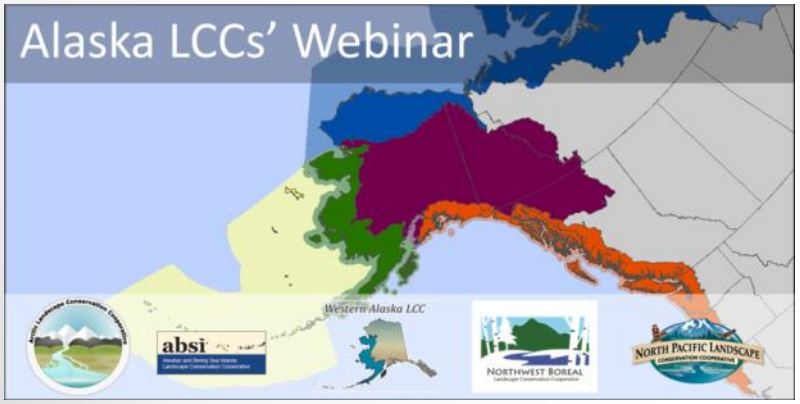
Connecting the Alaska Conservation Estate as a Climate Change Adaptation Strategy



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Connectivity as an Adaptation Strategy

Table 1 – List of recommendations for climate change adaptation strategies for biodiversity management assembled from 112 scholarly articles. 524 records were condensed into 113 recommendation categories and are ranked by frequency of times cited in different articles.

Rank	Recommendation	No. articles	References
1	Increase connectivity (design corridors, remove barriers for dispersal, locate reserves close to each other, reforestation	24	Beatley (1991), Chambers et al. (2005), Collingham and Huntley (2000), Da Fonseca et al. (2005), de Dios et al. (2007), Dixon et al. (1999), Eeley et al. (1999), Franklin et al. (1992), Guo (2000), Halpin (1997), Hulme (2005), Lovejoy (2005), Millar et al. (2007), Morecroft et al. (2002), Noss (2001), Opdam and Wascher (2004), Rogers and McCarty (2000), Schwartz et al. (2001), Scott et al. (2002), Shafer (1999), Welch (2005), Wilby and Perry (2006) and Williams (2000)
2	Integrate climate change into planning exercises (reserve, pest outbreaks, harvest schedules, grazing limits, incentive programs	19	Araujo et al. (2004), Chambers et al. (2005), Christensen et al. (2004), Dale and Rauscher (1994), Donald and Evans (2006), Dyer (1994), Erasmus et al. (2002), Hulme (2005), LeHouerou (1999), McCarty (2001), Millar and Brubaker (2006), Peters and Darling (1985), Rounsevell et al. (2006), Scott and Lemieux (2005), Scott et al. (2002), Soto (2001), Staple and Wall (1999), Suffling and Scott (2002) and Welch (2005)
3	Mitigate other threats, i.e. invasive species, fragmentation, pollution	17	Bush (1999), Chambers et al. (2005), Chornesky et al. (2005), Da Fonseca et al. (2005), de Dios et al. (2007), Dixon et al. (1999), Halpin (1997), Hulme

Biodiversity management in the face of climate change: A review of 22 years of recommendations – Nicole Heller and Erika Zavaleta

NORTHWEST BOREAL
Landscape Conservation Cooperative

Wetland within Devil's Elbow Habitat Protection Area, central Yukon
Photo: Ducks Unlimited Canada

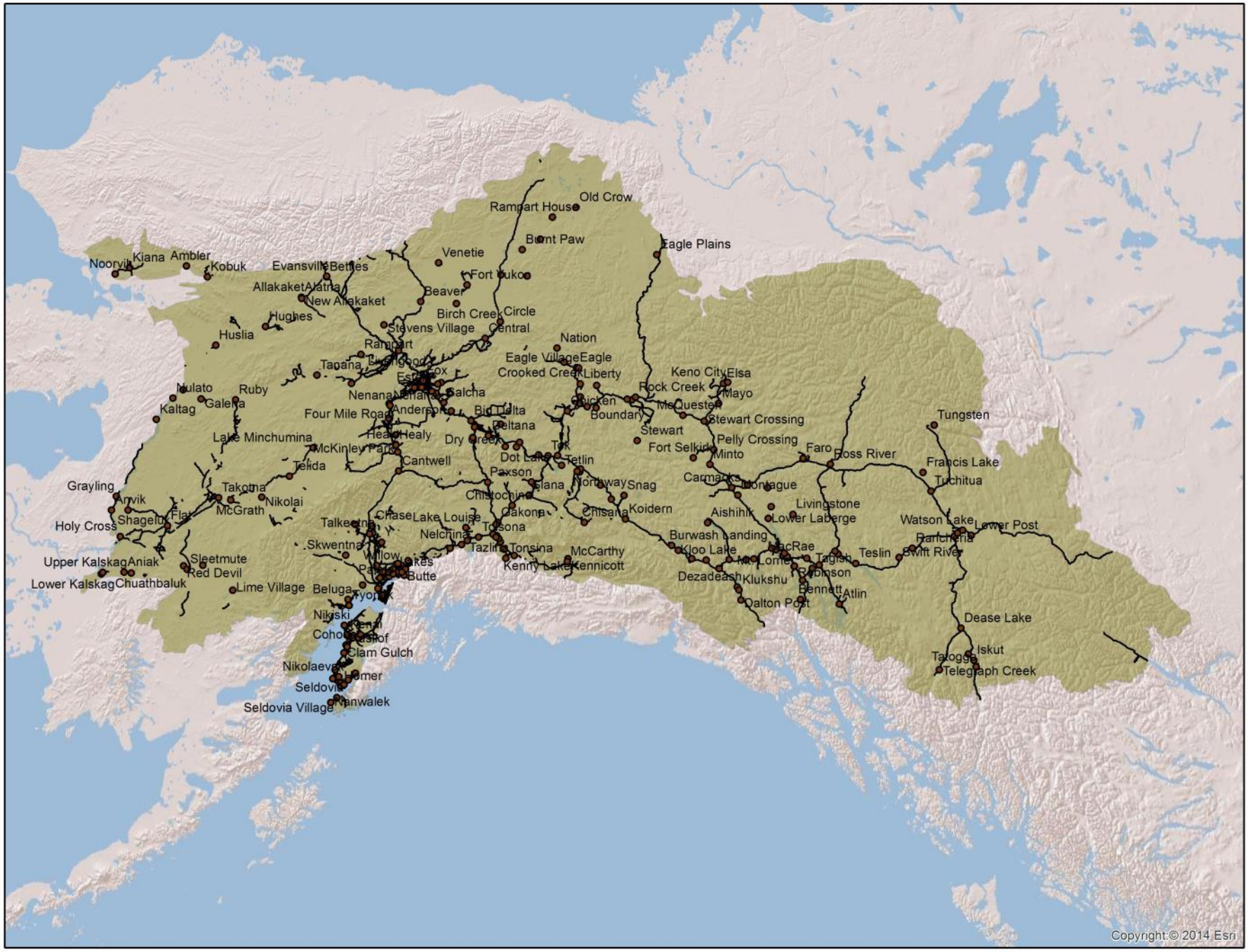
Strategic Plan

2015 - 2025

Version 1.0

Mount Sheldon, Yukon
Photo: John Meikle

Tintina Trench Wetland, Yukon
Photo: Lila Tauzer


Old Crow
Rampart House
Burnt Paw
Eagle Plains
Venetie
Fort Yukon
Noorvik
Kiana
Ambler
Kobuk
Evansville
Bettles
Allakaket
Alatna
New Allakaket
Beaver
Hughes
Birch Creek
Circle
Stevens Village
Central
Huslia
Rampart
Nation
Eagle Village
Eagle
Crooked Creek
Liberty
Tanana
Fairbanks
Fox
Keno City
Elsa
Rock Creek
Mayo
Nulato
Ruby
Galena
Kaltag
Nenana
Salcha
Chicken
McQuesten
Boundary
Stewart Crossing
Four Mile Road
Anderson
Big Delta
Deltana
Tungsten
Stewart
Pelly Crossing
Lake Minchumina
Healy
Dry Creek
Tok
Fort Selkirk
Minto
Faro
Ross River
McKinley Park
Telida
Cantwell
Dot Lake
Tetlin
Francis Lake
Paxson
Carmacks
Tuchitua
Grayling
Takotna
Slana
Northway
Snag
Montague
Nikolai
Chistochina
Livingstone
Anvik
McGrath
Gakona
Chisana
Koidern
Aishihik
Lower Laberge
Shageluk
Flat
Chase
Lake Louise
Watson Lake
Lower Post
Holy Cross
Talkeetna
Tonsona
Nelchina
Burwash Landing
Rancheria
Skwentna
Tazlina
Tonsina
McCarthy
Kloo Lake
MacRae
Swift River
Teslin
Upper Kalskag
Aniak
Sleetmute
Willow
Lakes
Kenny Lake
Kennicott
Tagish
Red Devil
Palmer
Dezadeash
Klukshu
Robinson
Lower Kalskag
Chuathbaluk
Butte
Lime Village
Beluga
Wrangell
Bennett
Atlin
Dalton Post
Nikiski
Kenai
Cohoe
Kasilof
Clam Gulch
Dease Lake
Iskut
Nikolaevsk
Homer
Telegraph Creek
Seldovia
Seldovia Village
Nanwalek
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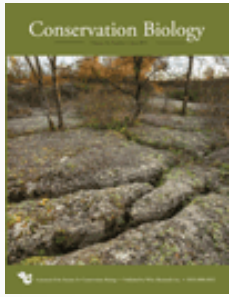
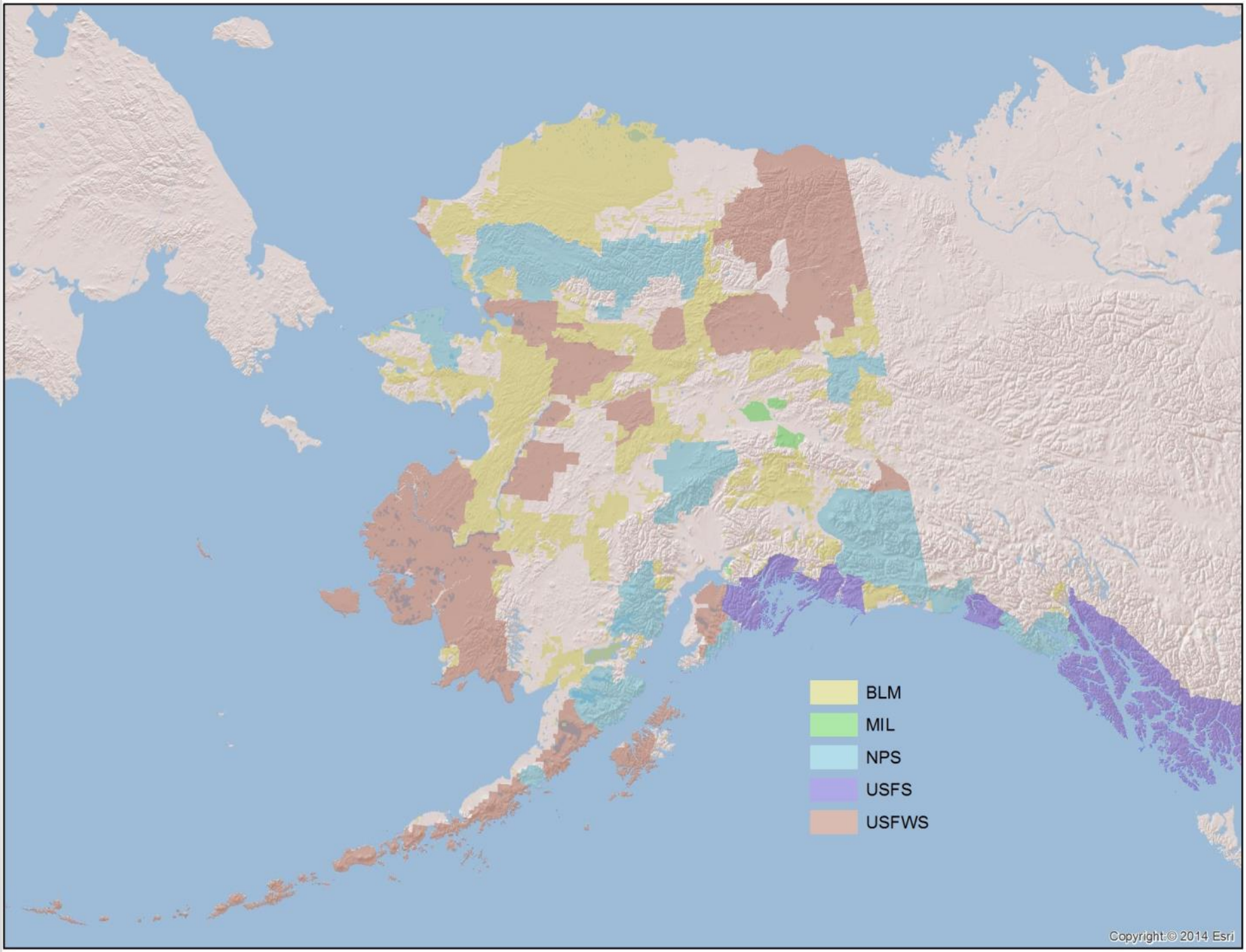
How can we plan for connectivity while assuming that ecosystems will be dynamic?

Conserving Nature's Stage



A course filter strategy that conserves representative sample of broadly defined environments

- 1988 – geodiversity as a surrogate for biodiversty
- 2000s – geodiversity as a surrogate for ecological and evolutionary processes
- 2010 – geodiversity as an alternative to species climate envelope models for adaptation planning


BLM
MIL
NPS
USFS
USFWS
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BLM Planning Process

Central Yukon Planning Area

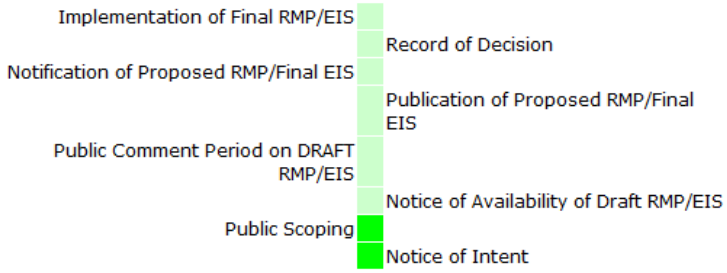
The Central Yukon Planning Area is approximately 59 million acres, of which approximately 16 million acres are BLM-managed public lands. Other federal lands in the planning area include portions of the Gates of the Arctic National Park and Preserve, the Koyukuk, Innoko Northern Unit, Nowitna, and Kanuti National Wildlife Refuges, and the U.S. Army Tanana Flats and Donnelly training areas. The decisions in the RMP will only apply to BLM-managed lands. Lands of note within the planning area include the Dalton Highway Utility Corridor, Central Arctic Management Area Wilderness Study Area, a segment of the Iditarod National Historic Trail, and numerous areas of critical environmental concern.

The planning area overlaps portions of the Northwest Arctic Borough, the North Slope Borough, the Denali Borough, and the Fairbanks North Star Borough. However, the majority of the planning area does not fall within any borough boundary. The planning area boundary includes 24 remote villages, 15 of which have tribal entities, and three ANCSA Regional Corporation boundaries (Doyon Limited, Arctic Slope Regional Corporation, and NANA, Inc.).

When completed and approved, the RMP will replace two existing BLM land use plans: the Utility Corridor RMP (1991) and the Central Yukon RMP (1986). It will also provide a RMP for a portion of the lands currently covered by the Southwest Management Framework Plan (1986) and unplanned lands near Fairbanks.

Central Yukon RMP Home Page

PLANNING PROCESS



The Central Yukon RMP is currently in the alternative development phase.

Central Yukon Planning Area
- Announcements
- RMP Documents
- Maps

Central Yukon
Resource Management Plan

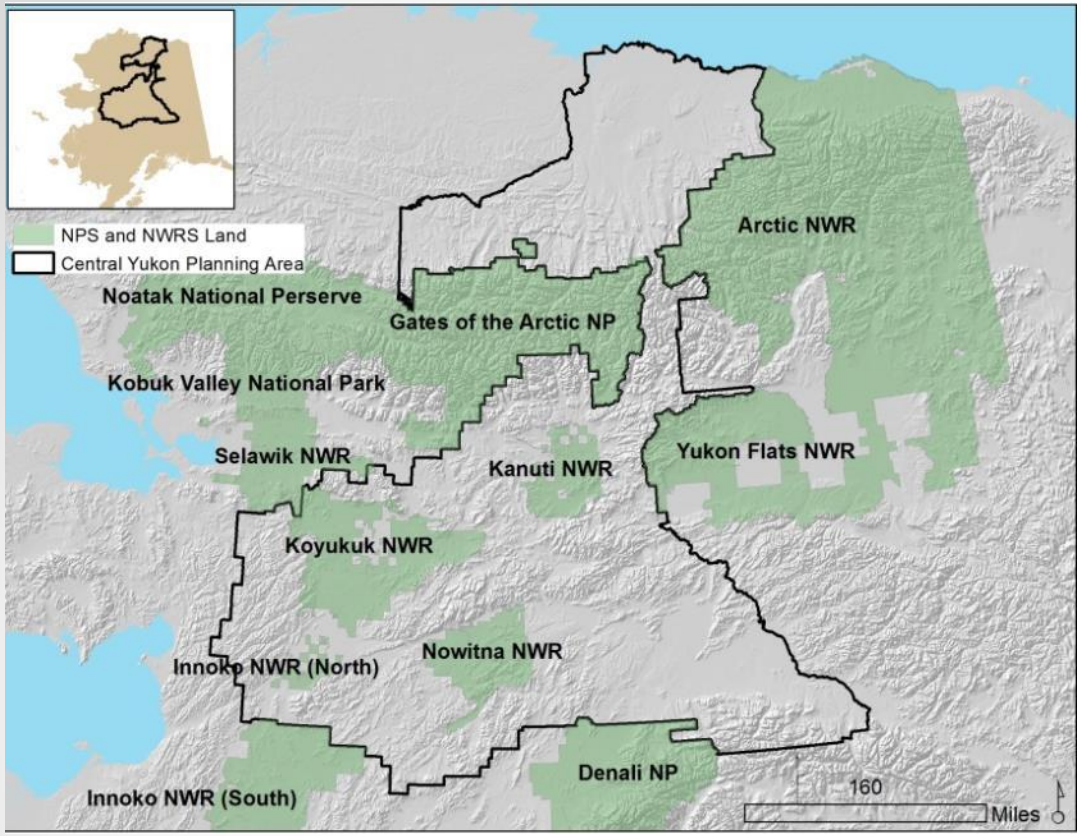
How to participate

To get added to the mailing list and stay informed of the planning effort:

- **Email:** CentralYukon@blm.gov
- **Fax:** 907- 474–2282
- **Mail:** Attn: Central Yukon Field Office, 1150 University Avenue, Fairbanks, AK 99709

For questions call Jeanie Cole 907-474-2340

When providing comments, before including your address, phone number, e-mail address, or other personal identifying information in your comment, be advised that your entire comment -- including your personal identifying information -- may be made publicly available at any time. While you can ask us in your comment to withhold from public review your personal identifying information, we cannot guarantee that we will be able to do so.



Leverage the Existing Conservation Estate

	Minimum Distance Between Conservation Units (miles)	0.1% Landscape Linkage Area (acres)	Area of Contiguous Conservation Lands Connected (acres)
Pair 1: Gates of the Arctic NP - Arctic NWR	8	176,295	50 million
Pair 2: Kanuti NWR - Yukon Flats NWR	30	50,871	29 million
Pair 3: Kanuti NWR - Koyukuk NWR	31	76,041	24 million
Pair 4: Koyukuk NWR - Nowitna NWR	34	126,269	24 million
Pair 5: Nowitna NWR and Denali NP	38	93,853	8 million
Pair 6: Koyukuk NWR - Innoko NWR (North)	11	68,744	23 million
Pair 7: Innoko NWR (North) - Innoko NWR (South)	23	29,790	4 million
Pair 8: Kanuti NWR - Gates of the Arctic NP	14	68,559	24 million

Analysis

Step 1
- Cluster analysis to identify geodiversity based on slope, elevation, insolation, and topographic position

Step 2
- Identify corridor termini in protected areas for focal geodiversity

Step 3
- Least-cost model to identify corridors between geodiversity

Step 4
- Create final linkage design as union of all least-cost corridors; add river corridors

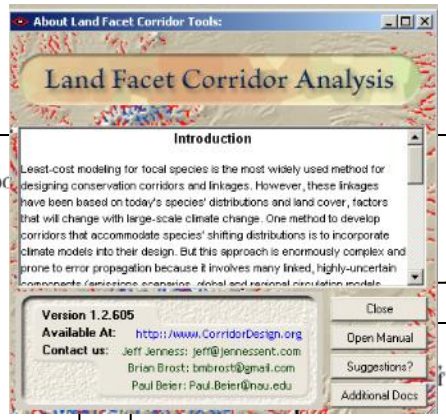
Conservation Biology

Contributed Paper

Use of Land Facets to Plan for Climate Change: Conserving the Arenas, Not the Actors

PAUL BEIER* AND BRIAN BROST

School of Forestry and Merriam-Powell Center for Environmental Research, Northern Arizona University, Flagstaff, AZ 96011-5018, U.S.A.



USE OF LAND FACETS TO DESIGN CONSERVATION CORRIDO

CONSERVING THE ARENAS, NOT THE ACTORS

Brian M. Brost

A Thesis

Submitted in Partial Fulfillment

of the Requirements for the Degree of

Master of Science

in Forestry

Northern Arizona University

May 2010

Comparing Linkage Designs Based on Land Facets to Linkage Designs Based on Focal Species

Brian M. Brost, Paul Beier

Published: November 12, 2012 • DOI: 10.1371/journal.pone.0048965

, pp. 87–103
f America

Use of land facets to design linkages for climate change

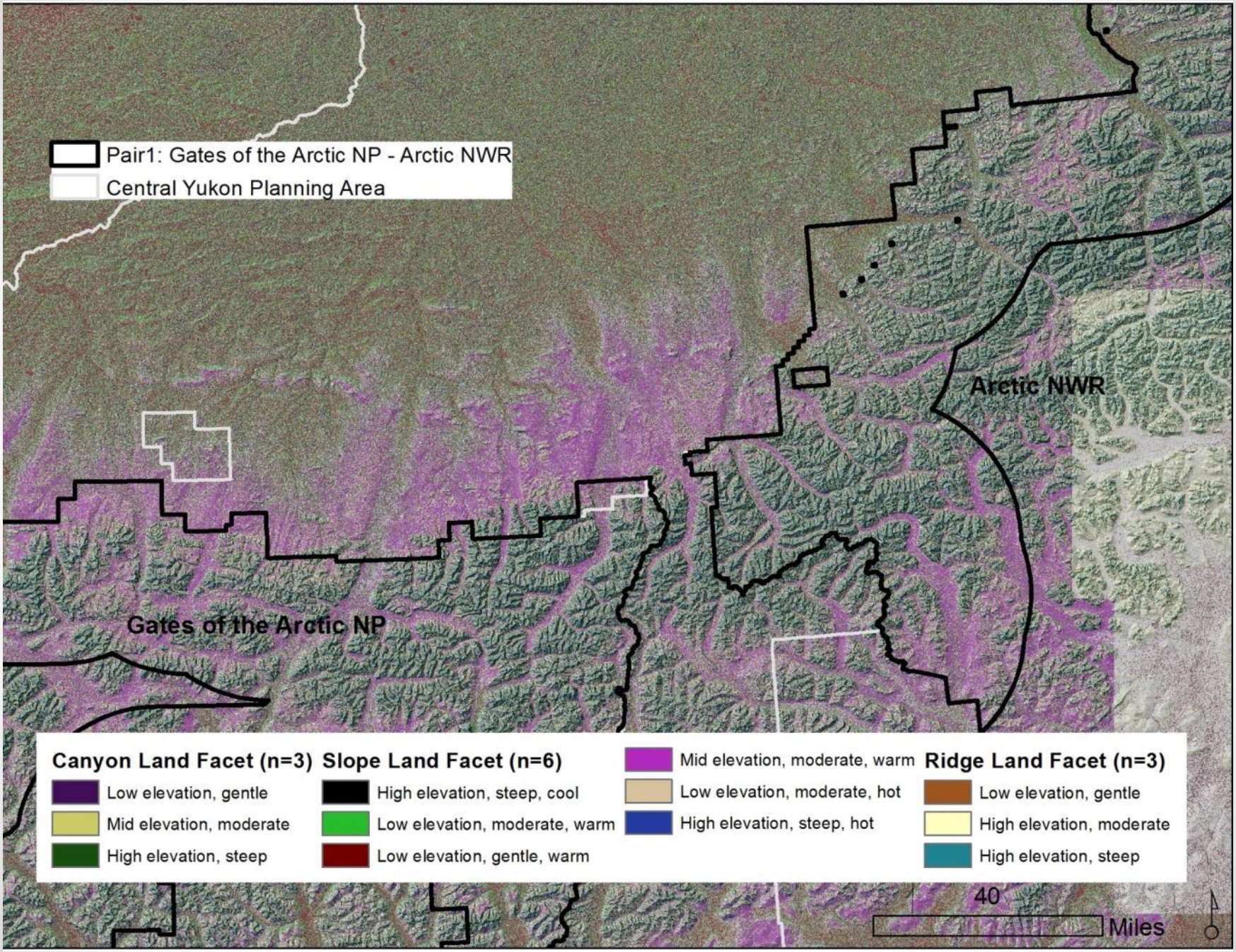
BRIAN M. BROST[1] AND PAUL BEIER

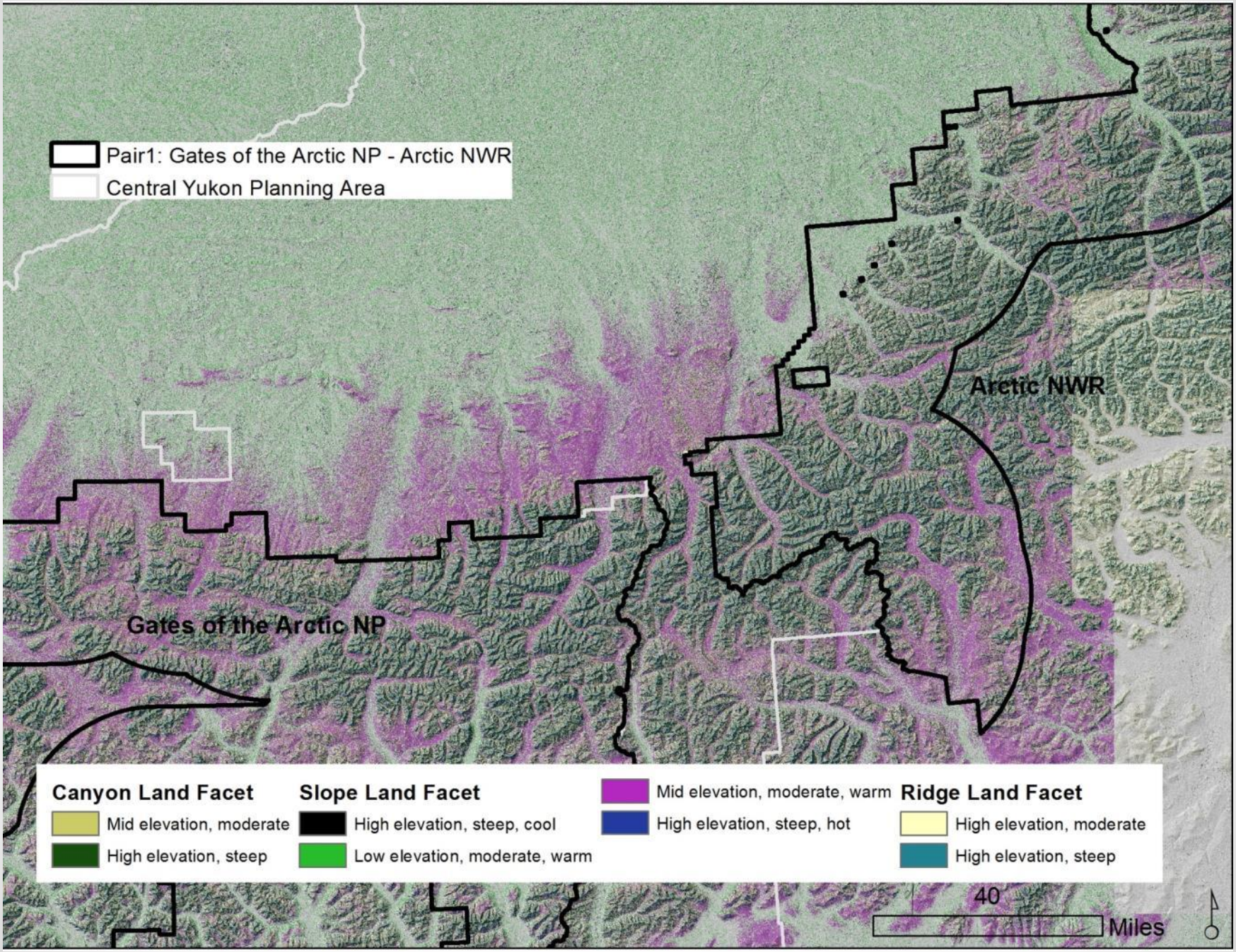
School of Forestry and Merriam-Powell Center for Environmental Research, Northern Arizona University, Flagstaff, Arizona 86011-5018 USA

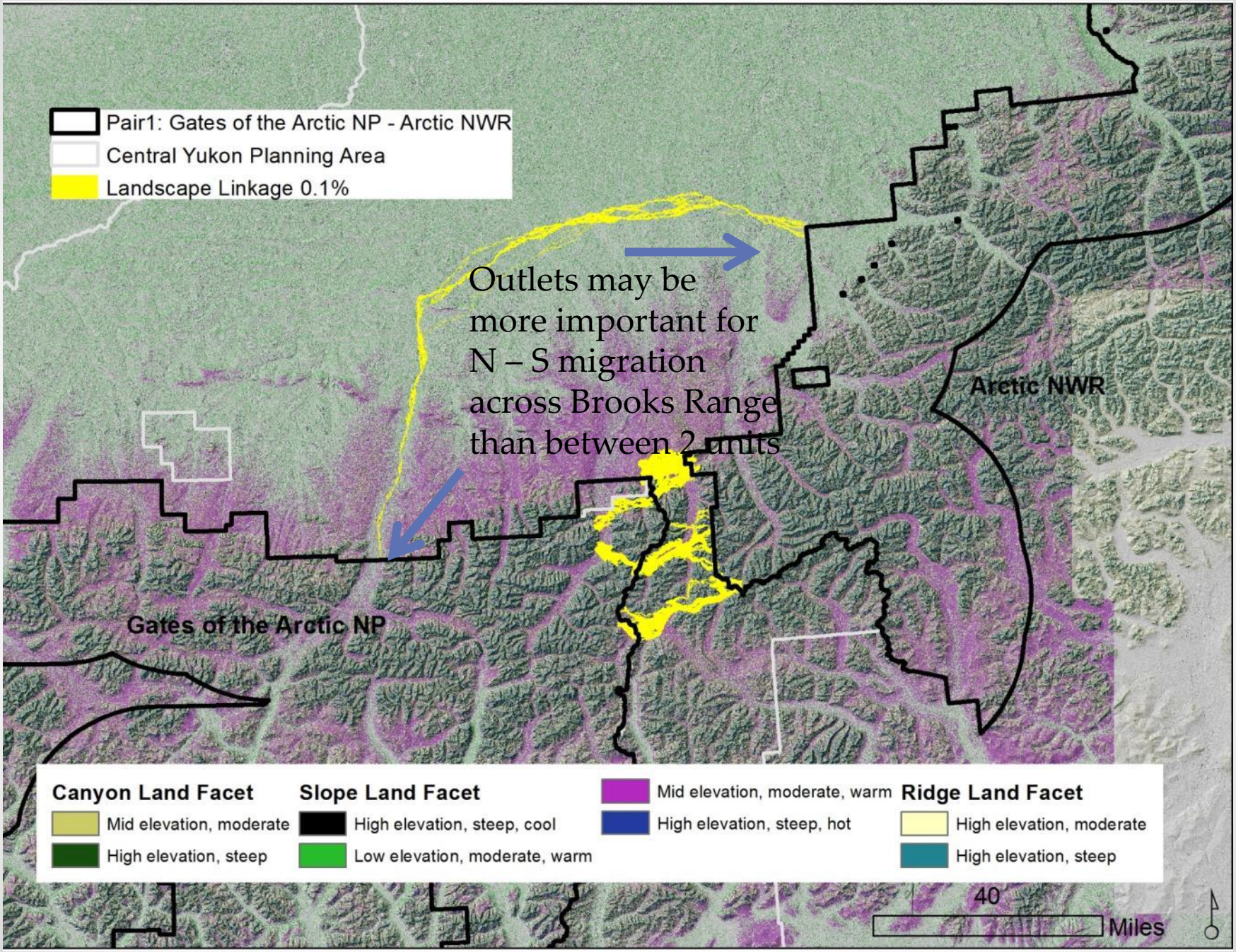
Canyon Land Facet (n=3)
Low elevation, gentle
Mid elevation, moderate
High elevation, steep
6.5
Miles

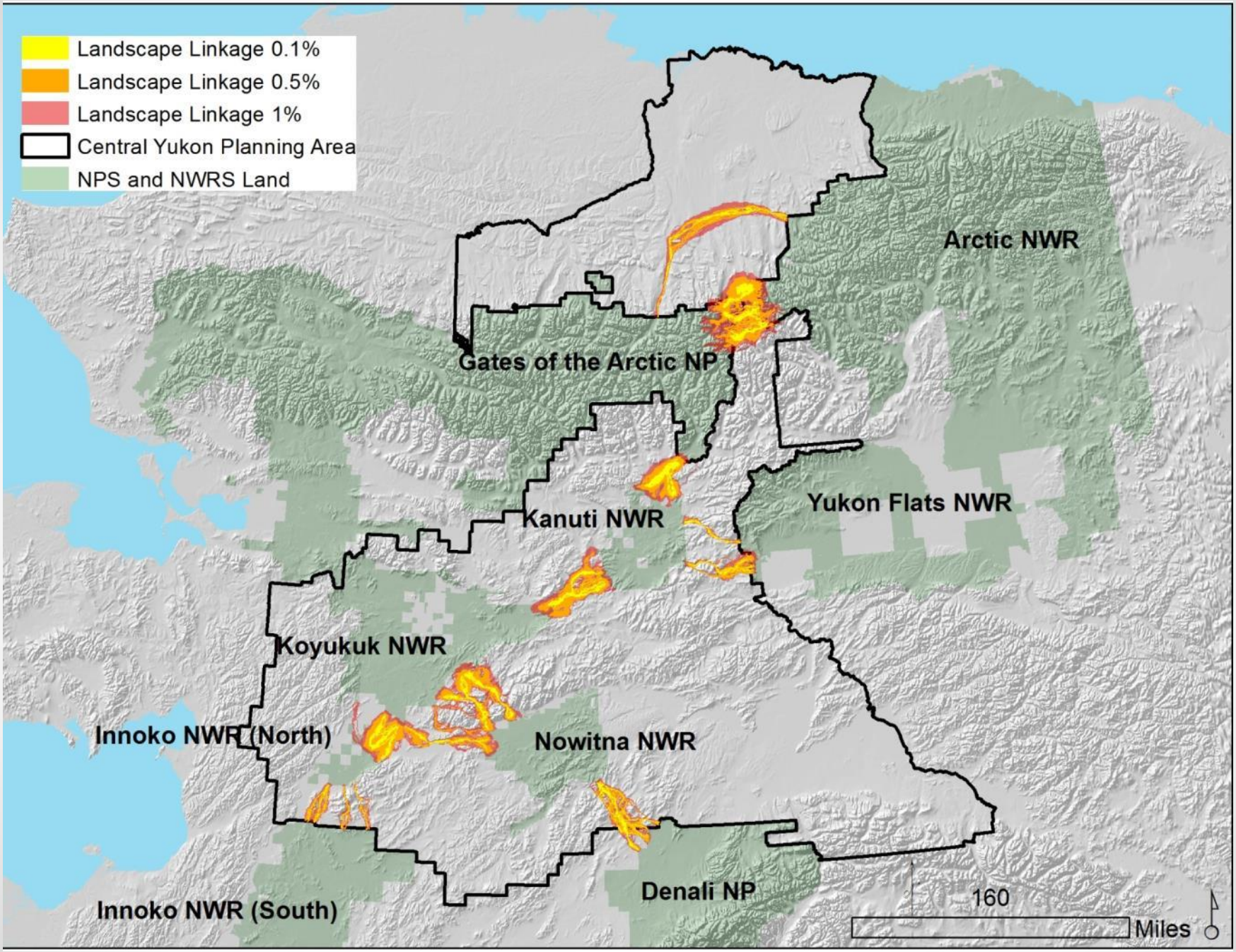
Identified Geodiversity (Land Facets)

	Elevation Mean (m)	Elevation SD (m)	Slope Mean (degrees)	Slope SD (degrees)	Solar Insolation Mean (watt hours / m2)	Insolation SD (watt hours / m2)
Canyon LF1 - Low elevation, gentle	228	188	10	6	N/A	N/A
Canyon LF2 - Mid elevation, moderate slopes	1019	249	17	7	N/A	N/A
Canyon LF3 - High elevation, steep	1216	328	35	8	N/A	N/A
Slope LF1 - High elevation, steep, cool	1071	347	31	9	388,029	91,064
Slope LF2 - Low elevation, moderate slopes, warm	274	200	13	5	510,625	46,395
Slope LF3 - Low elevation, gentle, warm	144	111	5	3	581,575	30,630
Slope LF4 - Mid elevation, moderate, warm	898	204	10	5	604,710	56,649
Slope LF5 - Low elevation, moderate, hot	203	138	10	5	642,439	35,271
Slope LF6 - High elevation, steep, hot	1155	325	29	9	705,099	72,364
Ridge LF1 - Low elevation, gentle	266	202	11	6	N/A	N/A
Ridge LF2 - High elevation, moderate	1175	295	19	8	N/A	N/A
Ridge LF3 - High elevation, steep	1311	351	36	8	N/A	N/A


Pair1: Gates of the Arctic NP - Arctic NWR
Central Yukon Planning Area
Arctic NWR
Gates of the Arctic NP
Canyon Land Facet (n=3)
Low elevation, gentle
Mid elevation, moderate
High elevation, steep
Slope Land Facet (n=6)
High elevation, steep, cool
Low elevation, moderate, warm
Low elevation, gentle, warm
Mid elevation, moderate, warm
Low elevation, moderate, hot
High elevation, steep, hot
Ridge Land Facet (n=3)
Low elevation, gentle
High elevation, moderate
High elevation, steep
40
Miles

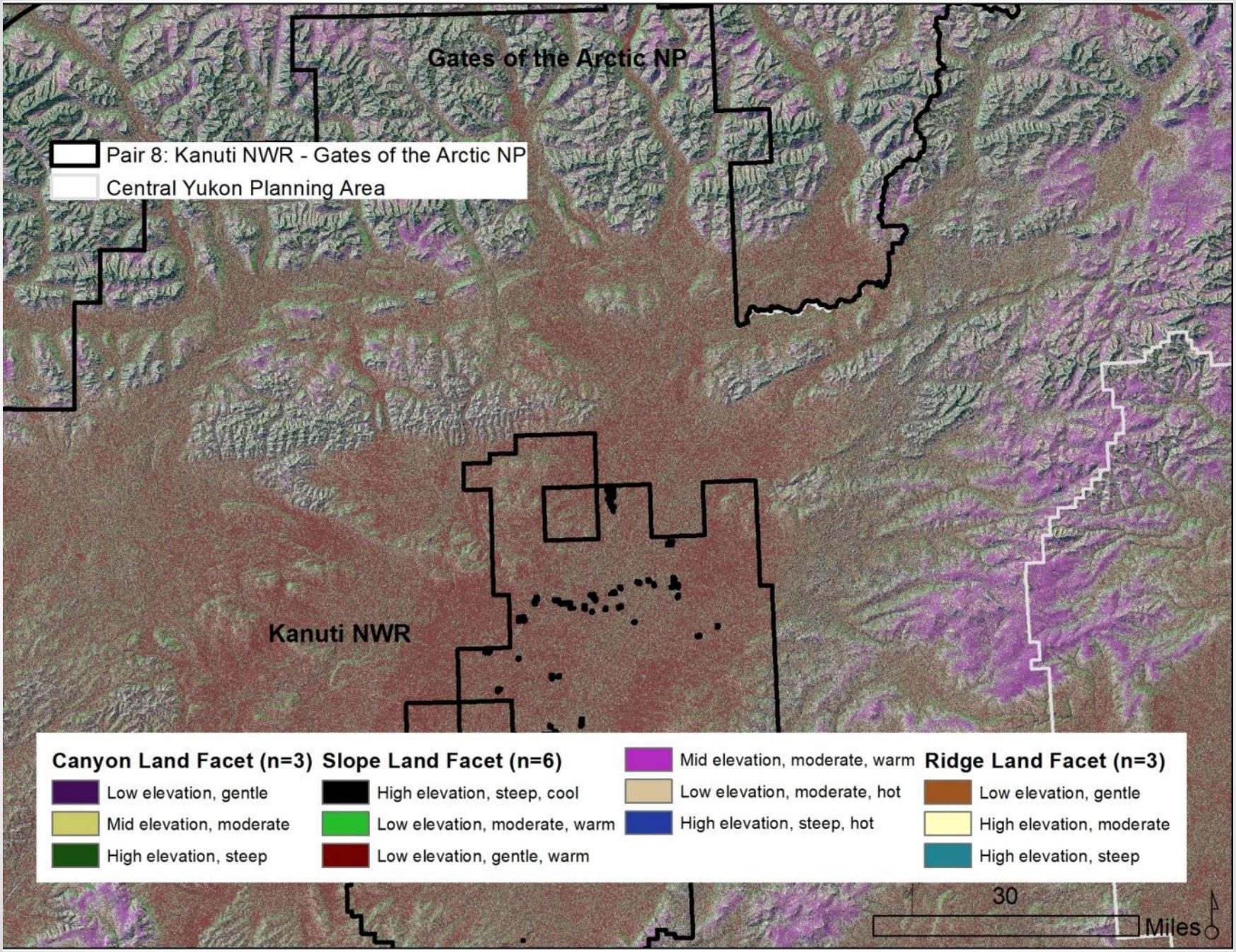

Pair1: Gates of the Arctic NP - Arctic NWR
Central Yukon Planning Area
Arctic NWR
Gates of the Arctic NP
Canyon Land Facet
Mid elevation, moderate
High elevation, steep
Slope Land Facet
High elevation, steep, cool
Low elevation, moderate, warm
Mid elevation, moderate, warm
High elevation, steep, hot
Ridge Land Facet
High elevation, moderate
High elevation, steep
40
Miles

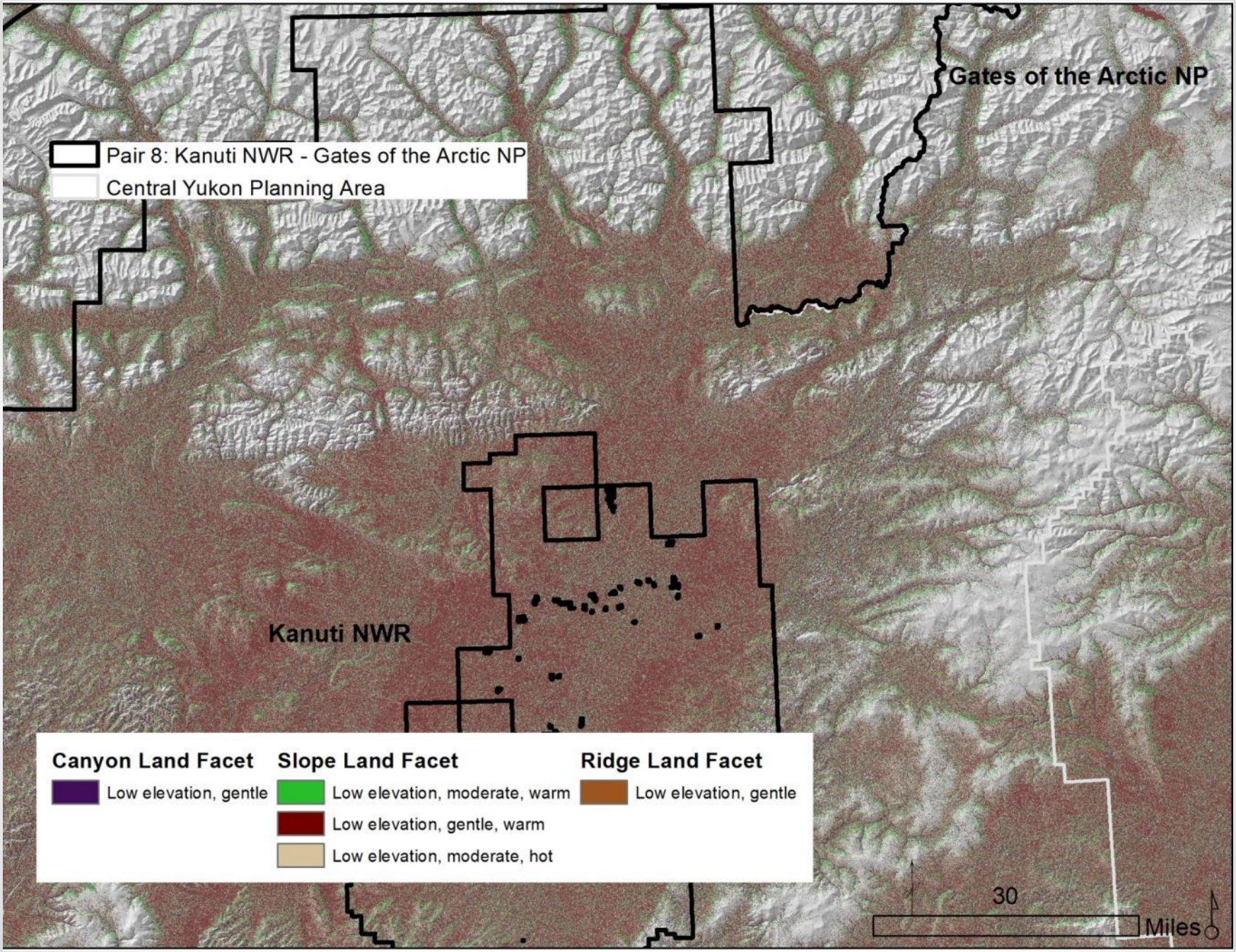

Pair1: Gates of the Arctic NP - Arctic NWR
Central Yukon Planning Area
Landscape Linkage 0.1%
Outlets may be more important for N – S migration across Brooks Range than between 2 units
Arctic NWR
Gates of the Arctic NP
Canyon Land Facet
Mid elevation, moderate
High elevation, steep
Slope Land Facet
High elevation, steep, cool
Low elevation, moderate, warm
Mid elevation, moderate, warm
High elevation, steep, hot
Ridge Land Facet
High elevation, moderate
High elevation, steep
40
Miles

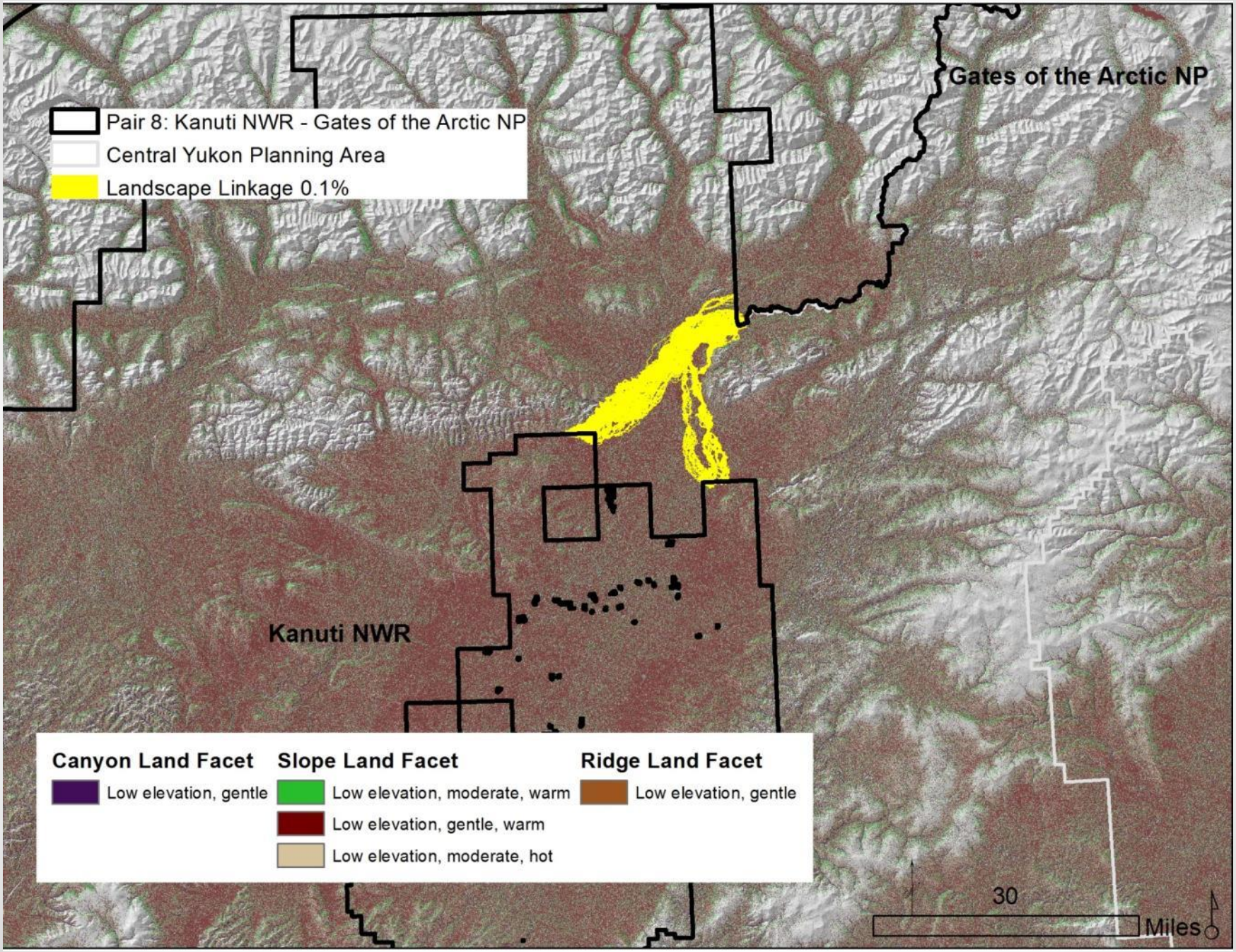

Landscape Linkage 0.1%
Landscape Linkage 0.5%
Landscape Linkage 1%
Central Yukon Planning Area
NPS and NWRS Land
Arctic NWR
Gates of the Arctic NP
Yukon Flats NWR
Kanuti NWR
Koyukuk NWR
Innoko NWR (North)
Nowitna NWR
Denali NP
Innoko NWR (South)
160
Miles

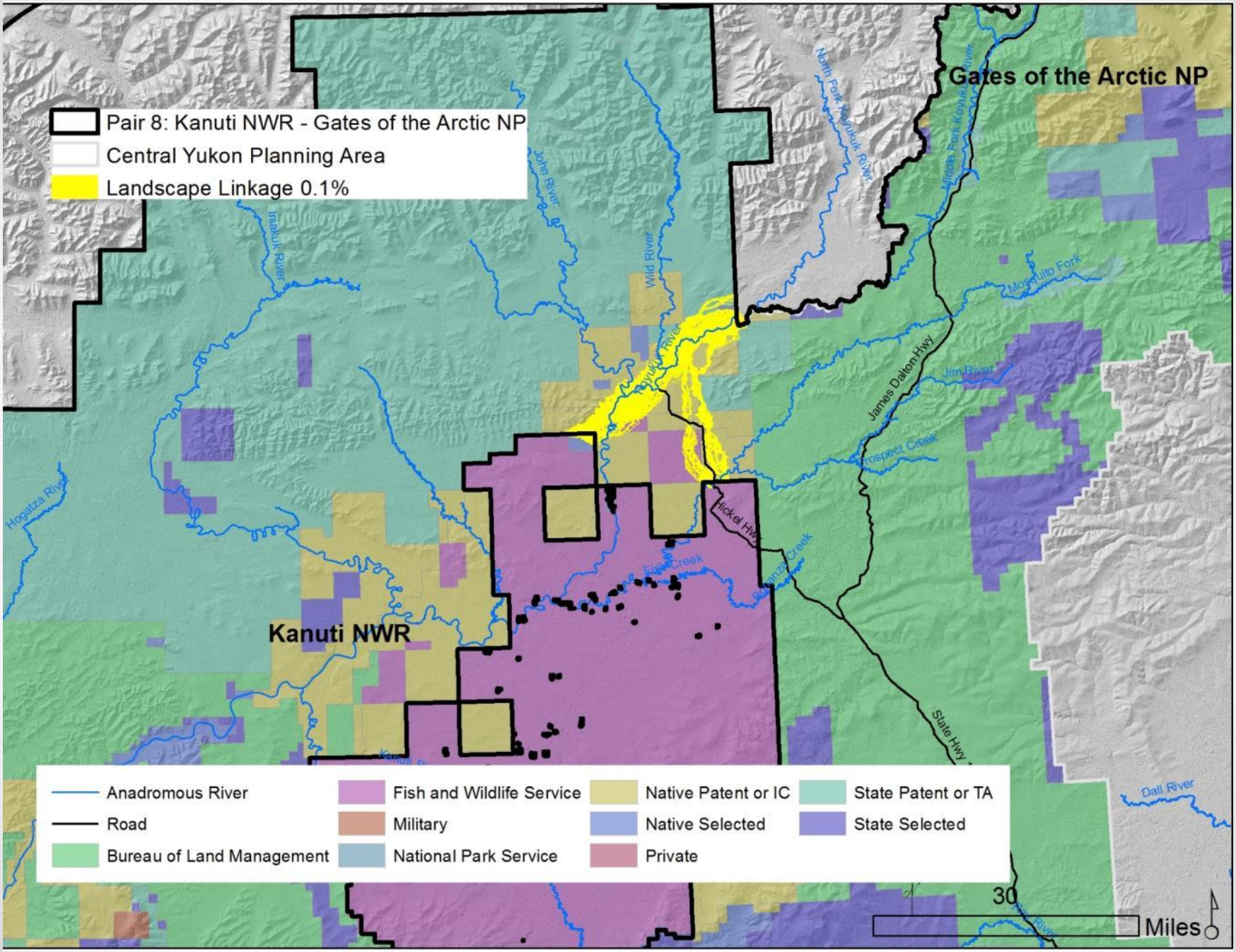
Different Land Ownership

	Proportion of Linkage with Land Status				
	BLM	Native Patent or IC	Native Selected	State Patent or TA	State Selected
Pair 1: Gates of the Arctic NP - Arctic NWR	50%	5%	1%	41%	3%
Pair 2: Kanuti NWR - Yukon Flats NWR	98%	0%	0%	0%	2%
Pair 3: Kanuti NWR - Koyukuk NWR	75%	11%	0%	0%	13%
Pair 4: Koyukuk NWR - Nowitna NWR	28%	15%	1%	21%	34%
Pair 5: Nowitna NWR and Denali NP	41%	0%	0%	0%	59%
Pair 6: Koyukuk NWR - Innoko NWR (North)	0%	69%	0%	31%	0%
Pair 7: Innoko NWR (North) - Innoko NWR (South)	18%	14%	0%	66%	2%
Pair 8: Kanuti NWR - Gates of the Arctic NP	0%	86%	1%	13%	0%

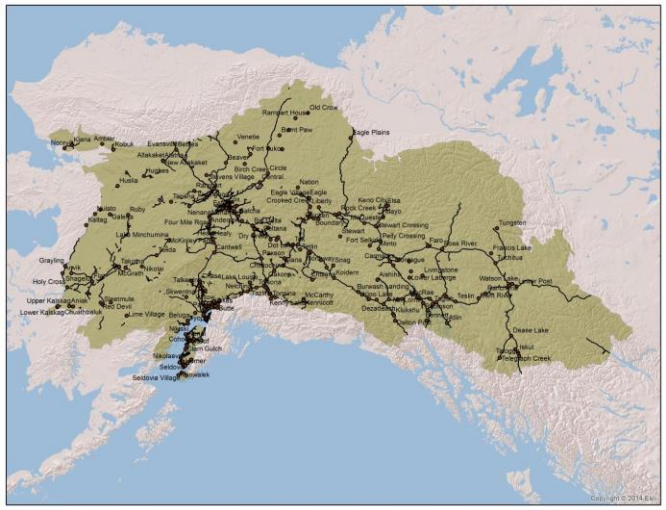

Gates of the Arctic NP
Pair 8: Kanuti NWR - Gates of the Arctic NP
Central Yukon Planning Area
Kanuti NWR
Canyon Land Facet (n=3)
Low elevation, gentle
Mid elevation, moderate
High elevation, steep
Slope Land Facet (n=6)
High elevation, steep, cool
Low elevation, moderate, warm
Low elevation, gentle, warm
Mid elevation, moderate, warm
Low elevation, moderate, hot
High elevation, steep, hot
Ridge Land Facet (n=3)
Low elevation, gentle
High elevation, moderate
High elevation, steep
30
Miles

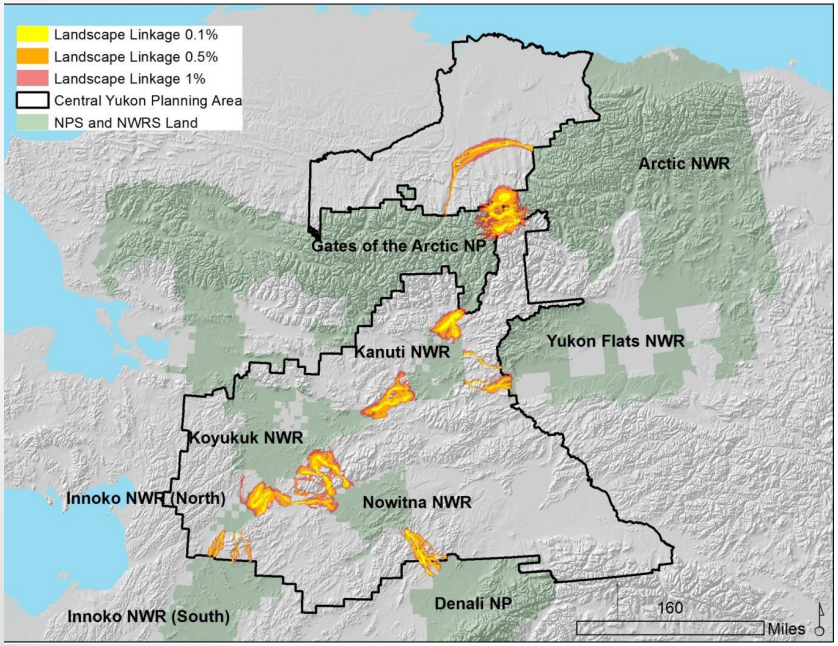

Gates of the Arctic NP
Pair 8: Kanuti NWR - Gates of the Arctic NP
Central Yukon Planning Area
Kanuti NWR
Canyon Land Facet
Low elevation, gentle
Slope Land Facet
Low elevation, moderate, warm
Low elevation, gentle, warm
Low elevation, moderate, hot
Ridge Land Facet
Low elevation, gentle
30
Miles


Pair 8: Kanuti NWR - Gates of the Arctic NP
Central Yukon Planning Area
Landscape Linkage 0.1%
Gates of the Arctic NP
Kanuti NWR
Canyon Land Facet
Low elevation, gentle
Slope Land Facet
Low elevation, moderate, warm
Low elevation, gentle, warm
Low elevation, moderate, hot
Ridge Land Facet
Low elevation, gentle
30
Miles


Pair 8: Kanuti NWR - Gates of the Arctic NP
Central Yukon Planning Area
Landscape Linkage 0.1%
Gates of the Arctic NP
Kanuti NWR
Anadromous River
Road
Bureau of Land Management
Fish and Wildlife Service
Military
National Park Service
Native Patent or IC
Native Selected
Private
State Patent or TA
State Selected
30
Miles

Landscape Connectivity Blueprint





Thanks