WHITE-TAILED DEER BEHAVIOURAL RESPONSE TO ANTHROPOGENIC FEATURES

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-with-

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RECONYX

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THE RESEARCH MOTIVATION

SITE 32

RECONYX

THE ECOLOGICAL CONTEXT:

Expanding boreal white-tailed deer bolster wolf numbers, suppressing caribou.

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THE RESEARCH QUESTION:
Are white-tailed deer selecting for anthropogenic features in the northeast boreal landscape?

SITE 12

RECONYX

THE METHODS: CAPTURE AND SATELLITE TELEMETRY

CLOVER TRAP

RECONYX

DEER CAPTURE RESULTS

Helicopter:
- 2012: 6 females – all collars failed.
- 2013: 5 females – 4 died shortly thereafter.

Clover Traps:

| Age-sex class	Number captured
collared females	29
captured males	10
captured fawns	29
recaptured fawns	2
recaptured collared does	3
total captures	74
total trap nights	222
total captures / 100 trap nights	32.8
total collars / 100 trap nights	13.1

METHODS:

SATELLITE TELEMETRY

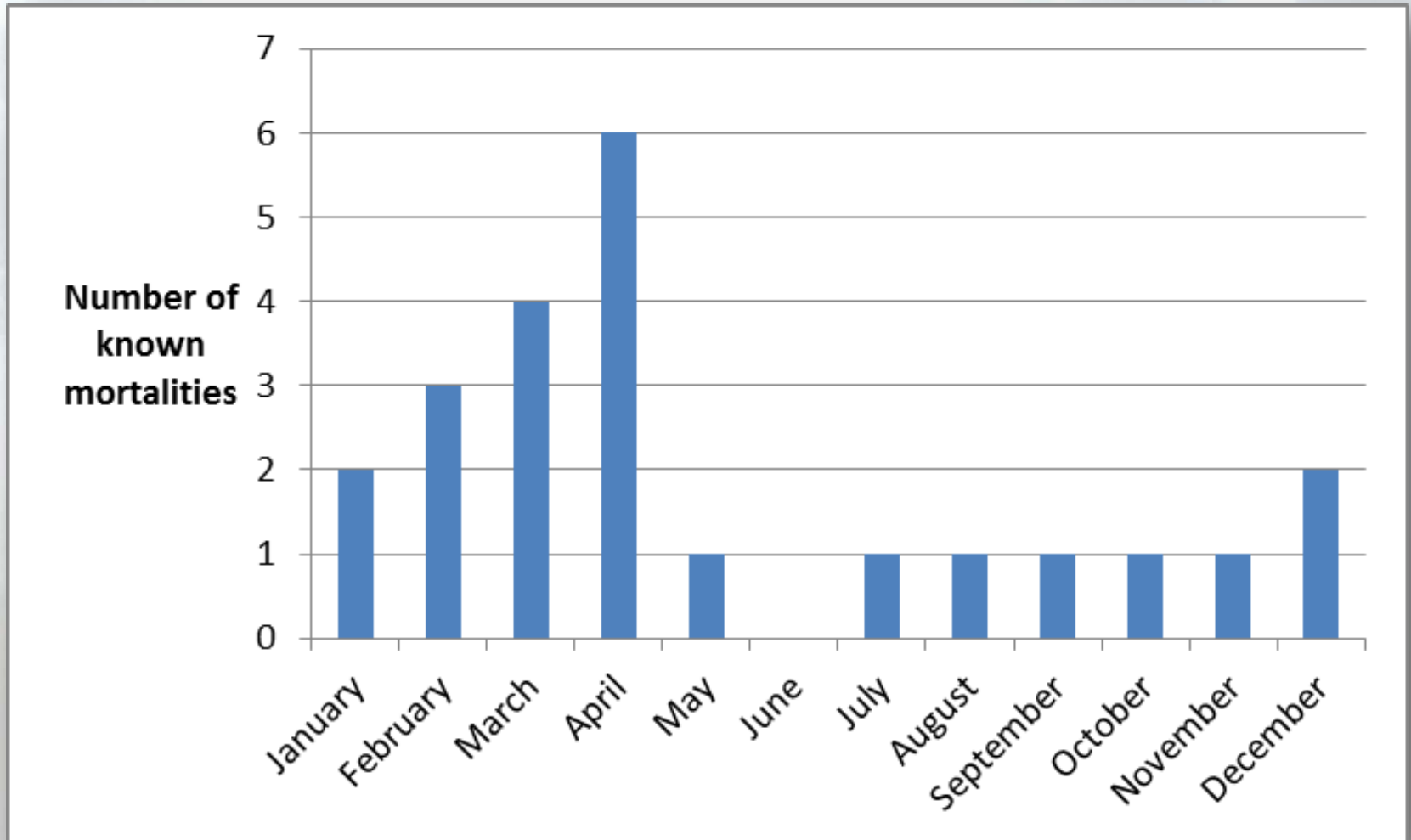Satellite collars were deployed on 40 female white-tailed deer across the study area.
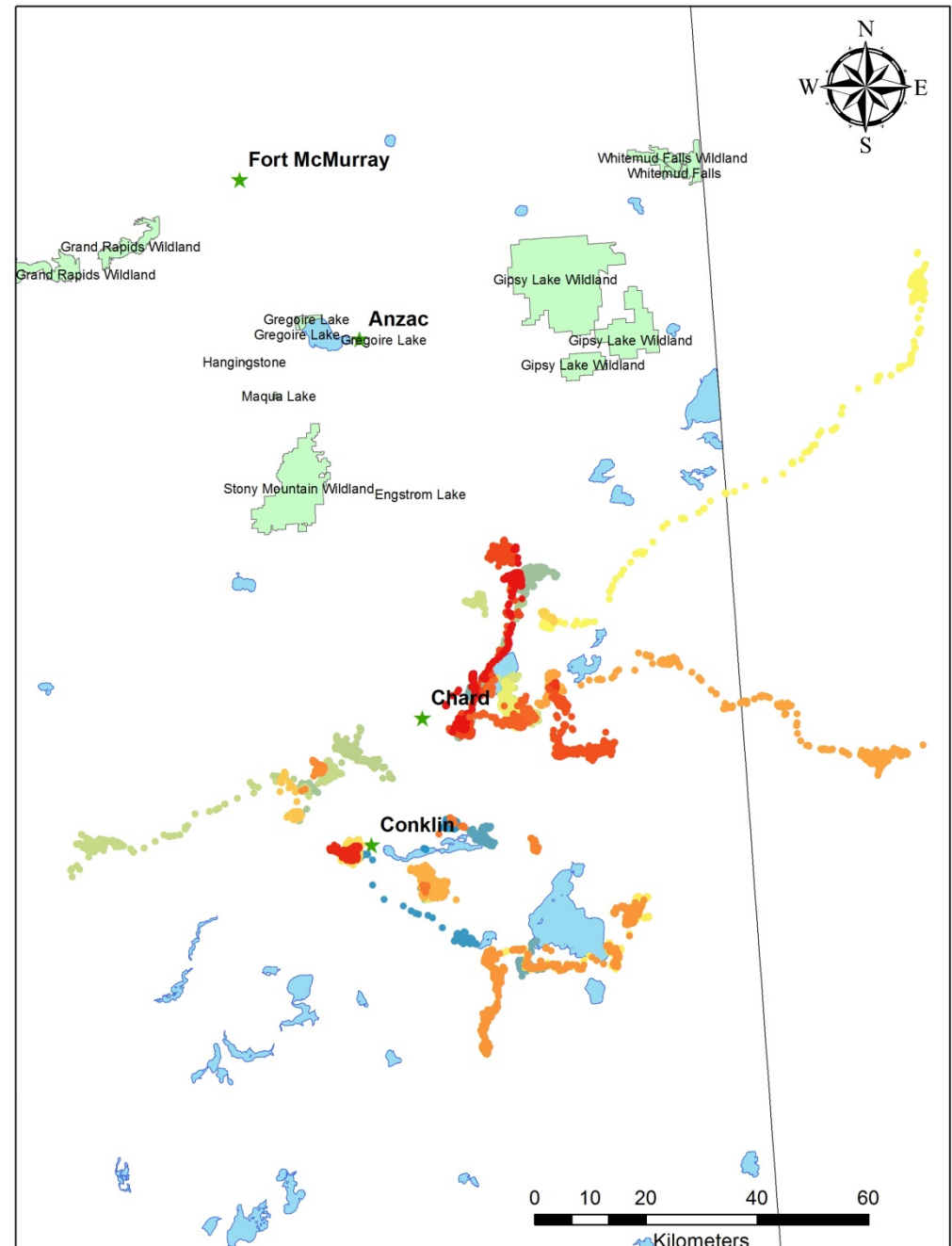
RESULTS

Deer survival was quite variable.
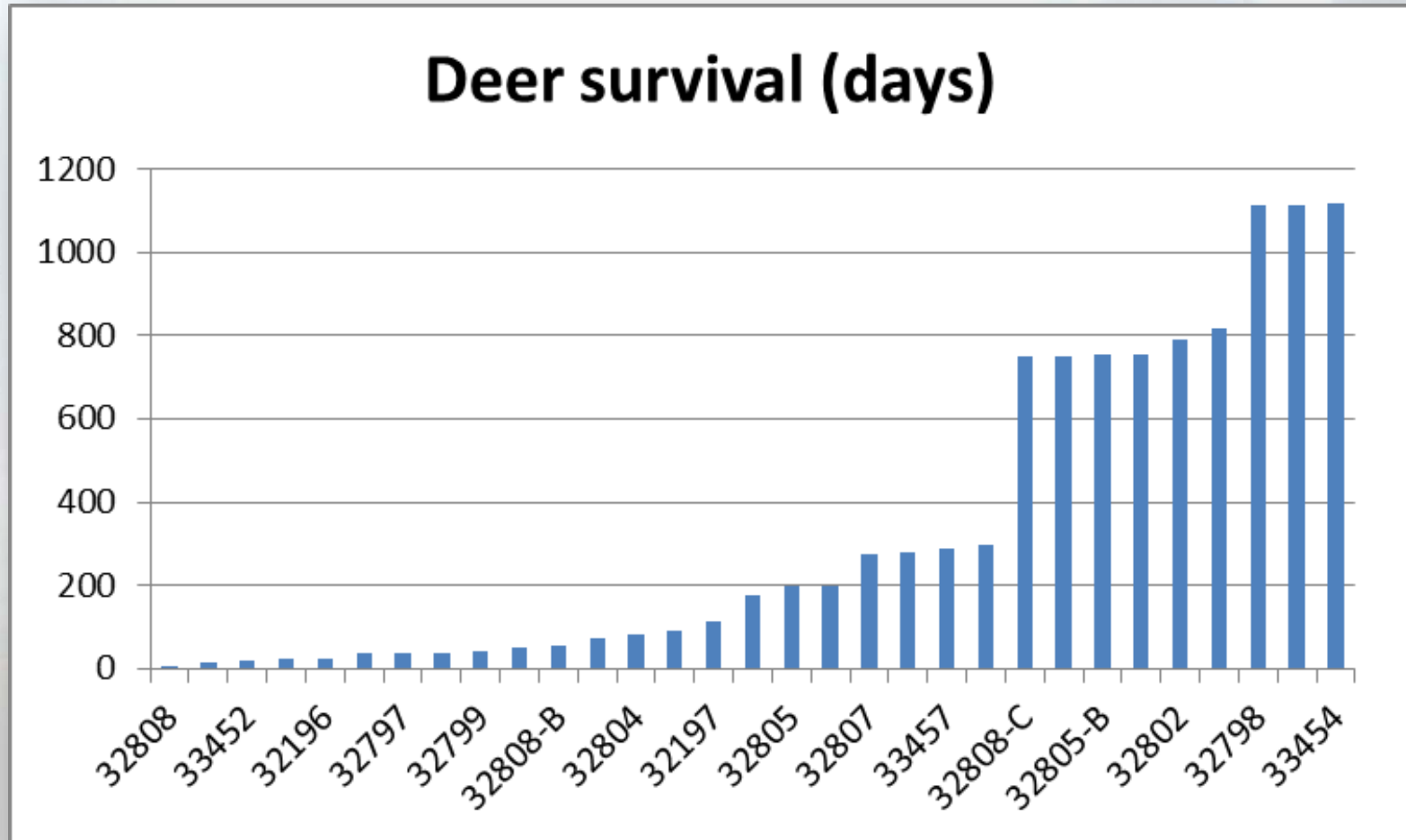
RESULTS

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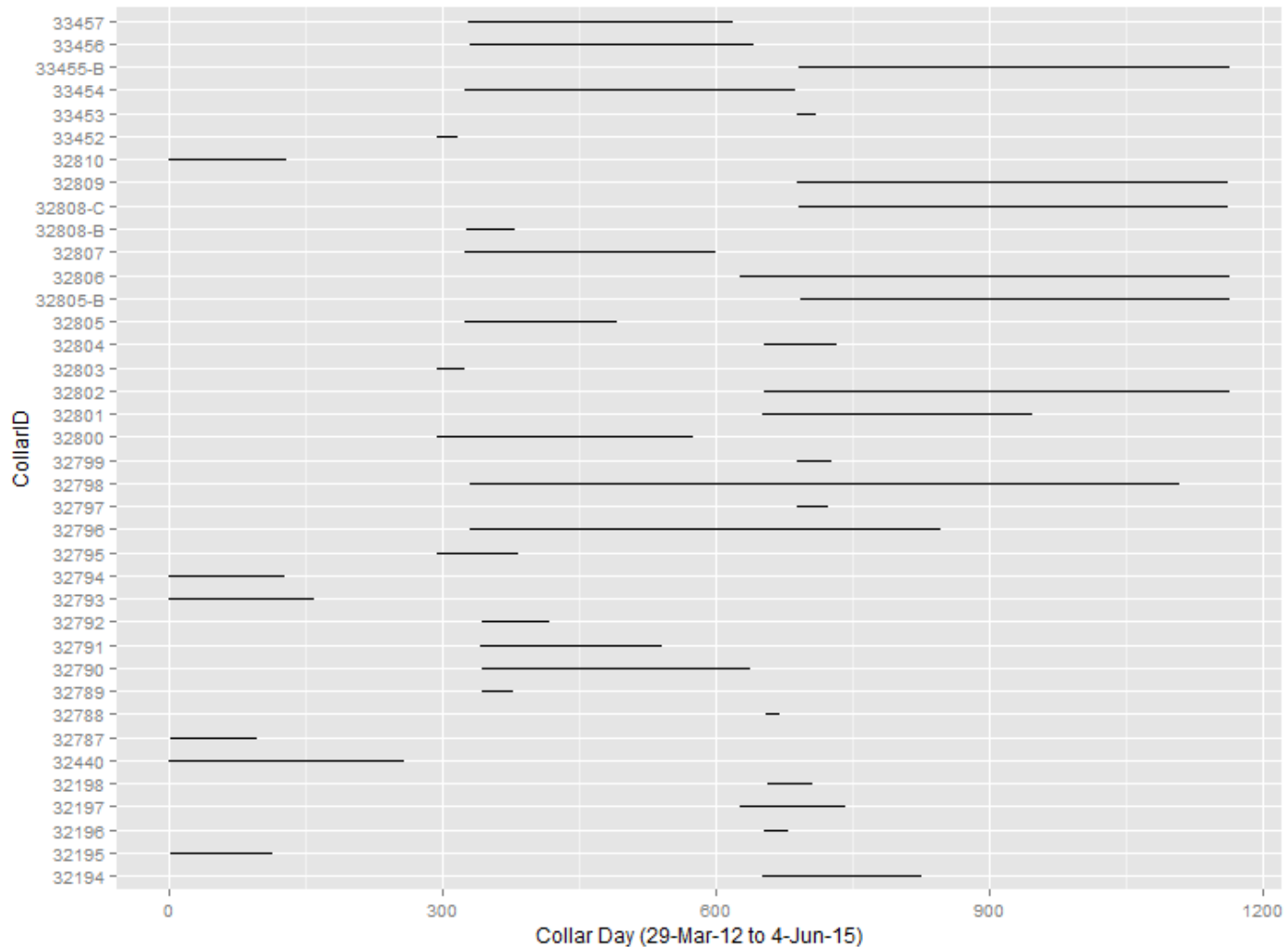
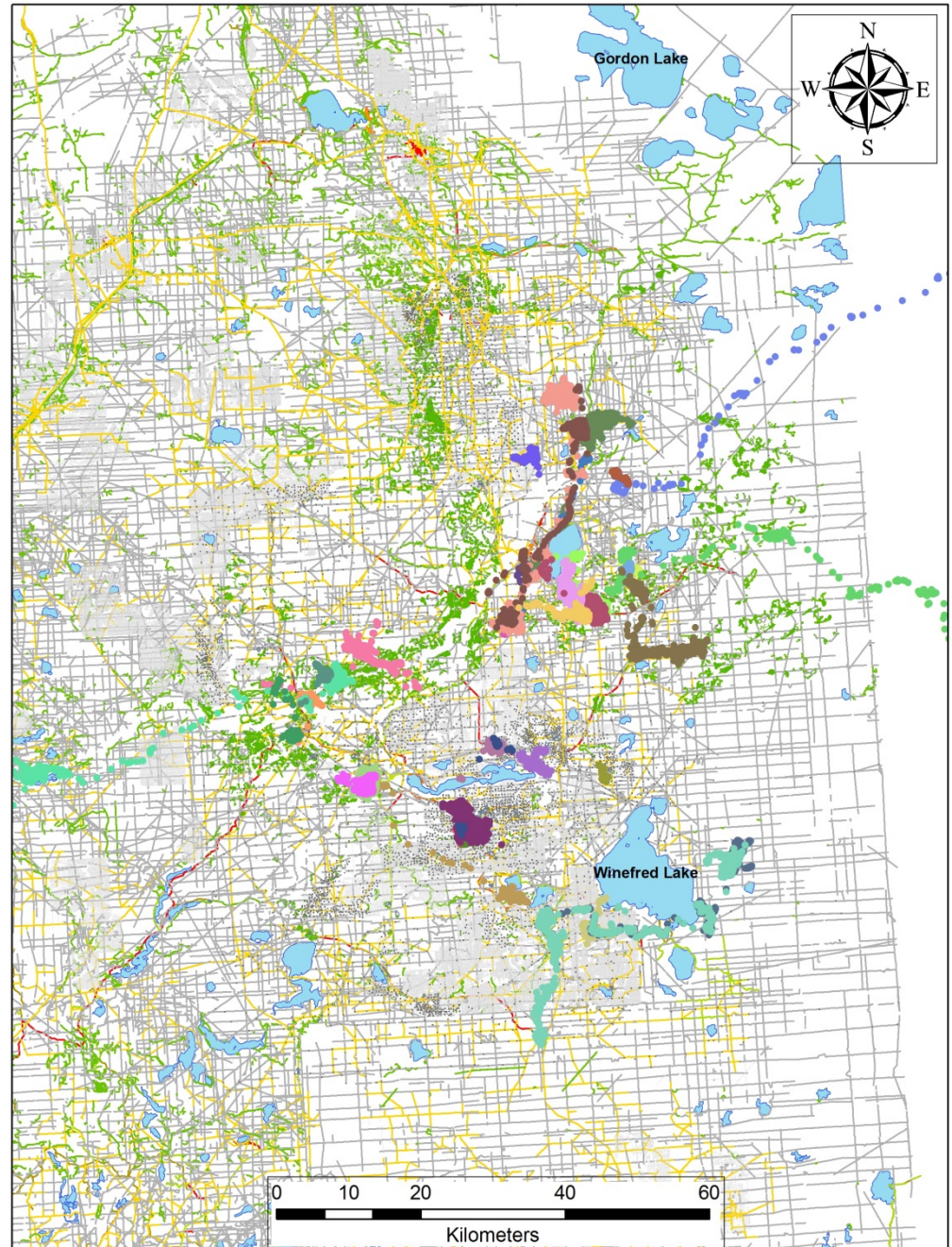# RESULTS

Deer survival was quite variable.

The duration each individual female (CollarID) was monitored.

METHODS:

SATELLITE TELEMETRY

We analysed location data using generalized linear mixed effects models.

We tested multiple hypotheses about deer selection or avoidance of natural and anthropogenic landscape features.

METHODS:
RESOURCE SELECTION FUNCTIONS

Variable Name	Description
CUTBLOCKS	Forest harvesting areas with mature trees removed and saplings regrowing
CUTLINE	Traditional seismic petroleum exploration line ca. 7-10 m wide
3D SEISMIC	Intensive (hashmarked) seismic petroleum exploration line ca. 1-3 m wide
ELECTRICAL	Electrical transmission line and grassy right of way
HIGH.DENSITY	High density industrial sites, representing high human activity (e.g. oil drilling camp)
INDUSTRIAL.MINE	Borrow Pits, Industrial Sites, Mine Sites, Well Sites, Peat Mines
NEAREST.BLOCK[+]	CutBlocks, High Density, Other Disturbed, Industrial Mine, Settlement, Wellsite
NEAREST.LINEAR[+]	Cutline, Cutline3D, Electrical, Pipeline, Trail, Truck Trail, Rail, Road
OTHER.DISTURBANCE	Recreation areas and other vegetated areas created for human use, including golf courses, grave yards, vegetated edges of airports, and any other disturbed areas that have recovered vegetation
OTHER.LINEAR[+]	All roads including one and two lane, paved and gravel, railways, and winter roads
PIPELINE	Petroleum pipeline and grassy right of way
RAIL	Railway line and associated vegetated right of way
ROAD	Hard surface road, Roads including vegetated verge, Unimproved (gravel) roads
SETTLEMENT[+]	Cultivated Areas, Municipal Areas, Urban Areas, Rural Residential Acreages
TRAIL	Unimproved dirt track ca. 5-10 m wide navigable by off-highway vehicle, foot, or horseback
TRUCK TRAIL	Unimproved dirt track navigable by truck
PCT_AW*	Trembling aspen Populus tremulodies
PCT_BW	White birch Betula papyrifera
PCT_FB	Balsam fir Abies balsamea
PCT_LT	Tamarack Larix laricina
PCT_PB	Balsam poplar Populus balsamifera
PCT_PJ	Jack pine Pinus banksiana
PCT_SB	Black spruce Picea mariana
PCT_SW	White spruce Picea glauca

RESULTS:
ANNUAL RESOURCE SELECTION FUNCTIONS

Deer selected a combination of natural and anthropogenic landscape features.

Ranking of best-supported models from each group			
Model Group	AIC	ΔAIC	AIC_w
Cumulative effects	192900	0.0	1.00
Block features	250008	57107.6	0.00
Linear features	244573	51672.8	0.00
SAGD features	276817	83917.3	0.00
Forest overstorey	257765	64865.3	0.00
Forest understorey	291353	98452.6	0.00

RESULTS:
ANNUAL RESOURCE SELECTION FUNCTIONS

Variable	Parameter estimate	Std. error	P value	Significance +
(Intercept)	-0.294	0.091	0.00129	**
CUTBLOCKS	0.899	0.011	< 2e-16	***
ASPEN FOREST	0.569	0.008	< 2e-16	***
HIGH DENSITY INDUSTRIAL	0.464	0.012	< 2e-16	***
WHITE SPRUCE	0.216	0.006	< 2e-16	***
3D SEISMIC	0.107	0.014	7.85E-14	***
LEGACY CUTLINE	-0.144	0.008	< 2e-16	***
BLACK SPRUCE	-0.243	0.007	< 2e-16	***
PIPELINE	-0.363	0.018	< 2e-16	***
WELLSITE	-0.405	0.014	< 2e-16	***
ROAD	-0.491	0.013	< 2e-16	***
TRUCKTRAIL	-0.530	0.017	< 2e-16	***
OTHER.DISTURBED	-0.812	0.010	< 2e-16	***
TRAIL	-1.051	0.009	< 2e-16	***

RESULTS:
WINTER RESOURCE SELECTION FUNCTIONS

Variable	Parameter estimate	Std. error	P value	Significance
3D SEISMIC	5.325	0.071	< 2e-16	***
TRUCKTRAIL	4.675	0.075	< 2e-16	***
PIPELINE	3.861	0.078	< 2e-16	***
WELLSITE	3.307	0.351	< 2e-16	***
HIGH DENSITY				***
INDUSTRIAL	1.409	0.040	< 2e-16	
CUTBLOCKS	-1.577	0.049	< 2e-16	***
LEGACY CUTLINE	-2.556	0.187	< 2e-16	***
ROAD	-3.108	0.174	< 2e-16	***
OTHER.DISTURBED	-3.237	0.054	< 2e-16	***
NEAREST LINEAR	-3.245	0.307	< 2e-16	***
TRAIL	-3.520	0.065	< 2e-16	***
INDUSTRIAL MINE	-3.830	0.364	< 2e-16	***
NEAREST BLOCK				***
FEATURE	-6.422	0.137	< 2e-16	
OTHER LINEAR	-7.121	0.123	< 2e-16	***

NEXT STEPS:

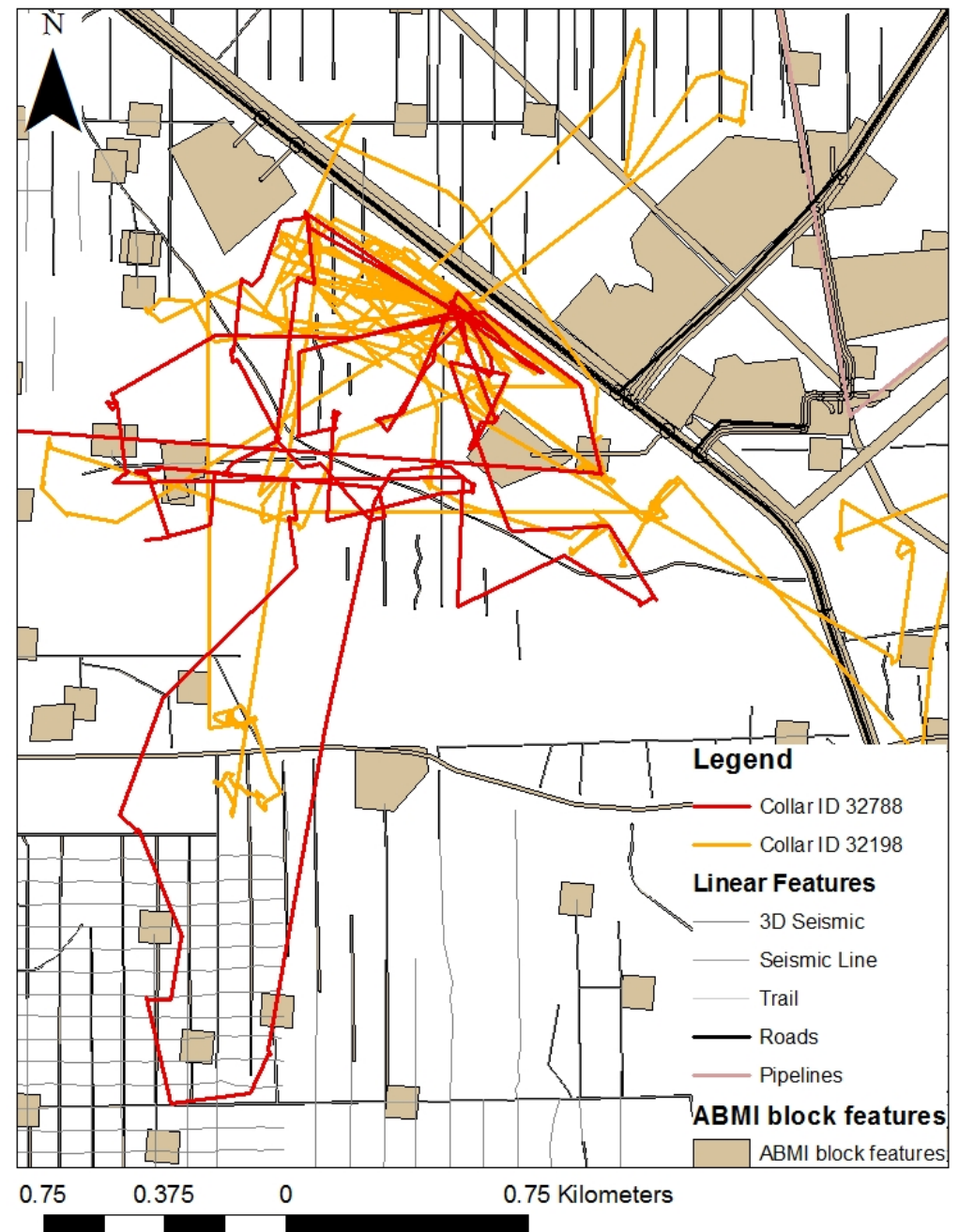## INTEGRATED STEP SELECTION FUNCTIONS

Are deer moving into areas of high forage subsidy (wellpads, industrial sites, cutblocks) in winter?
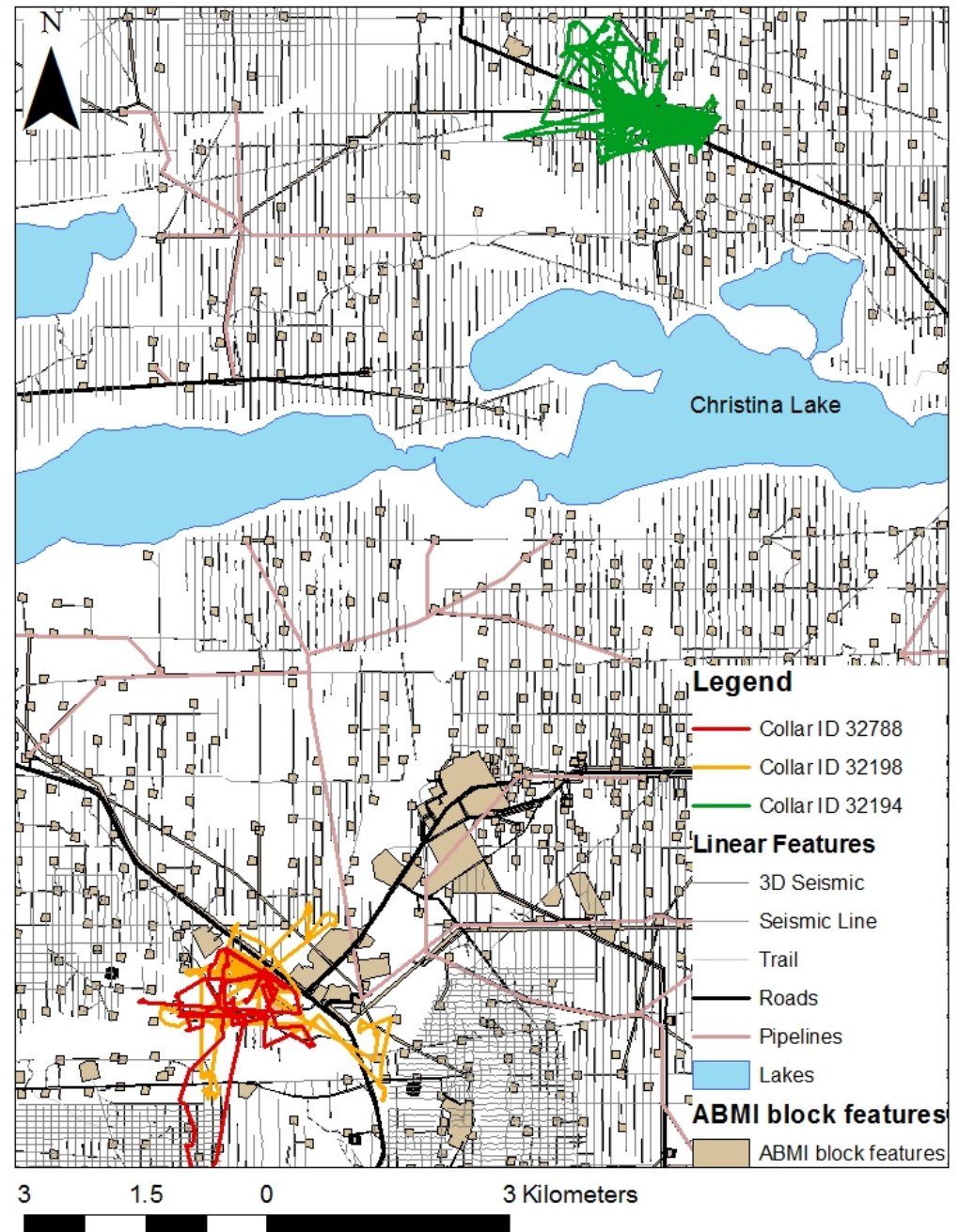
NEXT STEPS:

INTEGRATED STEP SELECTION FUNCTIONS

Are linear features facilitating white-tailed deer movement, or are linear features being avoided (and hence impeding movement)?

PRELIMINARY TAKE-HOME MESSAGES

1. Deer strongly select cutblocks, high density industrial sites, 3D cutlines.

2. Year-round, deer strongly avoid trails, truck trails, disturbed areas, roads, wellsites, pipelines, seismic lines.

3. In winter, deer strongly selected pipelines, well sites, and truck trails.

4. Deer space-use is generally consistent with:

   i. exploitation of early seral vegetation in polygonal features; and

   ii. segregation from linear features travelled by humans and predators that represent predation risk.

PRELIMINARY BEST MANAGEMENT PRACTICES

1. Reducing deer populations should be a priority for both the forest industry and the petroleum industry.

2. Industrial sites and well sites should be made unpalatable to white-tailed deer either by planting, fencing, or aversive techniques.

3. Existing 3D seismic lines may have to be targeted for restoration using conifers - in addition to current restoration of legacy seismic lines.

4. Anti-deer restoration should target features more distant from areas already perceived as risky, such as roads and trails.

THE END

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