Current Condition Report for Forest Biodiversity: Lakes Timber Supply Area

APPENDIX 7

Species Disturbance Hazard Rating, Mature and Old Forest Interior Indicator and Ratings, Area Undisturbed by Road, and Road Disturbance Rating in the Lakes Timber Supply Area (TSA)

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Species Disturbance Rating Overview

The *Species Disturbance Hazard Rating* is used to estimate the likelihood that species have altered behavior, biology, or interactions due to increased forest edges, roads, and other linear features. Two indicators are used in *the Species Disturbance Hazard* assessment: the *Mature and Old Interior Forest* and *Area Undisturbed by Roads and Linear Features* indicators.

Old and Mature Forest Interior Indicator

The *Old and Mature Forest Interior* indicator indicates the amount of old and mature forest that is not experiencing edge effect. Edge effect refers to the ecological changes that occur when a new forest edge is created, either by a natural disturbance such as fire or human-caused disturbance such as harvest.

The CEF Forest Biodiversity protocol uses an edge-weighted contrast buffer to consider the age and type of adjacent forest or non-forested patch to determine the extent that edge effects extend into a mature or old forest patch (Table 1). The illustration on the right shows the shaded areas within the mature and old forest patches that are not affected by edge effects that would be classified as interior forest based on different buffer distances applied to adjacent land cover or forest types.

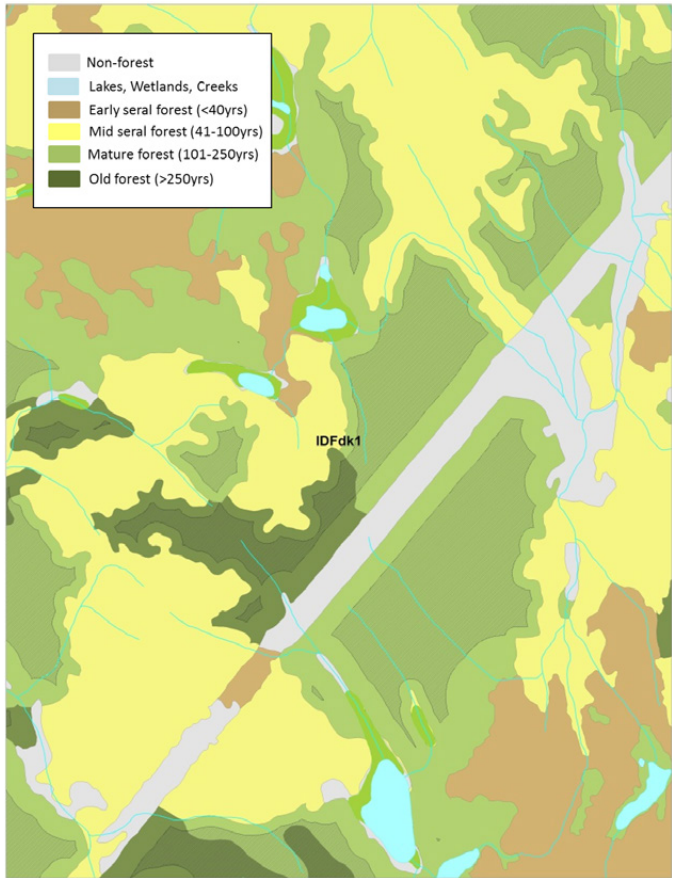


Table 1: *Edge Buffer Distances used to Represent the Influence of Edge Effects into Mature and Old Forests from Adjacent Patch Types.*

Seral Stage or Patch	Adjacent Patch						
	Mature	101–120 years	41–100 years	20–40 years	0–20 years	Non-productive; Non forested[a]	Lakes, Wetlands and Large Rivers
	Distance in meters (m)						
Old	10 m	25 m	50 m	100 m	200 m	100 m	100 m
Old and Mature	0 m	50 m	50 m	100 m	200 m	100 m	100 m

[a] This category includes naturally non-forested areas. Converted forest areas, including urban and agricultural lands and major linear corridors are included as patches 0-20 years old.

The Interior Forest Habitat Loss Rating

The *Interior Forest Habitat Loss Rating* is used as an estimate of the likelihood of a loss of mature and old interior forest habitats and increased edge effects. To derive the rating, the range of expected early seral forest amounts by stand-replacing disturbance return intervals (Table 2) was used to derive historic estimates for mature and old interior forest area based on the relationship between % early seral forest and interior forest area (further documentation is provided in Appendix 7 of the CEF Forest Biodiversity Protocol). In forested ecosystems with infrequent stand-replacing disturbances (NDT 1, 2, 4) and relatively low amounts of early seral and smaller patch sizes, interior forest area is expected to be relatively high. Forest ecosystems that experience more frequent stand-replacing disturbance events (NDT3) and that typically have higher amounts of edge, lower amounts of interior forest area estimates are expected (Table 2). The amount of mature and old interior forest by LU/BEC for the Lakes Timber Supply Area (TSA) is reported in Table 5. Maps of the percent mature and old interior forest and interior forest habitat loss ratings for the Lakes TSA are reported in Figure 2 and Figure 3.

Table 2: *Interior Forest Habitat Loss Ratings of Low, Moderate and High Relative to Stand-Replacing Disturbance Return Interval.*

Stand-Replacing Disturbance Return Interval	Interior Forest Habitat Loss Rating		
	Low	Moderate	High
	Percent (%) Interior Mature + Old Forest		
<200yrs	>25	11-25	<10
200-350yrs	>50	25-50	<25
350+yrs	>70	51-70	<50

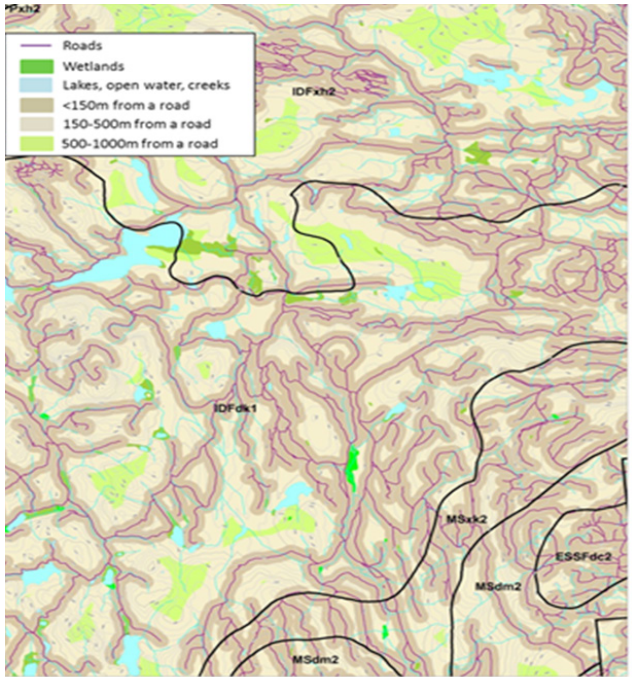
Area Undisturbed by Roads and Linear Features Indicator

The *Area Undisturbed by Roads and Linear Features* indicator is intended to estimate the proportion of the landscape potentially not affected by the negative effects associated with roads and linear features. Examples of impacts associated with roads include:

- increased mortality from increased predator efficiency,
- direct mortality from hunting or vehicle collisions, and
- animal displacement and stress on breeding individuals.

Two buffer distances (150 m and 500 m) are used to represent the 'zone of influence' of potential negative effects of roads and linear features into the surrounding forested land base. The 500 m buffer is applied to highways and main arterial roads reflecting greater traffic volume and noise, whereas the 150 m buffer is applied to all other roads. These distances are based on existing literature showing most responses by animals to road-related effects generally occur within this distance from a road. However, when using this indicator, this assumes all roads are open and accessible and used equally along their length. The illustration on the right shows the buffered area around roads.

The indicator uses the provincial Cumulative Effects Framework (CEF) Integrated Roads (2021) layer created by consolidating various road source information including the Digital Road Atlas (DRA), Forest Road tenures (FTEN), and Mineral Tenure roads.



Road Disturbance Rating

The *Road Disturbance Rating* is a qualitative estimate of the extent of roads and linear features effects in forested environments. Unlike other ratings where benchmarks are based on historic estimates, roads and linear features have no historical analogue. To derive ratings, existing published literature on road-related effects was reviewed to determine preliminary benchmarks. The existing literature does provide some evidence to suggest that relatively low road densities (<0.06 km/km^2, approximately 60% area >500 m from a road) in forested environments is required to maintain large carnivores such as wolves, mountain lion (*Felis concolor*), and functioning predator prey systems. Moderate to high road densities (>1.5 km/km^2; approximately <30% of the land base >500 m and almost no area >1000 m from a road) suggest that most of the landscape would experience relatively high level of road-related effects on almost all species and provides an upper benchmark between the moderate and high likelihood ratings (Table 3). The percent area undisturbed by roads and road disturbance rating by LU/BEC can be found in in Table 5 for the Lakes TSA. Maps of the percent area undisturbed area undisturbed by roads and the road disturbance rating by LU/BEC for the Lakes TSA are shown in Figure 4 and Figure 5.

Table 3: *The Road Disturbance Rating based on the Percent (%) of the Historic Forest Lane Base is more than 500 meters from a Road or Linear Feature.*

	Road/Linear Feature Disturbance Rating		
	Low	**Moderate**	**High**
Area >500m from a Road or Linear Feature	>60%	31-60%	<30%

Species Disturbance Hazard Rating

The *Species Disturbance Hazard Rating* is used to estimate the likelihood that species have altered their behaviour, biology, or interactions due to increased forest edges and roads and linear features effects. The rating is derived by combining the *Interior Forest Amount Rating* and the *Roads/ Linear Features Disturbance* Ratings in the following matrix (Table 4). Information on Species Disturbance Hazard ratings by LU/BEC can be found in Table 5 and maps are shown in Figure 1 for the Lakes TSA.

Table 4: *The Species Disturbance Hazard Rating Matrix based on the Forest Interior Loss and Road Disturbance Ratings.*

		Road/Linear Feature Disturbance Rating		
		Low	**Moderate**	**High**
Forest Interior Loss Rating	**Low**	Very Low	Low	Moderate
	Moderate	Low	Moderate	High
	High	Moderate	High	Very High

Species Disturbance Rating: Lakes TSA

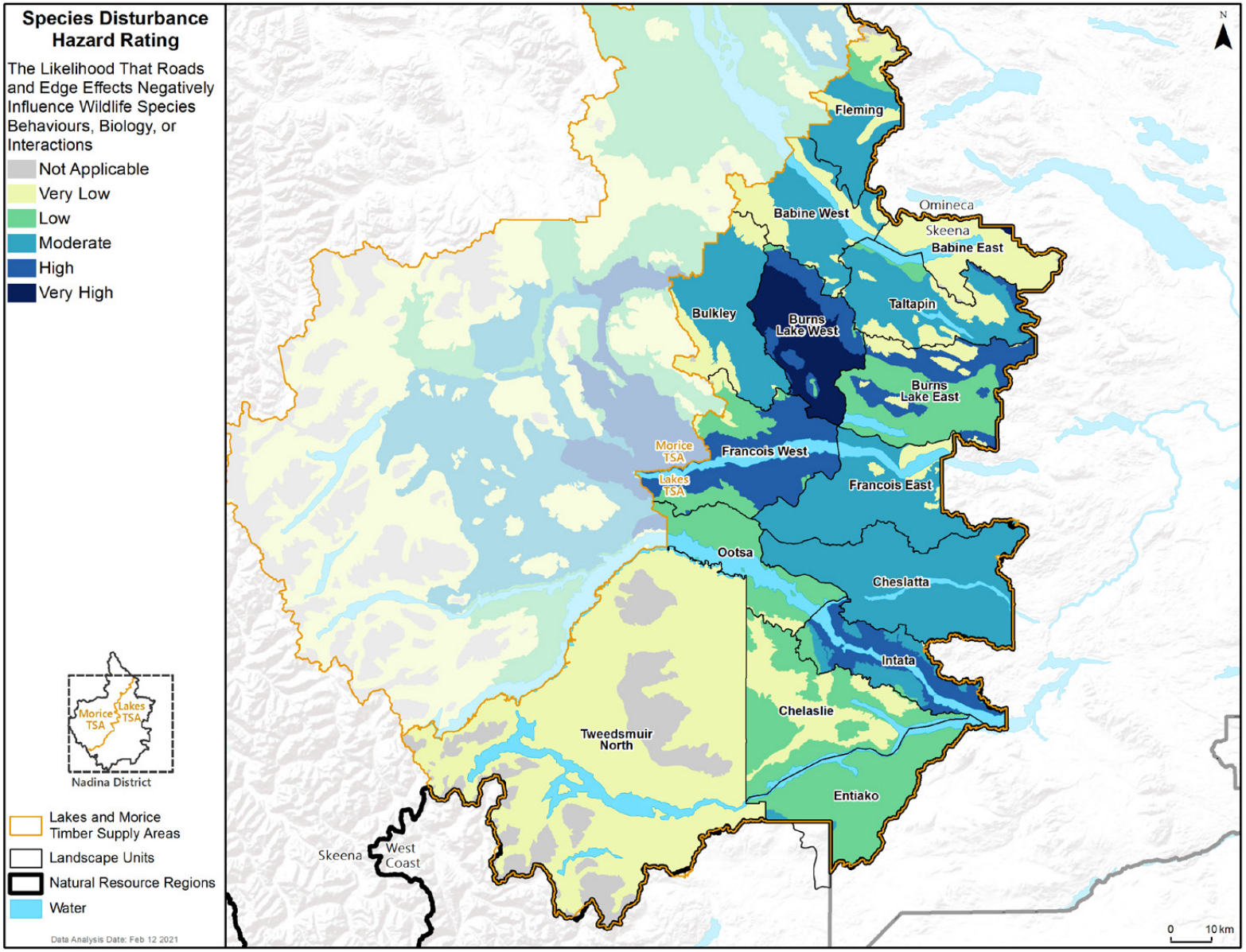


Figure 1: *Species Disturbance Rating for the Lakes Timber Supply Area.*

Table 5: *Species Disturbance Hazard Rating, Interior Forest Loss, and Road Disturbance Ratings in the Lakes Timber Supply Area.*

Landscape Unit	BEC	NDT	LU/BEC Area (ha)	HFLB Area (ha)	Percent Mature plus Old Forest (%)	Percent Mature plus Old Forest Interior (%)	Interior Forest Loss Rating	Area Undisturbed by Road (%)	Road Disturbance Rating	Species Disturbance Hazard Rating
Babine East	ESSFmc	NDT2	3,307	3,287	74.0	59.6	L	80.8	L	VL
	ESSFmv1		8,701	8,674	55.4	41.8	L	96.1	L	VL
	SBSdk	NDT3	21,749	15,173	64.0	45.0	L	80.7	L	VL
	SBSdw3		519	468	22.2	0.0	H	27.7	H	VH
	SBSmc2		18,308	18,013	51.7	31.9	L	78.3	L	VL
Babine West	ESSFmc	NDT2	14,467	13,563	80.2	58.2	L	79.9	L	VL
	ESSFmv1		1,693	1,681	79.8	56.6	L	86.1	L	VL
	SBSdk	NDT3	12,156	7,700	53.9	36.5	L	69.1	L	VL
	SBSmc2		42,607	39,543	48.3	24.0	M	50.8	M	M
Bulkley	ESSFmc	NDT2	17,355	16,104	59.9	38.4	L	75.6	L	VL
	SBSdk	NDT3	41,139	35,375	35.4	13.8	M	37.3	M	M
	SBSmc2		18,998	18,168	38.1	19.6	M	53.5	M	M
Burns Lake East	ESSFmc	NDT2	10,757	10,526	27.6	13.9	L	77.4	L	VL
	ESSFmv1		1,181	1,165	14.1	10.8	L	86.0	L	VL
	SBSdk	NDT3	47,192	41,283	27.2	9.7	L	45.3	M	L
	SBSdw3		7,302	7,011	24.8	6.8	L	52.8	M	L
	SBSmc2		31,187	30,307	15.3	8.8	H	58.2	M	H
Burns Lake West	ESSFmc	NDT2	1,803	1,737	52.0	28.6	M	60.2	L	L
	SBSdk	NDT3	49,700	45,023	34.5	9.1	H	18.0	H	VH
	SBSmc2		20,724	20,184	42.0	14.3	M	29.7	H	H
Chelaslie	ESSFmc	NDT2	32,852	31,147	57.3	43.3	M	77.1	L	L
	SBSdk	NDT3	31,599	23,263	32.2	20.3	M	71.5	L	L
	SBSmc2		45,955	42,505	49.4	36.9	L	68.7	L	VL
Cheslatta	ESSFmv1	NDT2	3,811	3,792	14.8	5.8	H	83.9	L	M
	SBSdk	NDT3	74,218	63,499	32.3	19.3	M	58.0	M	M
	SBSmc2		43,961	42,324	28.7	16.4	M	52.3	M	M

Landscape Unit	BEC	NDT	LU/BEC Area (ha)	HFLB Area (ha)	Percent Mature plus Old Forest (%)	Percent Mature plus Old Forest Interior (%)	Interior Forest Loss Rating	Area Undisturbed by Road (%)	Road Disturbance Rating	Species Disturbance Hazard Rating
Fleming	ESSFmv3	NDT2	10,733	10,644	81.4	65.6	L	87.5	L	VL
	SBSdk	NDT3	3,399	2,990	66.5	40.3	L	76.2	L	VL
	SBSmc2		34,662	33,674	48.2	24.5	M	57.8	M	M
	SBSwk3		5,283	5,252	60.6	28.9	L	39.9	M	L
François East	ESSFmc	NDT2	858	857	21.0	11.0	L	93.3	L	VL
	ESSFmv1		1,196	1,169	47.3	50.2	L	77.3	L	VL
	SBSdk	NDT3	64,924	54,387	27.3	11.9	M	47.4	M	M
	SBSdw3		8,933	5,239	46.8	27.8	L	81.6	L	VL
	SBSmc2		15,964	15,769	34.7	18.1	M	52.1	M	M
François West	ESSFmc	NDT2	3,911	3,799	58.0	42.2	L	67.0	L	VL
	SBSdk	NDT3	66,766	51,455	25.8	9.1	H	34.8	M	H
	SBSmc2		24,286	23,708	34.7	21.6	L	56.9	M	L
Intata	ESSFmc	NDT2	4,089	3,952	42.2	29.0	M	64.2	L	L
	ESSFmv1		103	103	21.8	0.0	L	80.3	L	VL
	SBSdk	NDT3	39,832	27,190	31.5	9.7	H	42.3	M	H
	SBSmc2		17,693	17,105	25.0	12.6	M	43.0	M	M
Ootsa	ESSFmc	NDT2	2,633	2,587	40.0	20.5	L	77.7	L	VL
	SBSdk	NDT3	45,596	26,576	32.7	14.1	L	50.8	M	L
	SBSmc2		9,173	8,864	34.5	18.8	L	58.3	M	L
Taltapin	ESSFmc	NDT2	17,474	17,251	61.0	42.0	L	71.3	L	VL
	ESSFmv1		3,307	3,281	35.6	23.9	H	52.3	M	H
	SBSdk	NDT3	6,784	3,612	56.9	18.6	L	48.2	M	L
	SBSmc2		52,928	47,336	41.9	18.1	M	41.5	M	M

Landscape Unit	BEC	NDT	LU/BEC Area (ha)	HFLB Area (ha)	Percent Mature plus Old Forest (%)	Percent Mature plus Old Forest Interior (%)	Interior Forest Loss Rating	Area Undisturbed by Road (%)	Road Disturbance Rating	Species Disturbance Hazard Rating
Tweedsmuir North	CWHws2	NDT2	13,431	8,371	98.3	82.5	L	98.3	L	VL
	ESSFmc		148,755	138,944	63.4	72.5	L	99.6	L	VL
	MHmm2	NDT1	15,293	11,020	83.9	64.1	L	100.0	L	VL
	SBPSmc	NDT3	214	212	0.0	93.7	L	100.0	L	VL
	SBSdk		9,710	8,891	38.1	43.3	L	98.7	L	VL
	SBSmc2		142,141	113,650	61.2	77.7	L	99.8	L	VL
Entiako	ESSFmc	NDT2	1,306	1,303	28.7	10.0*	H	100.0*	L	M
	ESSFmcp		1,650	165	7.3	10.0*	H	100.0*	L	M
	SBPSmc	NDT3	54,374	50,851	16.8	10.0*	M	100.0*	L	L
	SBSdk		22,990	16,428	6.6	10.0*	M	100.0*	L	L

* Estimated as these indicators were not calculated for Entiako LU in the original assessment.

Mature and Old Forest Interior Percent and Loss Rating: Lakes TSA

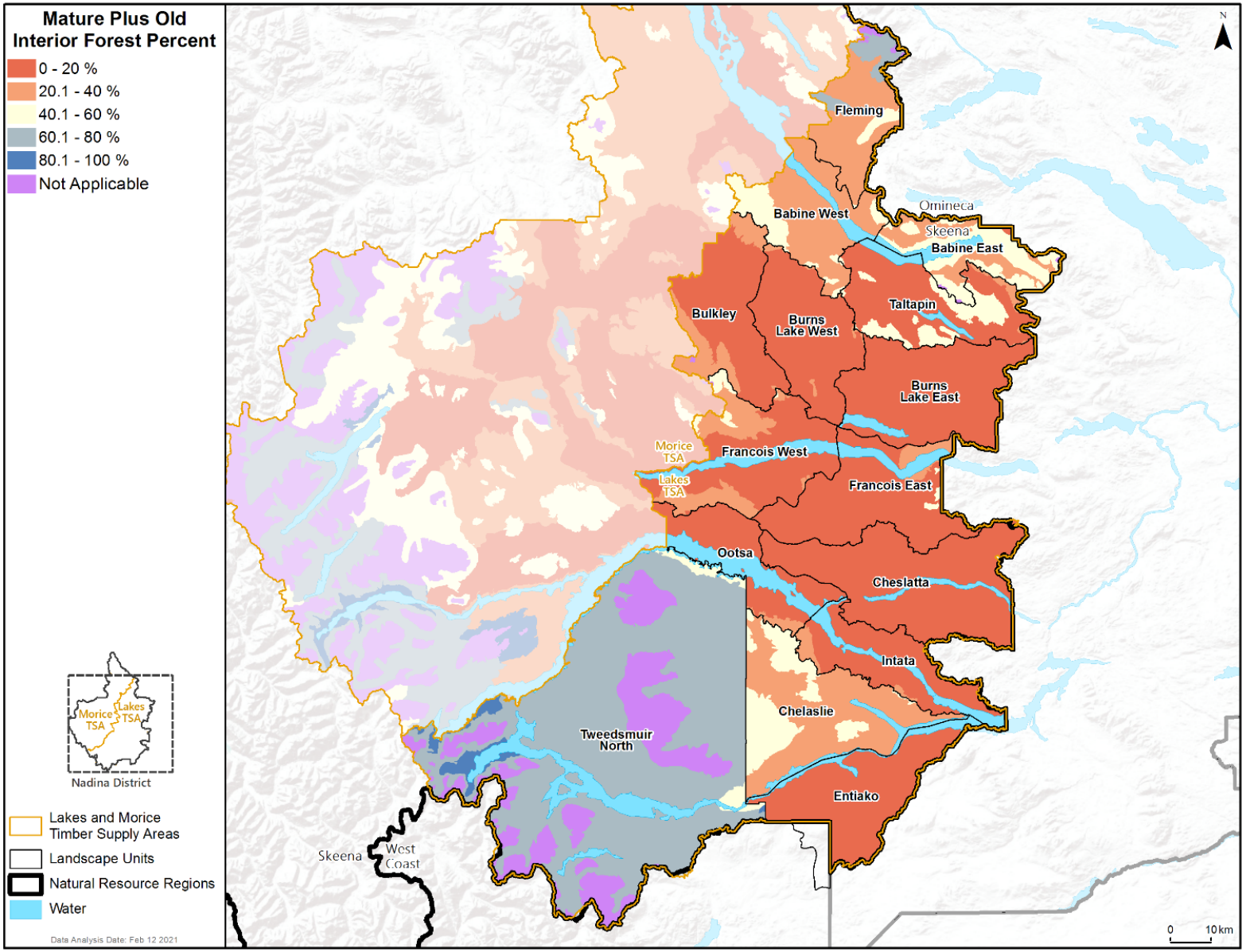


Figure 2: *Mature-plus-Old Forest Interior Percent for the Lakes Timber Supply Area.*

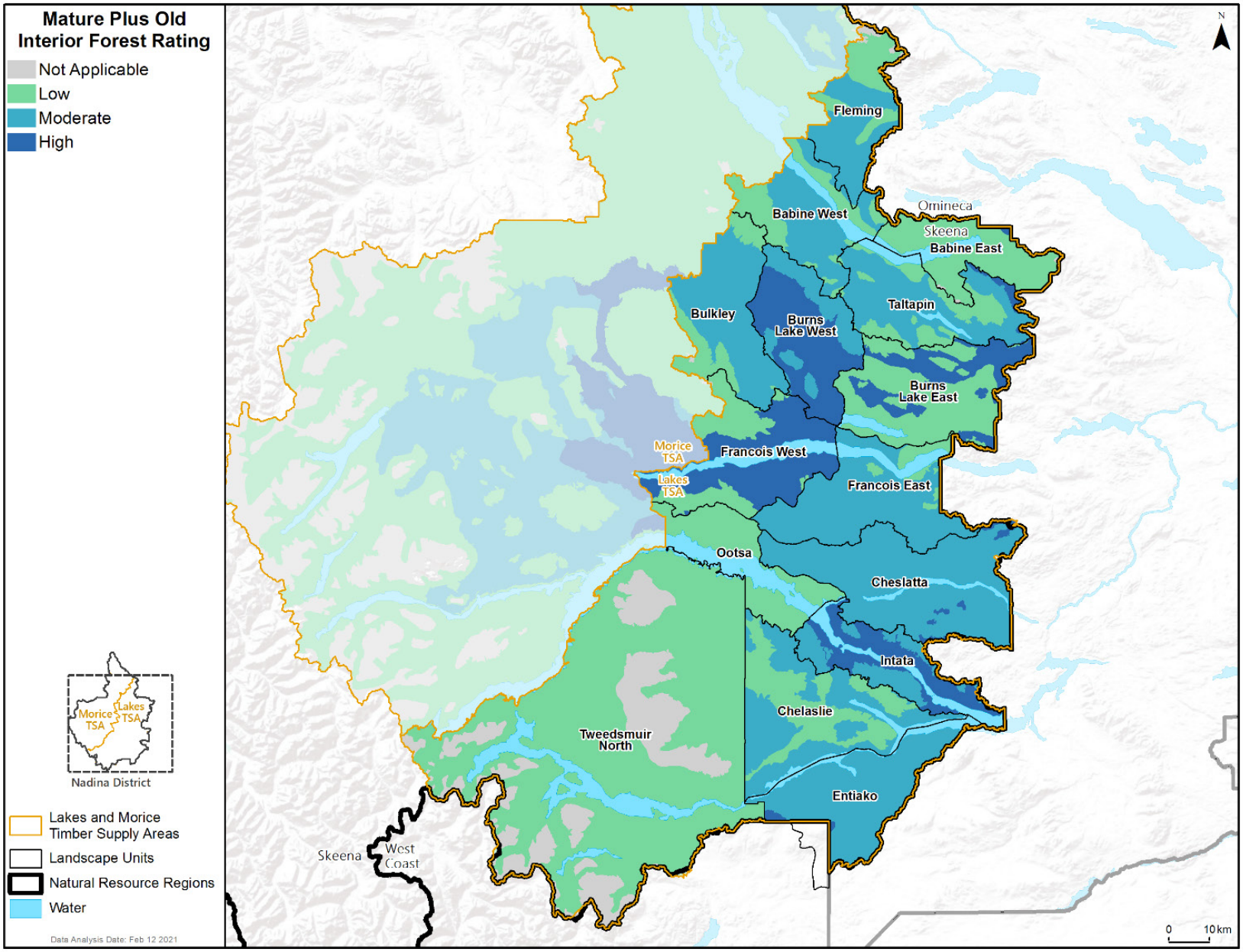


Figure 3: *Mature-plus-Old Interior Forest Loss Rating for the Lakes Timber Supply Area.*

Area Undisturbed by Roads Percent and Rating: Lakes TSA

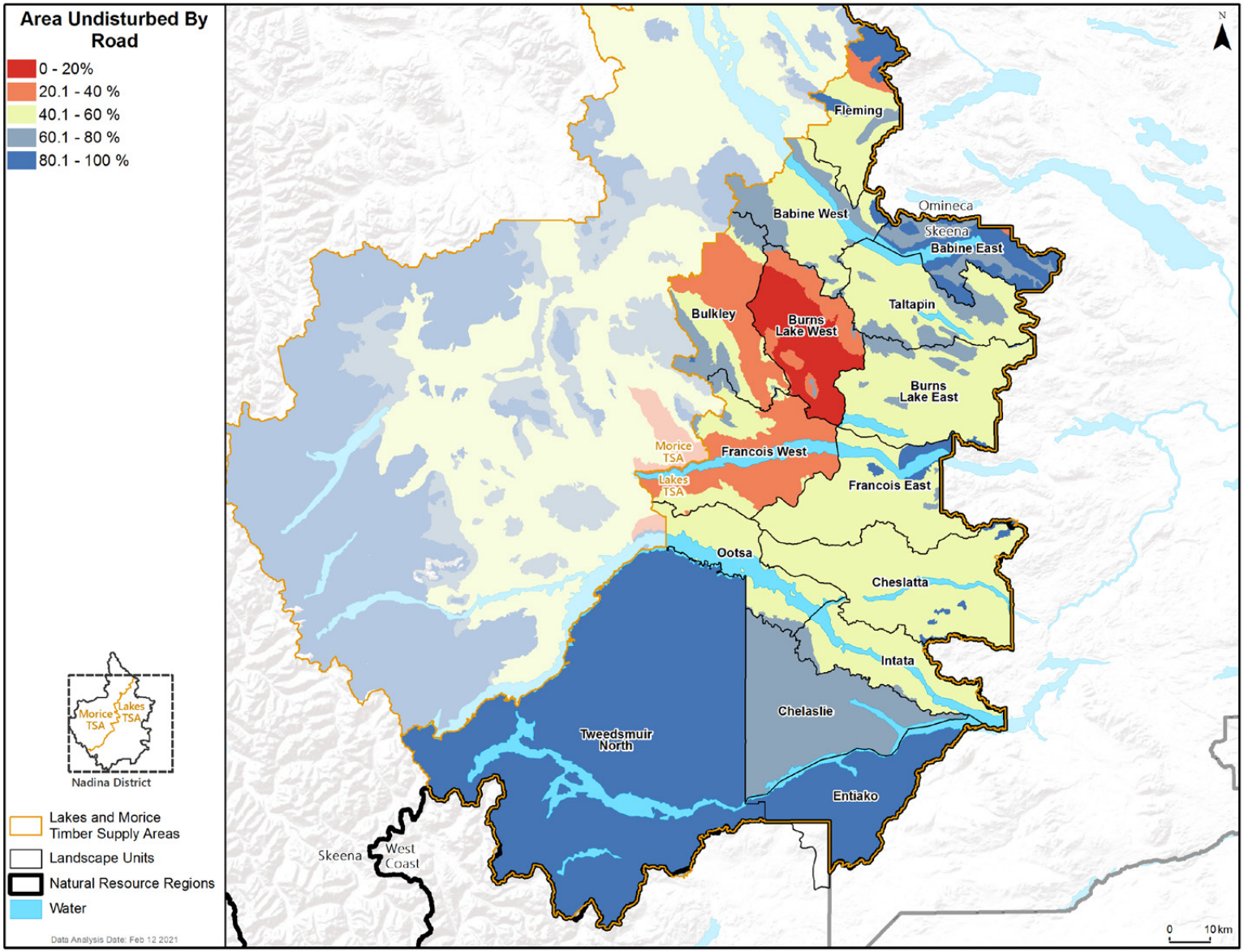


Figure 4: *Percent Area Undisturbed by Road for the Lakes Timber Supply Area.*

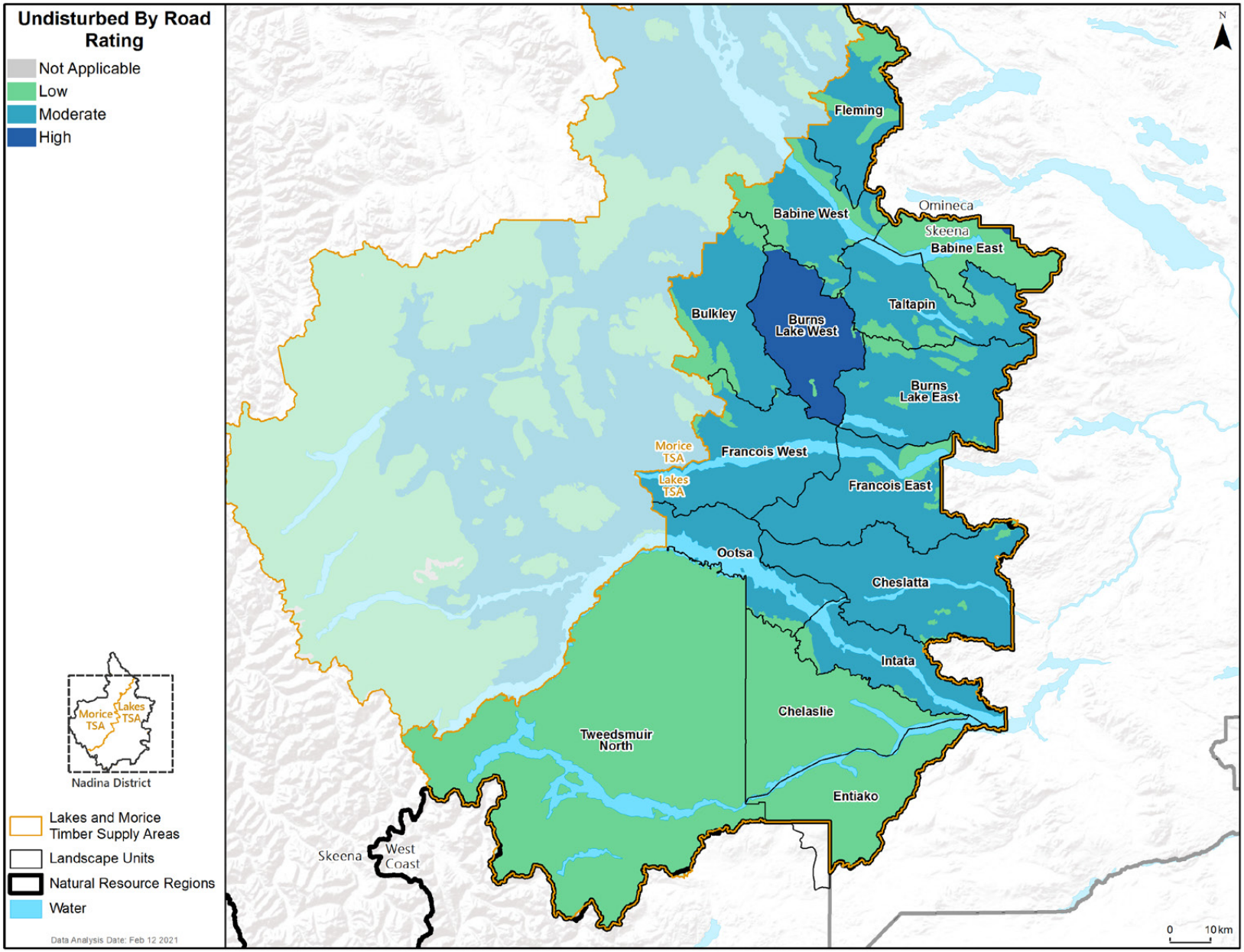


Figure 5: *Road Disturbance Rating for the Lakes Timber Supply Area.*