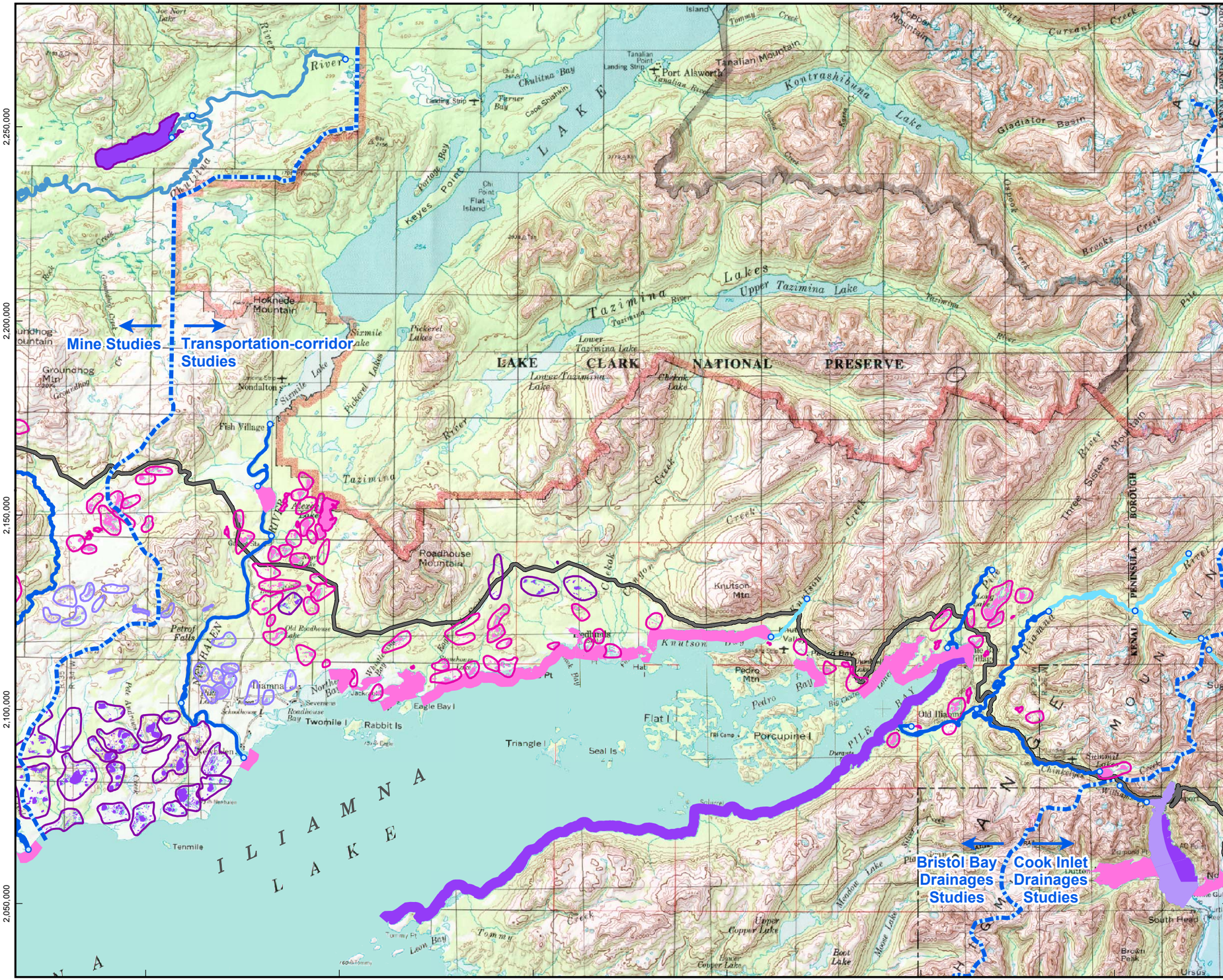

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Figure N-3.19
Lakes, Bays, and Rivers Surveyed for Staging Waterbirds during Spring and Fall Migration, Bristol Bay Drainages, Transportation-corridor Study Area, 2004 and 2005

Preliminary Data Only
Do Not Cite or Quote

Legend

Year Surveyed

Lake Group	Lake and Bay	River Segment
2004	2004	2004
2005	2005	2005
Both Years	Both Years	Both Years
		Segment Endpoint

Possible Road Alignment

Scale 1:310,000

Alaska State Plane Zone 5 (units feet)
1983 North American Datum

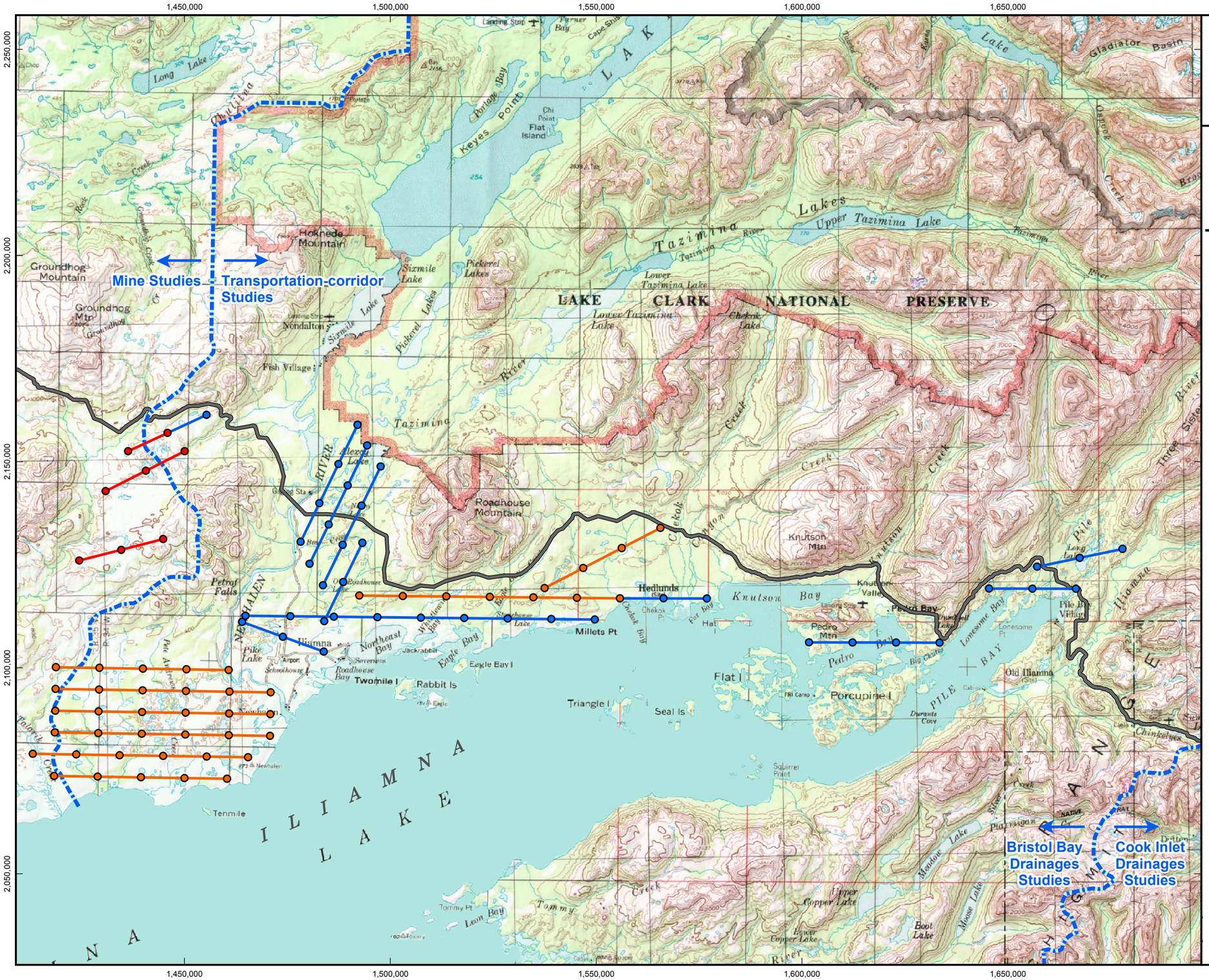

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Figure N-3.20
Transects for Waterfowl Breeding-population Survey, Bristol Bay Drainages, Transportation-corridor Study Area, 2004 and 2005

Preliminary Data Only
Do Not Cite or Quote

Legend

Breeding Pair Transect

- 3.2 km — Transportation-corridor Study Area, 2004 and 2005
- 3.2 km — Transportation-corridor Study Area, 2005 only
- 3.2 km — Mine Study Area, 2004 and 2005

Possible Road Alignment

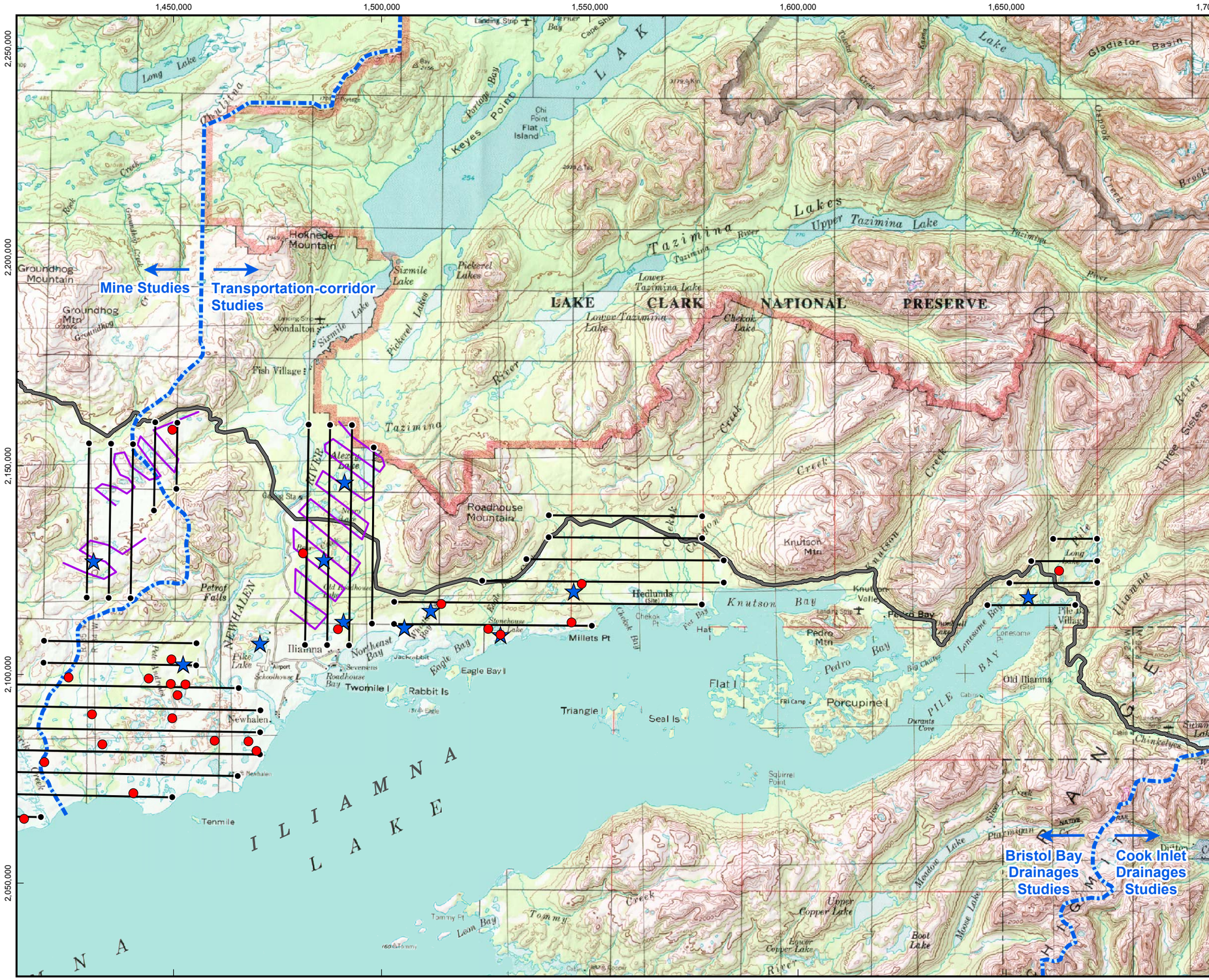

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Figure N-3.21
Swan Nesting Locations, Bristol Bay Drainages, Transportation-corridor Study Area, 2004 and 2005

Preliminary Data Only
Do Not Cite or Quote

Legend

- 2004 Nest
- 2005 Nest
- 2004 Survey Transect
- 2005 Survey Transect
- Possible Road Alignment

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Figure N-3.22
Harlequin Duck Pre-nesting Locations, Bristol Bay Drainages, Transportation-corridor Study Area, 2004

Preliminary Data Only
Do Not Cite or Quote

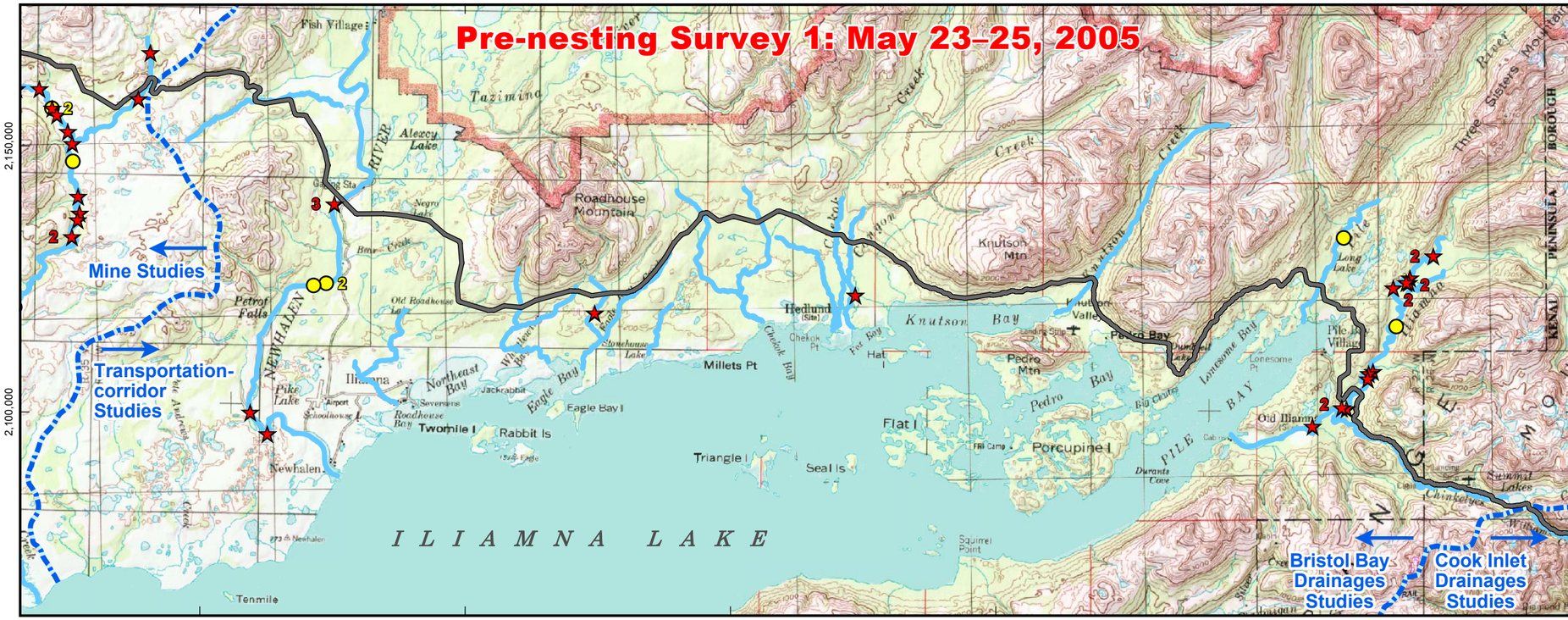
Legend

- Pairs (# pairs >1)
- Males (# birds >1)
- Female
- Survey Stream
- Possible Road Alignment

Miles: 0 2 4 6 8 10
Kilometers: 0 2 4 6 8 10 12 14
Scale 1:285,000

N

Alaska State Plane Zone 5 (units feet)
1983 North American Datum



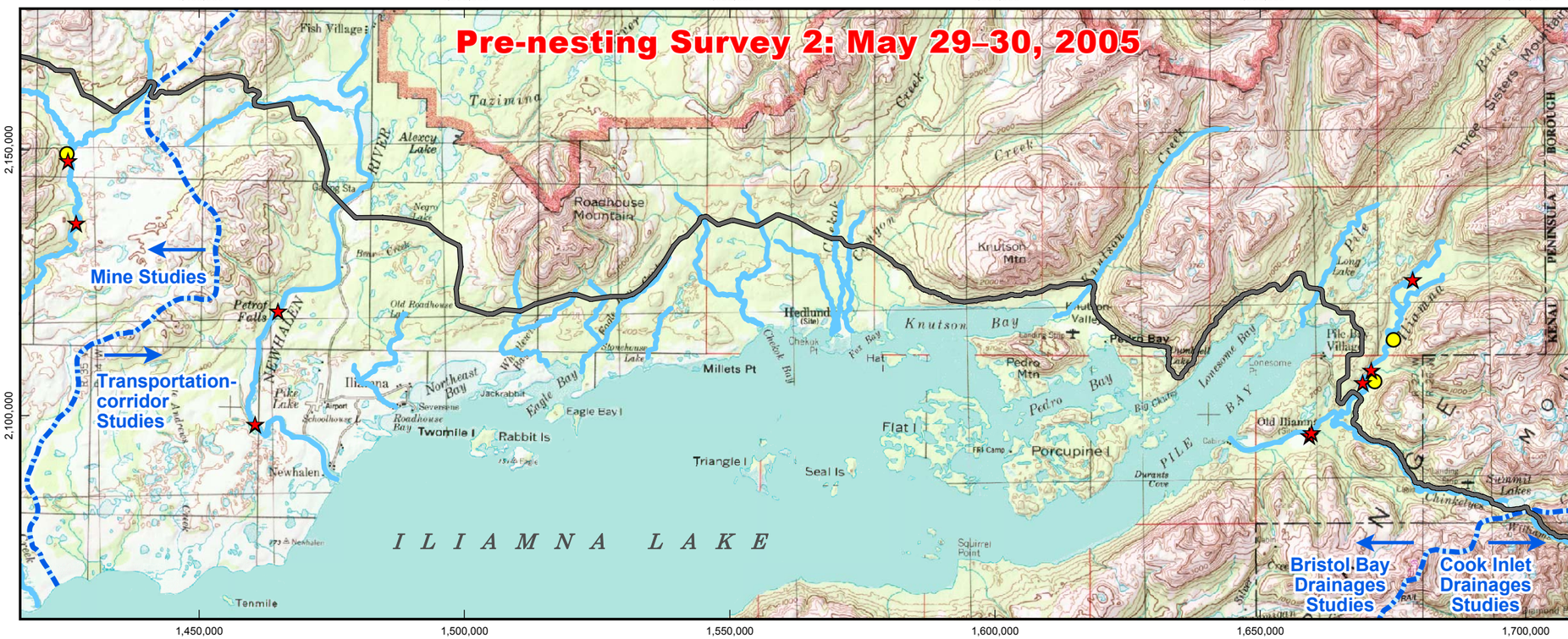


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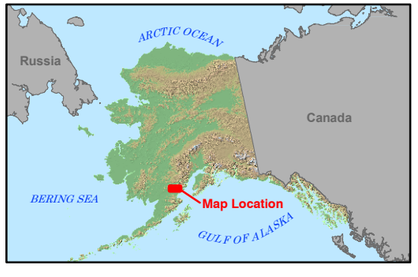
Figure N-3.23
Harlequin Duck
Pre-nesting Locations,
Bristol Bay Drainages,
Transportation-corridor Study Area,
2005

Preliminary Data Only
Do Not Cite or Quote

Legend

- Pairs (# pairs >1)
- Males (# birds >1)
- Survey Stream
- Possible Road Alignment



Miles: 0 2 4 6 8 10
Kilometers: 0 5 10 15
N

Scale 1:290,000

Alaska State Plane Zone 5 (units feet)
1983 North American Datum

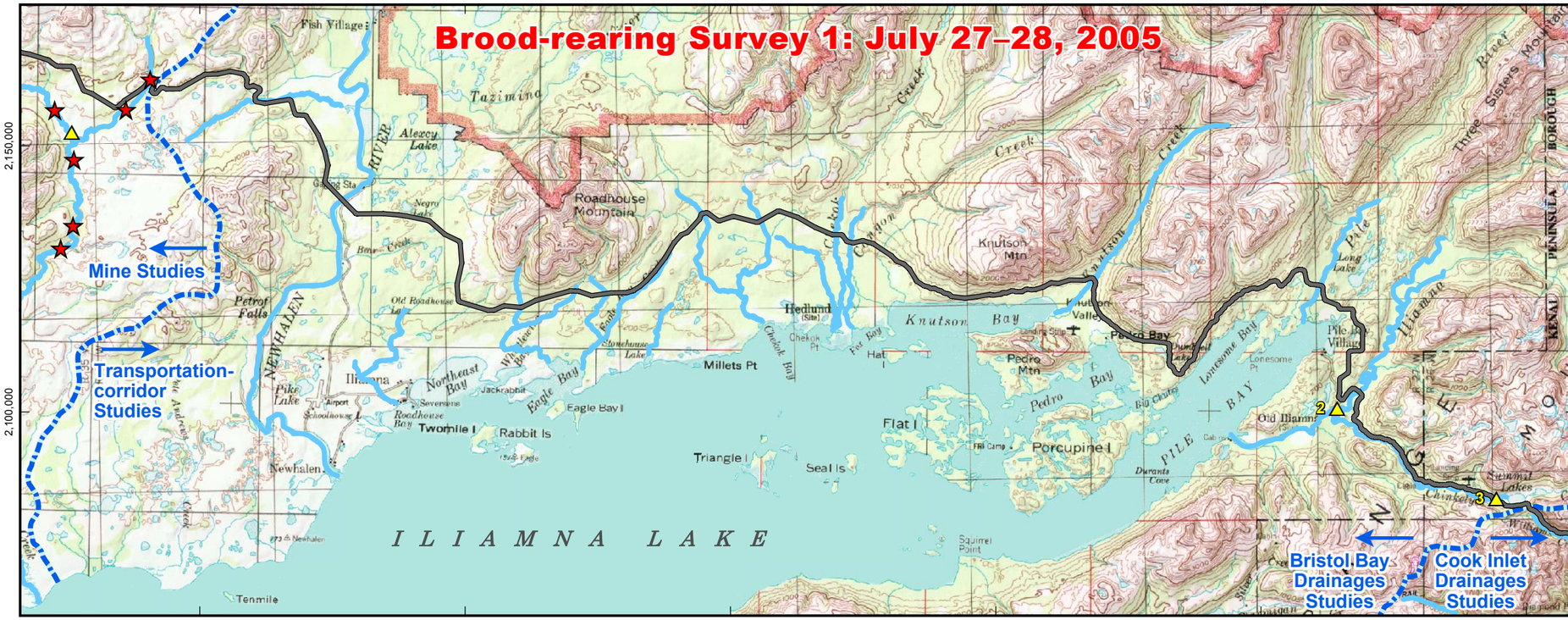


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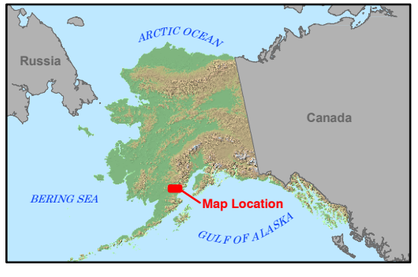
Figure N-3.24
Harlequin Duck
Brood-rearing Locations,
Bristol Bay Drainages,
Transportation-corridor Study Area,
2005

Preliminary Data Only
Do Not Cite or Quote

Legend

- Broods (# broods >1)
- Females (# birds >1)
- Survey Stream
- Possible Road Alignment



Miles: 0 2 4 6 8 10
Kilometers: 0 5 10 15
N

Scale 1:290,000
Alaska State Plane Zone 5 (units feet)
1983 North American Datum

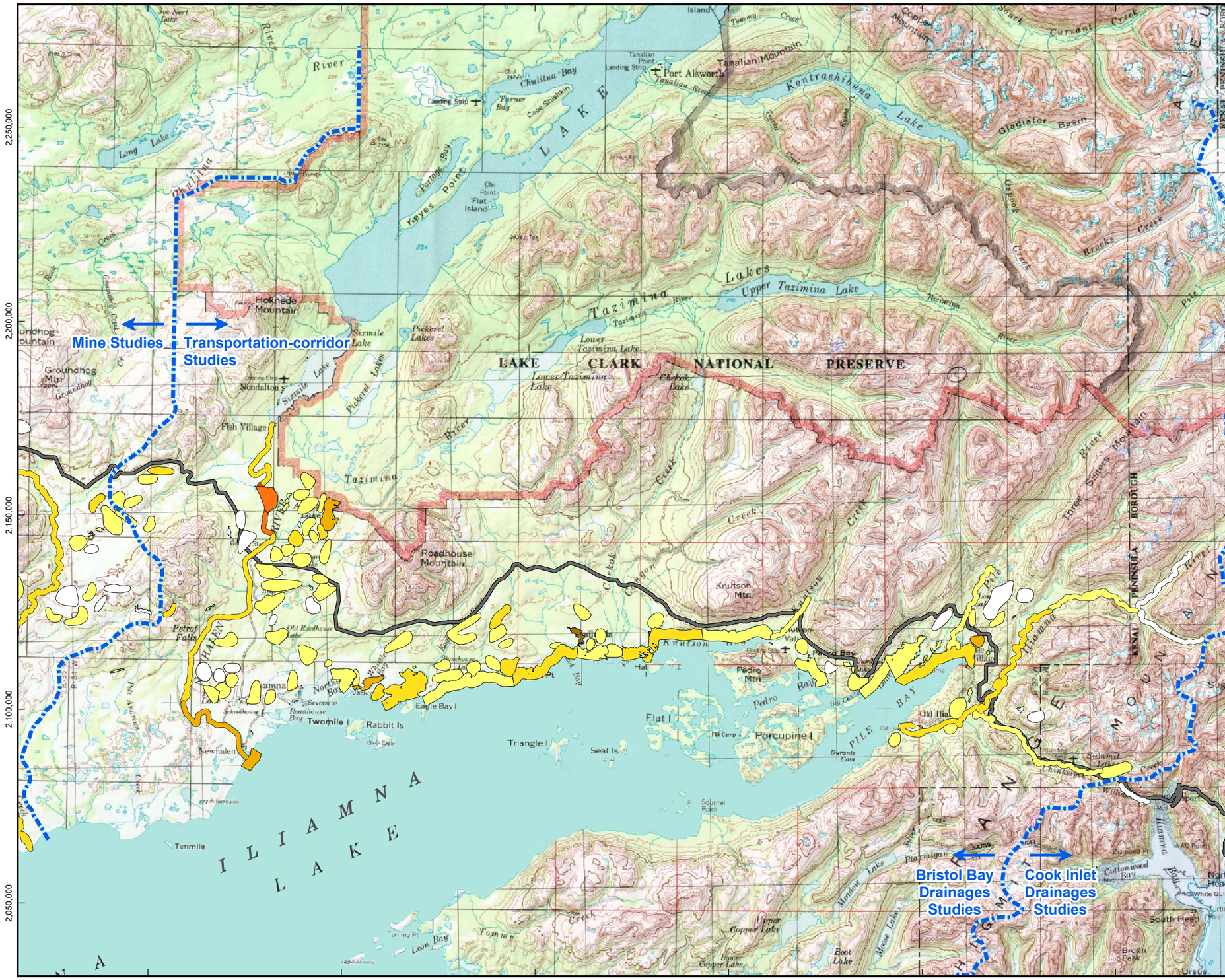


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Figure N-3.25
Distribution and Abundance (Maximal Number) of Staging Waterbirds during Spring Migration, Bristol Bay Drainages, Transportation-corridor Study Area, 2004

Preliminary Data Only
Do Not Cite or Quote

Legend

Maximal Number of Birds

- 0
- 1 – 25
- 26 – 100
- 101 – 250
- 251 – 500
- 501 – 1000

Possible Road Alignment

Miles: 0 2 4 6 8 10
Kilometers: 0 2 4 6 8 10 12 14
Scale 1:310,000

N

Alaska State Plane Zone 5 (units feet)
1983 North American Datum

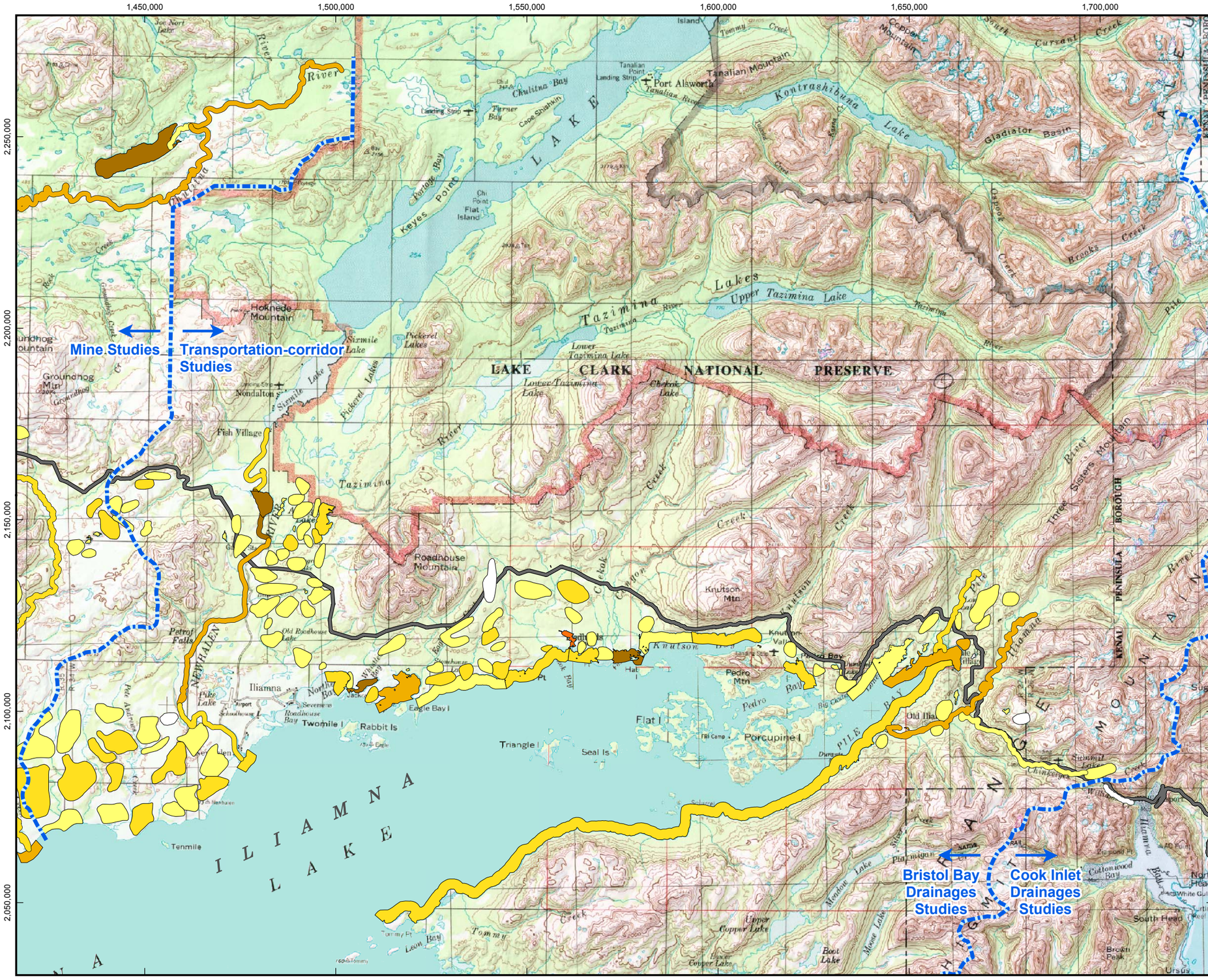

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Figure N-3.26
Distribution and Abundance (Maximal Number) of Staging Waterbirds during Spring Migration, Bristol Bay Drainages, Transportation-corridor Study Area, 2005

Preliminary Data Only
Do Not Cite or Quote

Legend

Maximal Number of Birds

- 0
- 1 – 25
- 26 – 100
- 101 – 250
- 251 – 500
- 501 – 1000

Possible Road Alignment

Miles: 0 2 4 6 8 10
Kilometers: 0 2 4 6 8 10 12 14
Scale 1:310,000

N

Alaska State Plane Zone 5 (units feet)
1983 North American Datum

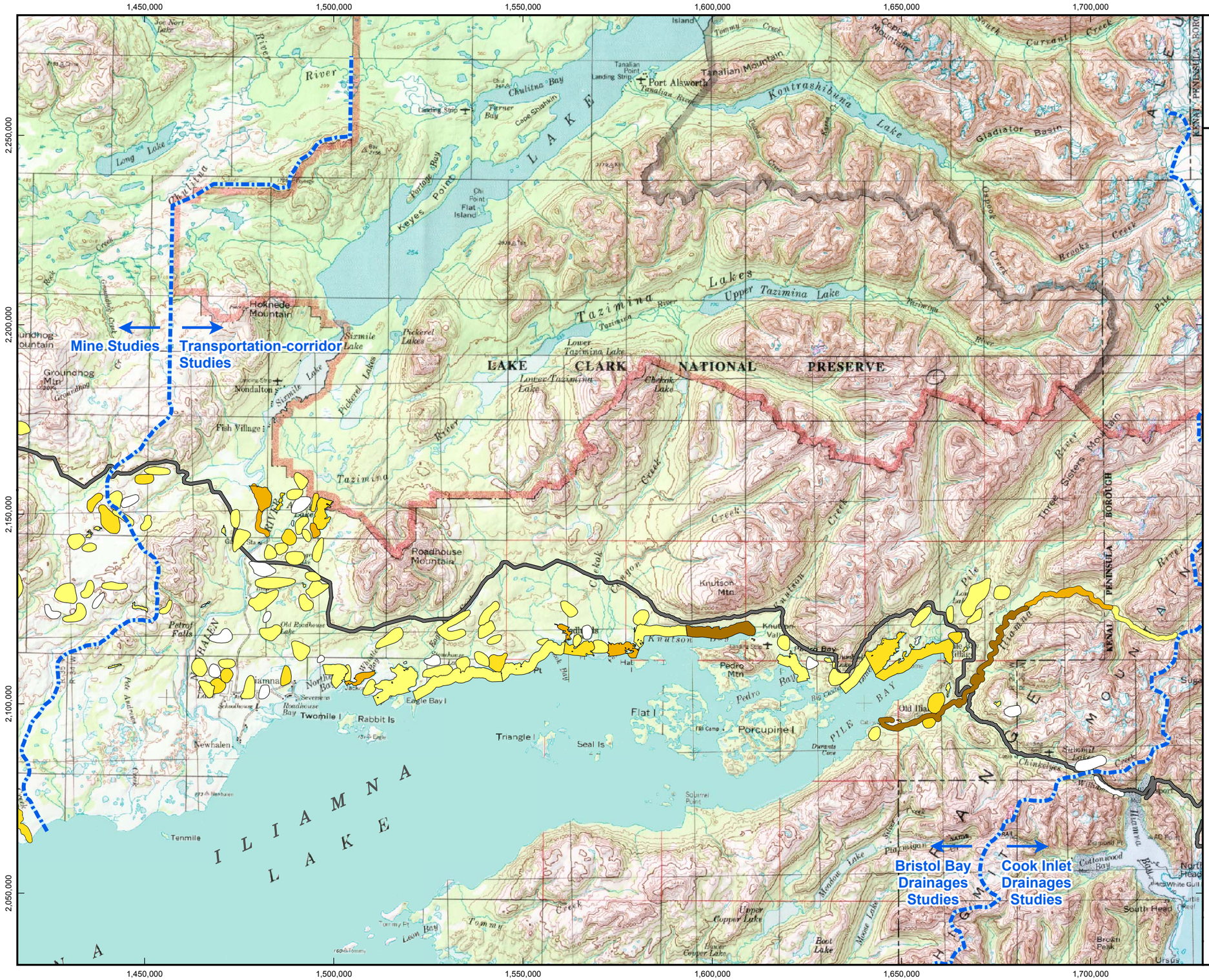

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Figure N-3.27
Distribution and Abundance (Maximal Number) of Staging Waterbirds during Fall Migration, Bristol Bay Drainages, Transportation-corridor Study Area, 2004

Preliminary Data Only
Do Not Cite or Quote

Legend

Maximal Number of Birds

- 0
- 1 – 25
- 26 – 100
- 101 – 250
- 251 – 500

Possible Road Alignment

Miles: 0 2 4 6 8 10
Kilometers: 0 2 4 6 8 10 12 14
Scale 1:310,000

N

Alaska State Plane Zone 5 (units feet)
1983 North American Datum

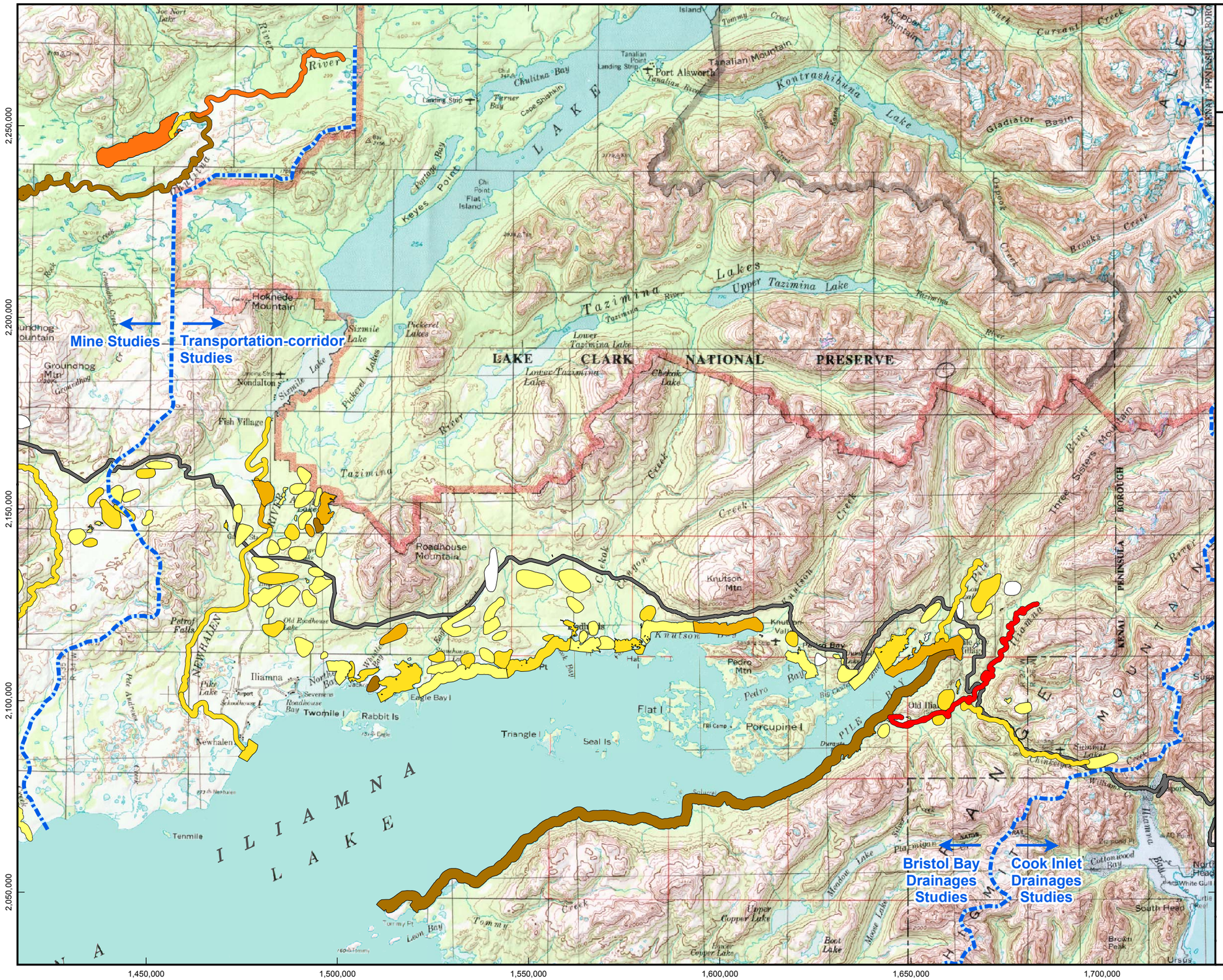

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Figure N-3.28
Distribution and Abundance (Maximal Number) of Staging Waterbirds during Fall Migration, Bristol Bay Drainages, Transportation-corridor Study Area, 2005

Preliminary Data Only
Do Not Cite or Quote

Legend

Maximal Number of Birds

- 0
- 1 – 25
- 26 – 100
- 101 – 250
- 251 – 500
- 501 – 1000
- 1001 – 2000

Possible Road Alignment

Miles: 0 2 4 6 8 10
Kilometers: 0 2 4 6 8 10 12 14

N

Scale 1:310,000
Alaska State Plane Zone 5 (units feet)
1983 North American Datum

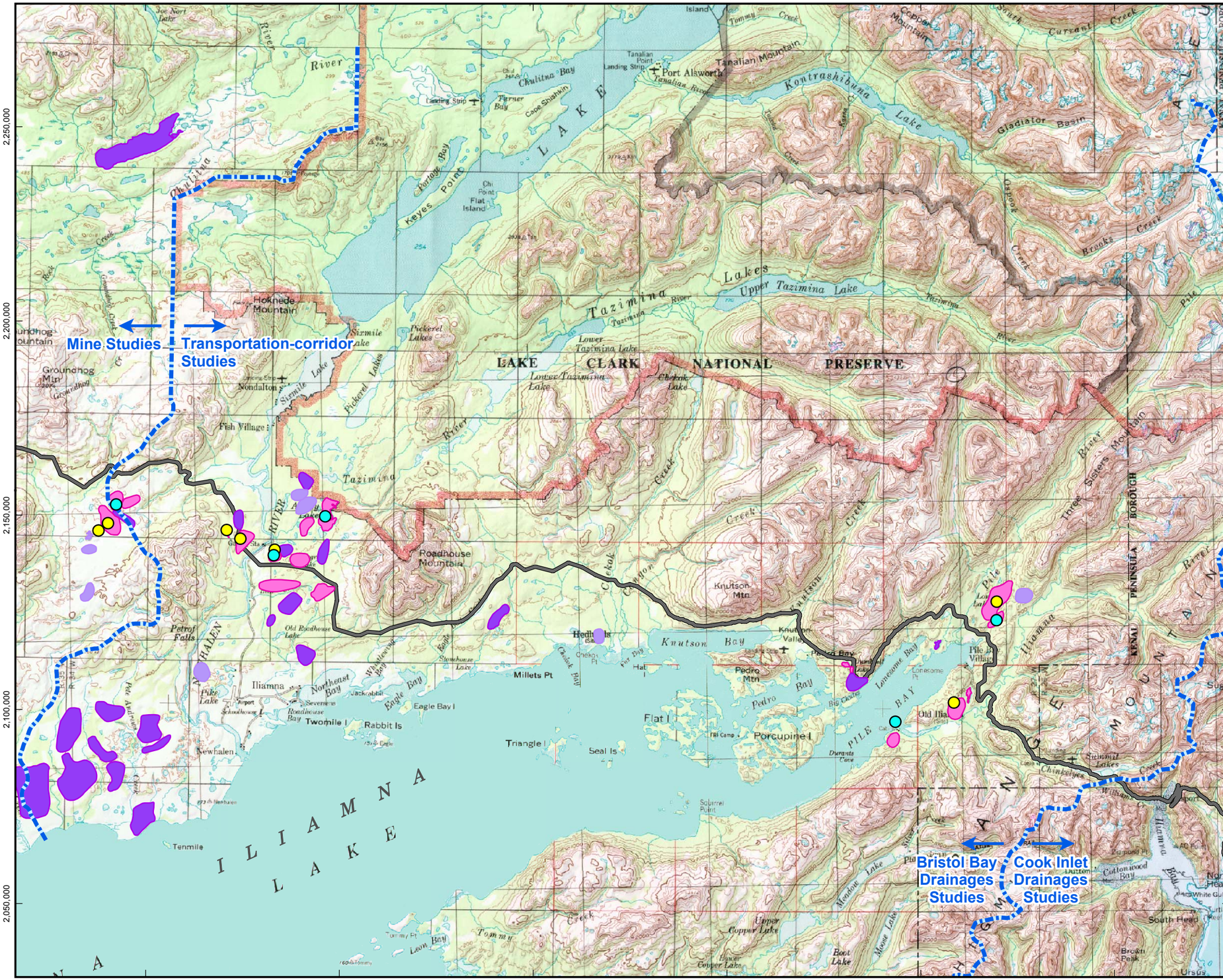

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Figure N-3.29
Common Loon Locations, Bristol Bay Drainages, Transportation-corridor Study Area, 2004 and 2005

Preliminary Data Only
Do Not Cite or Quote

Legend

Common Loon Brood
- 2004
- 2005

Lake Group with Adult Common Loons
- 2004
- 2005
- Both Years

- Possible Road Alignment

Alaska State Plane Zone 5 (units feet)
1983 North American Datum