



**WSP Indicator Analysis for the Kispiox TSA:
Total Land Cover Alteration
Freshwater Atlas (FWA) Assessment Watersheds**

Prepared for:

SkeenaWild Conservation Trust
Unit 103 - 4622 Greig Avenue
Terrace BC V8G 1M9

Prepared by:

Eclipse Geomatics Ltd.
3423 Fulton Avenue Unit 102
Smithers BC V0J 2N0

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Note to reader:

These Wild Salmon Policy (WSP) habitat indicator assessment reports are intended as a coarse filter approach to identify watersheds that are potentially at risk of exceeding thresholds for the four WSP habitat indicators (Road Density, Stream Crossing Density, Total Land Cover Alteration, and Riparian Disturbance). These reports present the results of GIS-based (Tier 1) methods for assessing the status of a particular freshwater aquatic habitat pressure indicator and determining the watershed indicator “risk” status by comparing the measured values to indicator benchmarks. Pressure indicators are identified by Canada’s WSP as proactive measures of identifying potential impacts to salmon habitat within a watershed. Additional information on the WSP is available at <https://www.pac.dfo-mpo.gc.ca/fm-gp/salmon-saumon/wsp-pss/ip-pmo/ip-smm-pmo-eng.html#assessment>.

The analysis presented in this report was carried out using standardized provincial datasets and did not integrate field-based (Tier 2) information or industry datasets. The results are presented for informational purposes and are not intended to replace operational watershed assessments.

Acknowledgements

We would like to thank Sarah Railton, Greg Knox, and Julia Hill Sorochan for their contributions and feedback, and to Glen Buhr for his assistance and guidance.

WSP Indicator Analysis for the Kispiox TSA

Pressure Indicator: Total Land Cover Alteration

Assessment Units: FWA Assessment Watersheds

Description of Pressure Indicator

Total Land Cover Alteration (TLCA) refers to the change in land surface cover following human development or natural disturbance events, resulting in a suite of potential changes to hydrological processes and sediment generation, with potential impacts to downstream salmon habitat as well as changes in biodiversity (Stalberg et al., 2009). Land cover alteration categories include agriculture, urban development, mining activity, road and utility development, forestry, and fire disturbance. TLCA is reported as a percentage of the total area assessed. The Wild Salmon Policy (WSP) Habitat Working Group has ranked TLCA as a high value pressure indicator (Stalberg et al., 2009).

Study Area

The Kispiox timber supply area (TSA) is situated in the interior of northwest BC and encompasses the District of New Hazelton and the communities of Hazelton, South Hazelton, Kitwanga, Cedarvale, Kispiox, Gitsegukla, Gitwangak, Gitanyow, Hagwilget, Glen Vowell and Gitanmaax (Figure 1). The Kispiox TSA is part of the Skeena Natural Resource Region and is administered by the Skeena Stikine Natural Resource District office in Smithers.

The Kispiox TSA is comprised of seven TSA supply blocks (12A to 12G), with the Cranberry TSA consolidated with the Kispiox TSA on March 31, 2009 as Block 12G. The current allowable annual cut for the Kispiox TSA is 1,087,000 cubic metres (Province of BC, 2019).

This report presents results for BC Freshwater Atlas (FWA) assessment watersheds within the Kispiox TSA and the neighbouring upper Kispiox River and Swan Lake watersheds. The FWA assessment watersheds are mesoscale groupings of fundamental watersheds with a target size of between 2,000 ha and 10,000 ha (Province of BC, 2020). A reference key for the identification of assessment units was developed based on groupings by major watershed, and reference maps of the study area with Kispiox TSA and FWA assessment watersheds are included as Appendix A.



Figure 1: The study area is indicated in red. The grey polygon indicates the outline of the Skeena River watershed.

Methodology

Data layers used to perform the spatial analysis include:

- Kispiox Road Inventory (BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development [BC MFLNRORD], 2017)
- Digital Road Atlas (BC MFLNRORD, 2020a)
- Forest Tenure Road Section Lines (BC MFLNRORD, 2020b)
- BC Transmission Lines (BC MFLNRORD, 2020c)
- Harvested Areas of BC (Consolidated Cutblocks) (BC MFLNRORD, 2020d)
- TANTALIS – Crown Tenures (BC MFLNRORD, 2020e)
- Railway Track Line (BC MFLNRORD, 2019a)
- Municipalities - Legally Defined Administrative Areas of BC (BC Ministry of Municipal Affairs and Housing, 2019)
- Reserves & Band Names - Administrative Boundaries (BC MFLNRORD, 2019b)
- Permitted Mine Areas - Major Mine (BC MEMPR, 2020)
- Fire Perimeters - Historical (BC FLNRORD, 2020f)
- Freshwater Atlas Assessment Watersheds (BC MFLNRORD, 2019c)

For the purposes of this study, anthropogenic alterations to the land base were calculated as well as natural disturbance from wildfires. Principal sources of human disturbance identified within the study area include settlements, forest harvesting (cutblocks), and road, railway, and electric powerline corridors.

Linear Disturbance Characterization

The Kispiox Road Inventory data layer was developed by BC MFLNRORD Skeena-Stikine District staff using information sourced from provincial TRIM base mapping, the Digital Road Atlas (DRA), Forest Tenure Road Section Lines (FTEN), and major licensee digital road files. The dataset was refined using best available orthophoto and satellite imagery and non-existent roads were removed (e.g. phantom duplicate or parallel road sections and planned roads that were never constructed) while deactivated roads were left in the data set (G. Buhr, personal communication, October 15, 2020).

An updated roads layer was developed for the purposes of this analysis by adding new (post-2017) road segments from the DRA and FTEN data layers that do not appear in the Kispiox Road Inventory as well as all DRA and FTEN roads within the study area but outside of the extent of the Kispiox Road Inventory dataset. These additional segments were extracted from the 2020 DRA and FTEN datasets by applying a buffer of 30 m to the Kispiox Road Inventory and selecting DRA and FTEN roads outside of this buffer added since 2017. Overlapping roads within the DRA and FTEN subsets were removed by applying a 30 m buffer to the DRA subset and selecting FTEN roads outside of the buffer. The extracted DRA and FTEN roads were then merged with the Kispiox Road Inventory to produce the input roads dataset.

Calculated road, railway, and transmission line right-of-way buffer widths were applied to the respective disturbance layers as set out below, where buffer width refers to the total width of each right-of-way:

Description	Modelled Buffer Width (m)
Trail	0
Overgrown Road	5
Unimproved Road	10
Resource Road	15
Main Resource Road	20
Local Road	25
Highways Road	50
Railway	15
Transmission Line	30

The KRI roads layer is published with modelled buffer width as an attribute in the dataset according to the characterization above. Modelled buffer width was derived for DRA and FTEN road features with characterization estimated based on road class, road surface, and number of lanes in the case of the DRA and file type for the FTEN road segments. Refer to Appendix B for details on the method applied.

Land cover alteration along pipeline rights-of-way and other utility corridors was estimated from the TANTALIS – Crown Tenures dataset selected for utility and transportation with a tenure stage of “tenure” (i.e. active tenures). The utility category does not include the Prince Rupert Gas Transmission Project, which has been permitted but to our knowledge not constructed.

Forestry Disturbance Characterization

The Consolidated Cutblocks layer was used to identify disturbance from forest harvesting within the last 60 years (i.e. harvested since 1959). This is consistent with the approach used by the Pacific Salmon Foundation (2020).

Other Anthropogenic Disturbance Characterization

Municipal and reserve boundaries were used to estimate disturbance from settlements in the study area. Additional sources of land cover alteration were estimated from the TANTALIS – Crown Tenures dataset selected for agriculture, industrial, commercial, quarrying, residential, and community tenure purposes with a tenure stage of “tenure” (i.e. active tenures). Mine footprints were estimated from the Permitted Mine Areas - Major Mine layer.

For the purposes of this analysis, ‘other’ disturbance includes disturbance from settlements, agriculture, industrial and commercial areas, mines, pipelines, transmission lines, and railways.

Natural Disturbance Characterization

The Fire Perimeters layer was used to estimate fire disturbance within the last 25 years (i.e. fires post 1994), consistent with the approach used by the Pacific Salmon Foundation (2020).

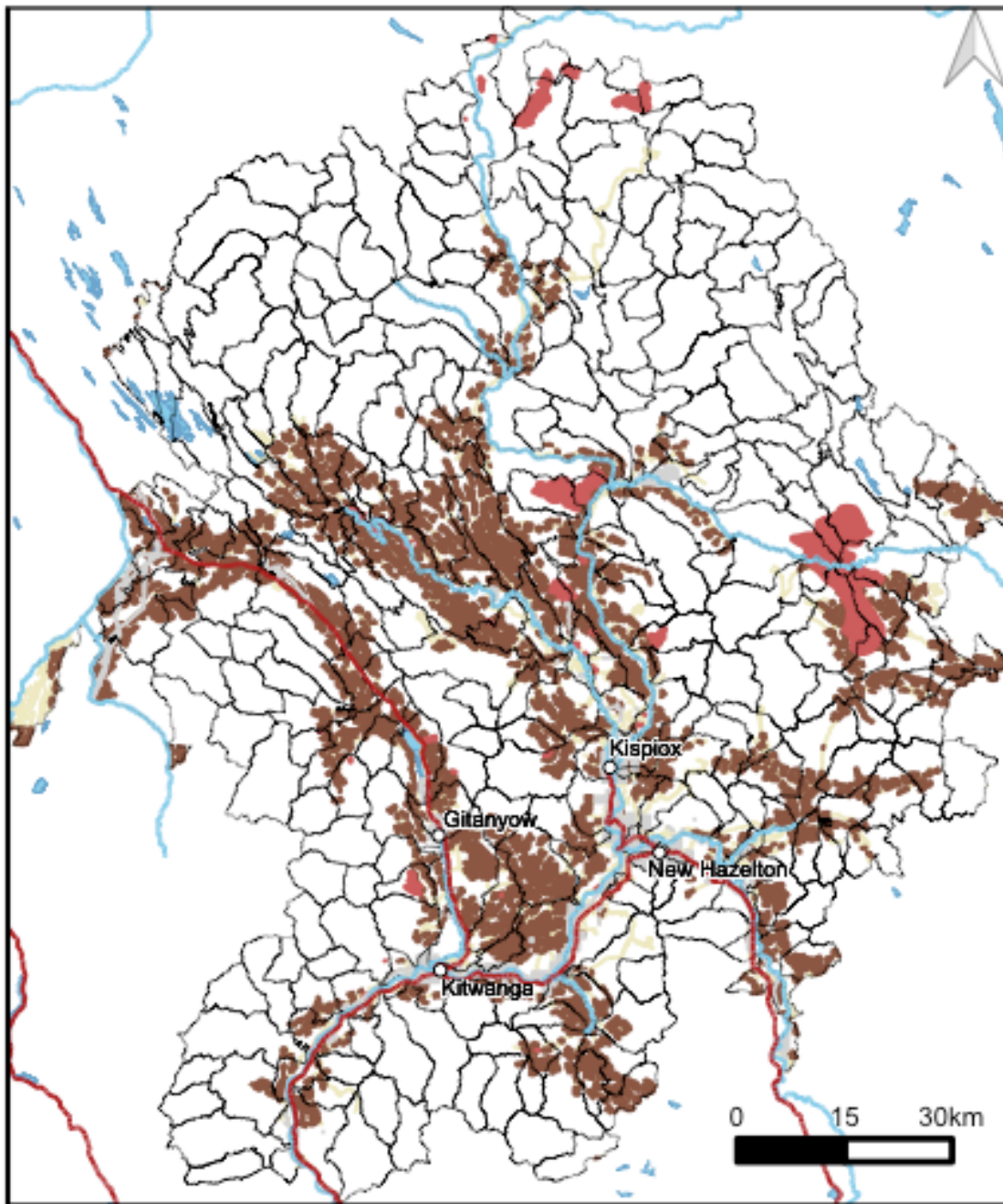
TLCA Calculation

In order to report estimated total disturbed areas by disturbance type without overlaps, a hierarchy based on predicted degree of disturbance was applied: overlapping 'other' disturbances (railways, transmission lines, mines, settlements, and tenures) were removed from harvested areas, 'other' disturbances and harvested areas were removed from road areas, and 'other' disturbances, harvested areas, and road areas were removed from fire disturbance areas.

TLCA was calculated by merging all the disturbance layers into a total disturbance layer for each assessment unit and dividing the total disturbed area by the area of each assessment unit using FWA assessment watersheds as assessment units. Figure 2 shows the location and types of land cover alteration with respect to the assessment units.

This analysis follows the methodology set out by the Pacific Salmon Foundation (2020) for Total Land Cover Alteration with the following adaptations:

- Substitution of the updated Kispiox Road Inventory for the DRA and FTEN datasets as it is considered to be the more accurate road layer for the study area;
- Application of the buffer widths provided by G. Buhr as they were considered more accurate for roads and more conservative for rail and transmission line disturbance;
- Use of agricultural Crown tenures to estimate agricultural land area instead of the outdated Baseline Thematic Mapping dataset; and
- Use of the municipality and reserves layers in order to estimate urban areas and settlements instead of the Vegetation Resource Index dataset.



— Highway — Road ■ Cutblock ■ Other ■ Fire

Figure 2: Assessment units and land cover alteration in the study area, including alteration by forest harvesting; roads; wildfire; and agricultural, industrial, utility, transportation, commercial, quarrying, residential and community land tenures, railways, powerlines, and settlements, shown collectively as other disturbance.

Risk Threshold

Categorical risk thresholds applied were generated by the Pacific Salmon Foundation based on the relative distribution of values across all Skeena River watersheds (Porter et al., 2014) and are tabulated below:

Threshold Rating	Percent of Total Land Cover Altered (%)
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Low	< 6.4 %
Moderate	6.4 - 22 %
High	> 22 %

Results of Analysis

A summary of the results of the TLCA analysis with categorical risk thresholds for each assessment unit are shown as Figure 3; Figure 4 provides an overview of the results distribution. Detailed results for each assessment unit are tabulated in Appendix C, and the distribution of the assessment results are shown as a series of figures in Appendix D.

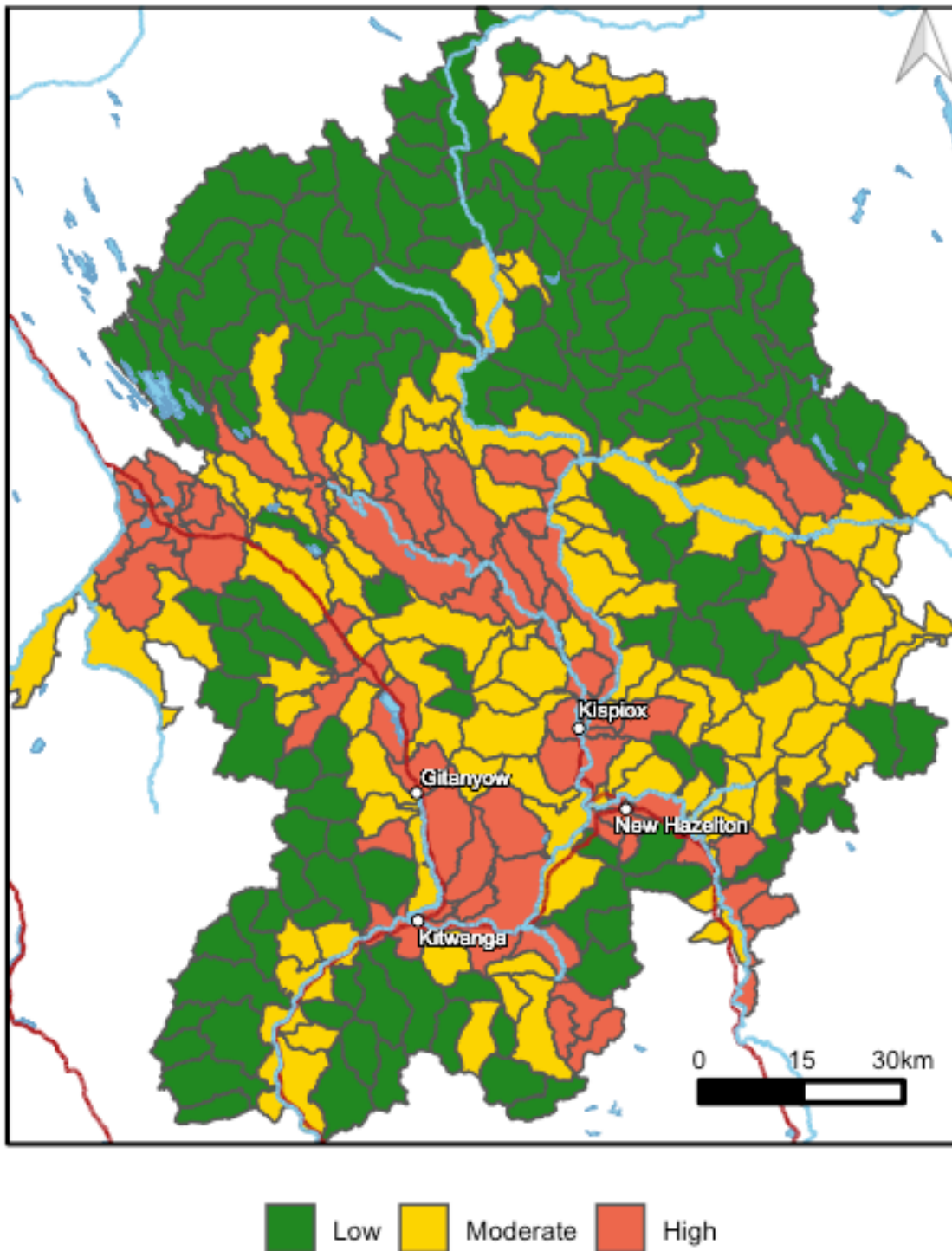


Figure 3: Total land cover alteration for each boundary in the study area is shown on a study area map. The results are colorized by risk threshold (low risk < 6.4 % of land area altered, moderate risk 6.4 - 22 % of land area altered, high risk > 22% of land area altered).

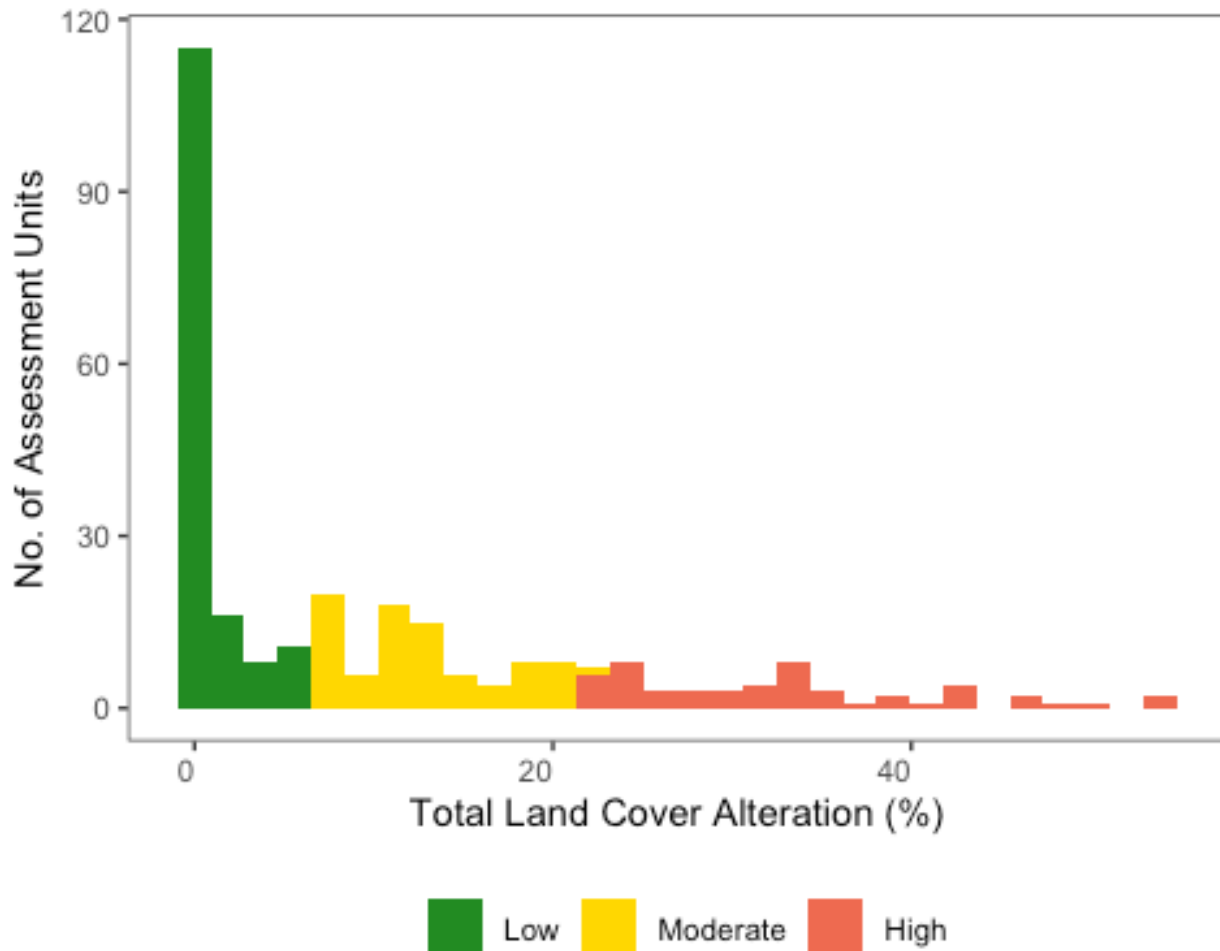


Figure 4: Distribution of results showing the number (count) of assessment units by total land cover alteration. The results are colorized by risk threshold (low risk < 6.4 % of land area altered, moderate risk 6.4 - 22 % of land area altered, high risk > 22% of land area altered).

Total land cover alteration was calculated for a total of 288 assessment units. Values ranged from 0 to a maximum of 53.84% within the Station Creek (BULK-09) sub-watershed, which comprises the majority of the municipality of New Hazelton (Figure 4; Appendix A and Appendix C). Fifty-two assessment units had TLCA values above the threshold for high risk, and were largely associated with disturbance from forestry activities, wildfires, or urban areas (Figure 2 and Figure 3; Appendix C). Eighty-six assessment units had TLCA values in the moderate risk threshold range (Appendix C and Appendix D). Assessment units with high or moderate risk of TLCA impacts were largely situated within the central portion of the study area (Figures 2 and 3).

Interactive visualizations of the indicator analysis results calculated as part of the Kispiox TSA WSP Indicator Analysis are available at <https://data.skeenasalmon.info/dataset/wild-salmon-policy-indicator-analysis-for-the-kispiox-tsa>.

Summary of Results

Total land cover alteration estimations from forestry activities, transportation and utility corridors, settlements, and other industrial activities were calculated for 288 FWA assessment watersheds within the Kispiox TSA and adjacent Swan Lake and upper Kispiox River sub-watersheds using datasets sourced from the Province of BC. Risk categories derived by the Pacific Salmon Foundation were used to assess risk to freshwater habitat as a result of TLCA.

Results of the analysis indicated TLCA within the study area ranged from 0 to 53.84 % of the total assessment unit area, with 52 assessment units at high risk and 86 assessment units at moderate risk from TLCA-related impacts largely situated within the central portion of the study area.

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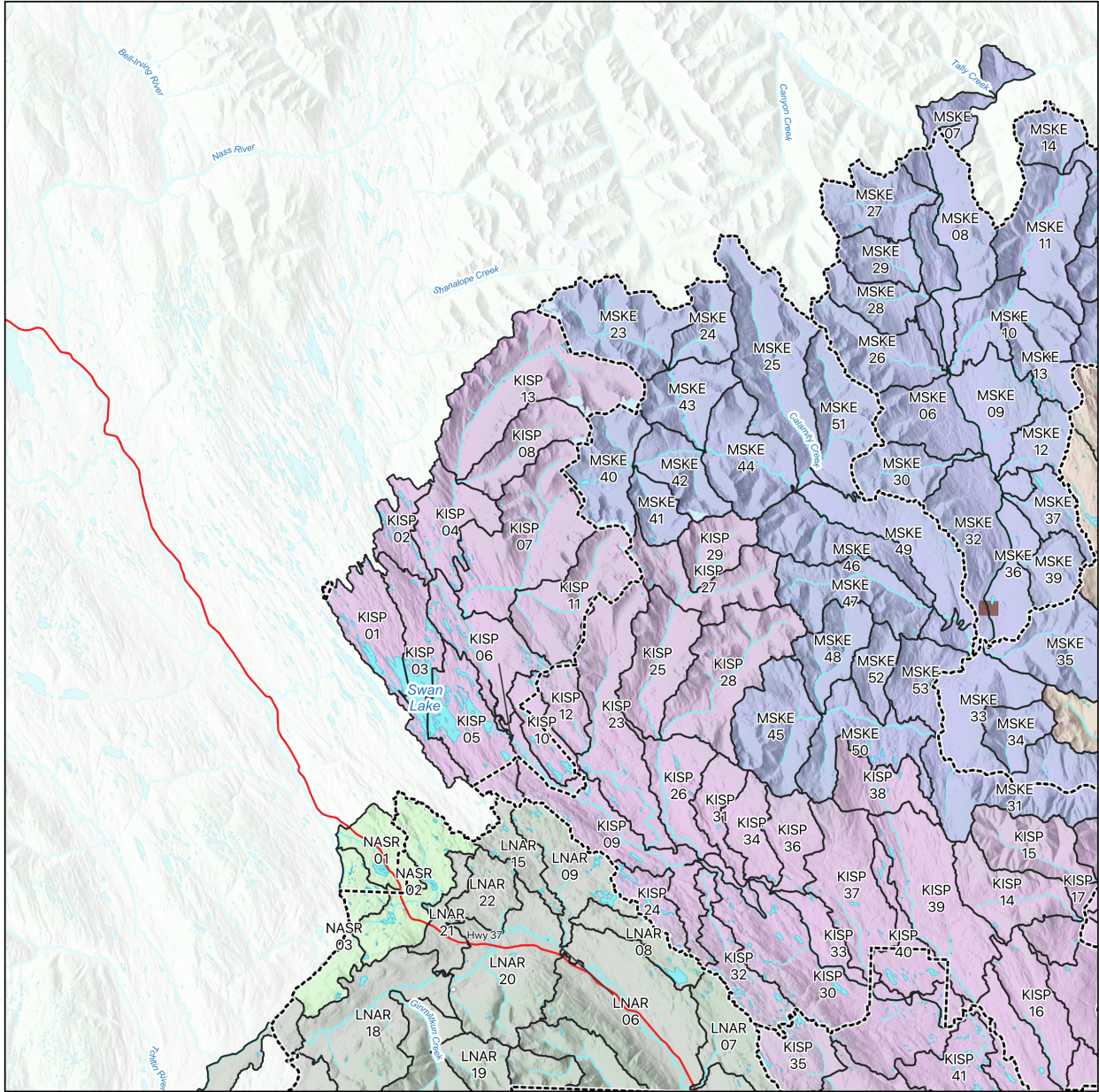
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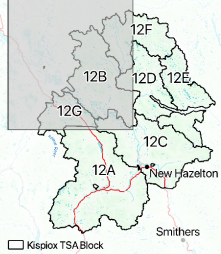
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Appendix A: Reference Maps

Kispiox Study Area Reference Map - Northwest






Location Map



Legend

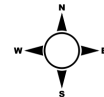
Boundary

-  Fresh Water Atlas Assessment Watershed
-  Kispiox TSA Block
-  Reserve Boundary

Major Watershed Group

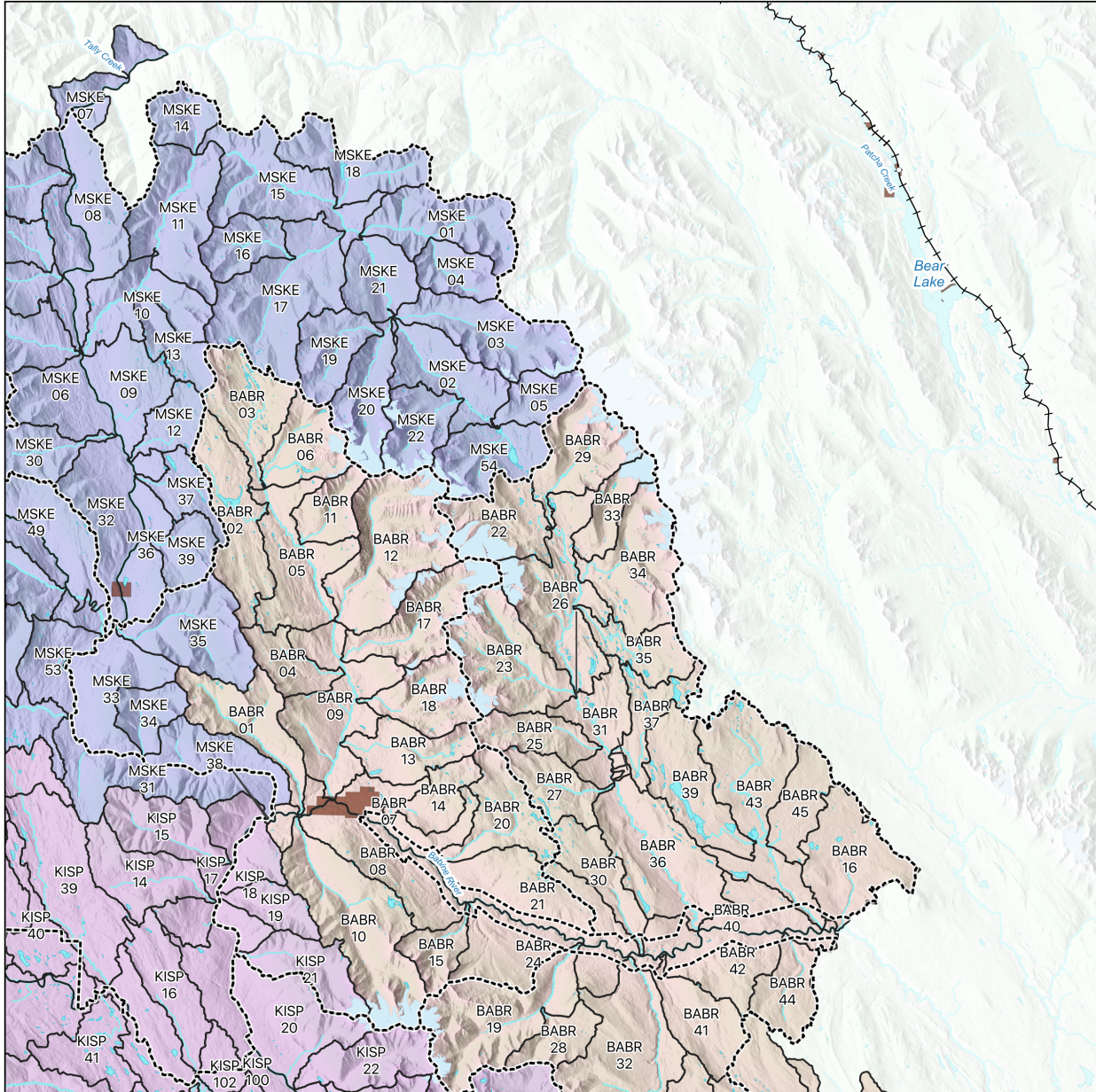
-  BABR
-  BULK
-  KISP
-  KLUM
-  LNAR
-  MSKE
-  NASR

0 5 10 km



Prepared for SkeenaWild
by Eclipse Geomatics Ltd.,
June 2020

Kispiox Study Area Reference Map - Northeast






Location Map



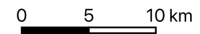
Legend

Boundary

-  Fresh Water Atlas Assessment Watershed
-  Kispiox TSA Block
-  Reserve Boundary

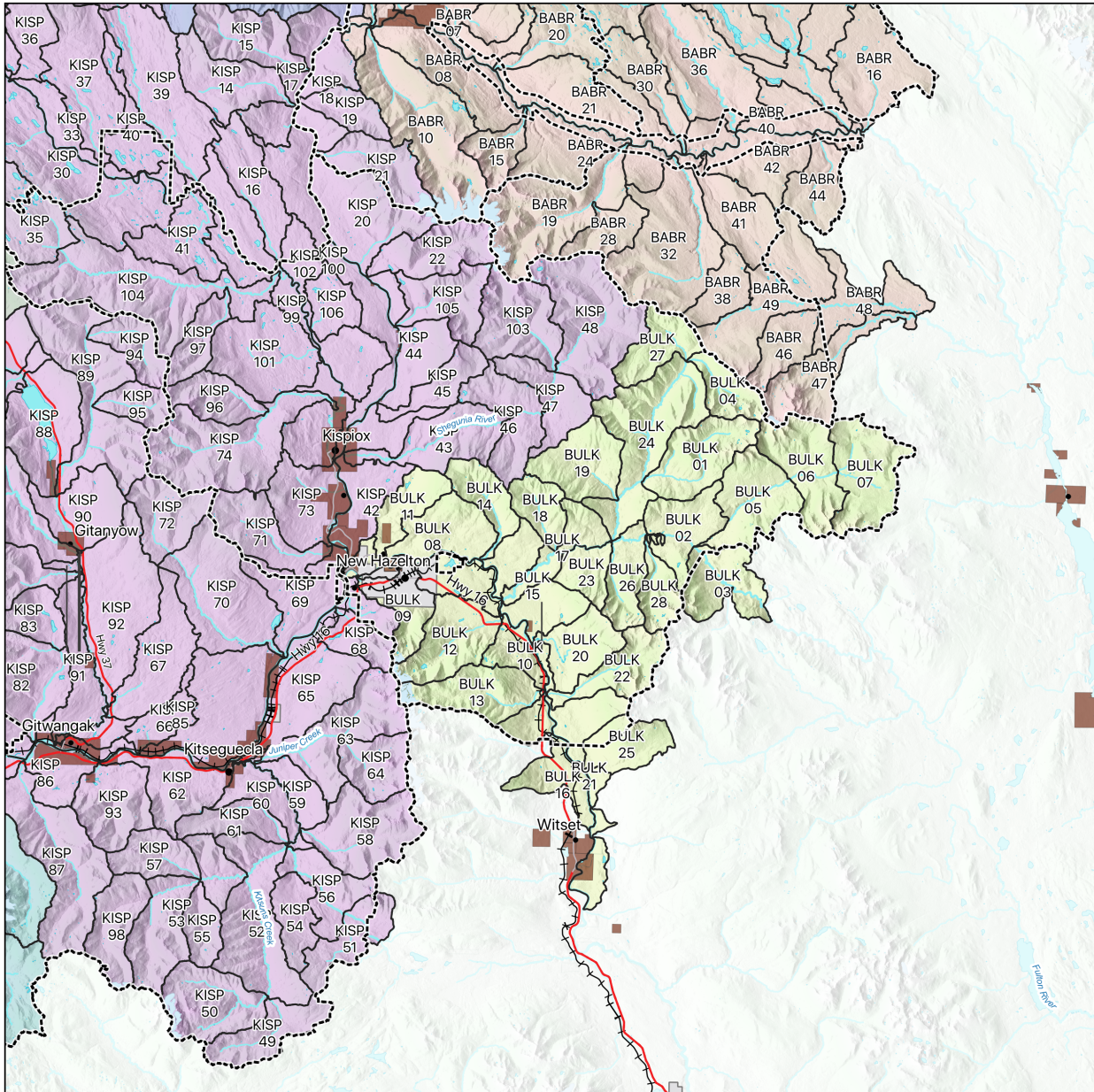
Major Watershed Group

-  BABR
-  KLUM
-  LNAR
-  MSKE
-  NASR

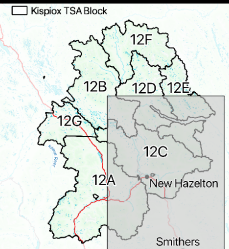


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Kispiox Study Area Reference Map - Southeast






Location Map



Legend

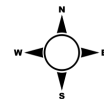
Boundary

-  Fresh Water Atlas Assessment Watershed
-  Kispiox TSA Block
-  Reserve Boundary

Major Watershed Group

-  BABR
-  BULK
-  KISP
-  KLUM
-  LNAR
-  MSKE
-  NASR

0 5 10 km



Prepared for SkeenaWild
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June 2020

Appendix B: Modelled Road Buffer Width Methodology

Description	Modelled Buffer Width (m)	FTEN Attributes	DRA Attributes
Trail	0	-	ROAD_CLASS = trail, driveway or proposed
Overgrown Road	5	-	RDSURFACE = overgrown or seasonal
Unimproved Road	10	-	ROAD_CLASS = resource or unclassified, RDSURFACE ≠ paved or overgrown, AND NUMLANES = 1
Resource Road	15	FIL_TP_DSC = Road Permit	ROAD_CLASS = resource, recreation or unclassified, RDSURFACE ≠ rough, paved, overgrown or seasonal, AND NUMLANES = 2
Main Resource Road	20	FIL_TP_DSC = Forest Service Road	ROAD_CLASS = resource or unclassified, AND RDSURFACE = rough, AND NUMLANES = 2
MOT/Local Road	25	-	ROAD_CLASS = local, arterial, service, or strata, OR RDSURFACE = paved, AND ROAD_CLASS ≠ trail or highway
Highways	50	-	ROAD_CLASS = highway

Notes:

FIL_TP_DSC = file type description

RDSURFACE = road surface

NUMLANE = number of lanes

Appendix C: Results Tables

Reference AU	Sub-Watershed Name	FWA FID	Area (km ²)	Disturbed Area (km ²)				Total Disturbed Area (km ²)	Percent Disturbed (%)	Risk
				Roads	Harvested (Post 1959)	Other Disturbance	Fire Disturbance (Post 1994)			
BABR-24	Babine River	494	60.65	0.09	0.34	0.00	6.85	7.28	12.01	Moderate
BABR-25	Cayuse Jack Creek	448	30.36	0.00	0.00	0.00	0.00	0.00	0.00	Low
BABR-26	Shelagyote River	455	77.32	0.00	0.00	0.00	0.00	0.00	0.00	Low
BABR-27		446	31.02	0.00	0.00	0.00	0.00	0.00	0.00	Low
BABR-28		441	23.39	0.06	0.00	0.00	0.00	0.06	0.25	Low
BABR-29		453	53.77	0.00	0.00	0.00	0.00	0.00	0.00	Low
BABR-30	Le Clair Creek	443	33.99	0.00	0.00	0.00	11.44	11.44	33.67	High
BABR-31	Shelagyote River	454	35.97	0.00	0.00	0.00	0.00	0.00	0.00	Low
BABR-32	Gail Creek	442	92.08	0.51	13.19	0.00	18.51	32.20	34.97	High
BABR-33		452	25.69	0.00	0.00	0.00	0.00	0.00	0.00	Low
BABR-34	Barger Creek	451	64.93	0.00	0.00	0.00	0.00	0.00	0.00	Low
BABR-35		450	29.62	0.00	0.00	0.00	0.00	0.00	0.00	Low
BABR-36	Shelagyote River	445	81.34	0.00	0.00	0.00	19.56	19.56	24.05	High
BABR-37		447	27.67	0.00	0.00	0.00	0.00	0.00	0.00	Low
BABR-38		486	24.75	0.09	4.19	0.00	6.43	10.72	43.29	High
BABR-39		460	54.97	0.00	0.00	0.00	0.00	0.00	0.00	Low
BABR-40	Babine River	495	41.81	0.00	0.00	0.00	4.53	4.53	10.83	Moderate
BABR-41	Cataline Creek	444	39.81	0.27	7.55	0.00	12.00	19.82	49.79	High
BABR-42	Babine River	496	47.39	0.13	3.89	0.00	4.85	8.87	18.72	Moderate
BABR-43	Hanawald Creek	458	87.27	0.01	0.01	0.00	0.00	0.02	0.02	Low
BABR-44		457	32.07	0.34	1.88	0.00	0.00	2.21	6.91	Moderate
BABR-45		459	32.14	0.01	2.00	0.00	0.00	2.00	6.24	Low
BABR-46		485	27.92	0.15	2.64	0.00	0.00	2.79	10.01	Moderate
BABR-47		482	46.24	0.09	3.57	0.00	0.00	3.66	7.91	Moderate
BABR-48	Nichyeskw a Creek	487	37.47	0.30	7.38	0.00	0.00	7.68	20.50	Moderate
BABR-49	Nichyeskw a Creek	488	75.82	0.30	9.16	0.00	0.00	9.46	12.48	Moderate

Reference AU	Sub-Watershed Name	FWA FID	Area (km ²)	Disturbed Area (km ²)				Total Disturbed Area (km ²)	Percent Disturbed (%)	Risk
				Roads	Harvested (Post 1959)	Other Disturbance	Fire Disturbance (Post 1994)			
BULK-01	Denison Creek	1275	48.43	0.08	5.20	0.00	0.00	5.27	10.89	Moderate
BULK-02	Suskwa River	1298	37.64	0.11	4.88	0.03	0.00	5.03	13.36	Moderate
BULK-03	Harold Price Creek	1279	40.73	0.09	0.86	0.00	0.00	0.95	2.34	Low
BULK-04		1276	23.95	0.00	1.60	0.00	0.00	1.61	6.71	Moderate
BULK-05	Suskwa River	1299	49.78	0.06	6.31	0.00	0.00	6.37	12.80	Moderate
BULK-06	Suskwa River	1300	50.81	0.04	2.71	0.00	0.00	2.75	5.41	Low
BULK-07	Suskwa River	1301	54.65	0.00	0.00	0.00	0.00	0.00	0.00	Low
BULK-08	Bulkley River	1267	48.69	0.50	0.79	4.88	0.06	6.23	12.81	Moderate
BULK-09	Station Creek	1268	29.63	0.04	0.00	15.72	0.00	15.76	53.20	High
BULK-10	Bulkley River	1413	50.03	0.78	0.50	11.15	0.00	12.43	24.85	High
BULK-11	Two Mile Creek	1269	26.93	0.44	1.64	1.56	0.05	3.70	13.73	Moderate
BULK-12	Mudflat Creek	1302	47.41	0.40	0.93	1.15	0.00	2.47	5.22	Low
BULK-13	Porphyry Creek	1304	44.11	0.02	0.00	0.16	0.00	0.19	0.42	Low
BULK-14	Nine Mile Creek	1270	26.52	0.04	0.05	0.00	0.00	0.09	0.34	Low
BULK-15	Bulkley River	1414	49.43	0.44	6.50	0.60	0.22	7.77	15.71	Moderate
BULK-16	Bulkley River	1415	39.18	0.74	5.73	1.38	0.00	7.85	20.03	Moderate
BULK-17	Suskwa River	1271	26.13	0.35	4.97	0.07	0.00	5.38	20.61	Moderate
BULK-18	Fifteen Mile Creek	1272	23.38	0.04	0.08	0.00	0.00	0.12	0.51	Low
BULK-19	Iltzul Creek	1274	43.66	0.29	7.19	0.00	0.00	7.48	17.13	Moderate
BULK-20	Corduroy Creek	1303	34.91	0.05	10.39	0.00	0.00	10.43	29.89	High
BULK-21	Bulkley River	1416	46.12	0.43	7.16	2.93	0.00	10.52	22.81	High
BULK-22	Luno Creek	1305	33.95	0.03	1.72	0.00	0.00	1.75	5.15	Low
BULK-23	Suskwa River	1296	20.30	0.22	2.25	0.00	0.00	2.47	12.16	Moderate

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KISP-12		6248	22.25	0.13	0.00	0.00	0.00	0.13	0.56	Low
KISP-13	Kispiox River	6263	106.0 ₂	0.00	0.00	0.00	0.00	0.00	0.00	Low
KISP-14	Carrigan Creek	6273	44.91	0.24	7.09	0.00	0.00	7.33	16.33	Moderate
KISP-15	Blackstock Creek	6275	43.50	0.00	1.02	0.00	14.23	15.25	35.06	High
KISP-16	Murder Creek	6231	40.63	0.17	9.04	0.13	4.32	13.67	33.63	High
KISP-17	Skeena River	6287	35.54	0.08	11.63	0.00	5.44	17.15	48.26	High
KISP-18	Skeena River	6286	30.87	0.35	2.83	0.00	0.00	3.19	10.32	Moderate
KISP-19	Bretson Creek	6274	21.97	0.14	1.67	0.00	0.00	1.82	8.26	Moderate
KISP-20	Skeena River	6285	61.32	0.38	8.09	0.00	0.00	8.47	13.81	Moderate
KISP-21	Shewililba Creek	6272	36.63	0.10	4.39	0.00	0.00	4.49	12.27	Moderate
KISP-22	Sediesh Creek	6271	42.46	0.06	2.23	0.00	2.78	5.07	11.93	Moderate
KISP-23	Nangeese River	6247	87.17	0.38	12.82	0.21	0.00	13.41	15.38	Moderate
KISP-24	Brown Paint Creek	6246	21.64	0.05	2.56	0.00	0.00	2.60	12.03	Moderate
KISP-25	Sweetin River	6244	51.88	0.07	0.31	0.00	0.00	0.39	0.74	Low
KISP-26	Sweetin River	6241	39.23	0.19	12.59	0.00	0.00	12.79	32.60	High
KISP-27	Sweetin River	6245	48.42	0.00	0.00	0.00	0.00	0.00	0.00	Low
KISP-28		6242	77.46	0.02	0.80	0.00	0.00	0.82	1.06	Low
KISP-29		6243	27.89	0.00	0.00	0.00	0.00	0.00	0.00	Low
KISP-30	Kispiox River	6259	117.9 ₃	0.74	37.25	0.25	0.31	38.55	32.69	High
KISP-31	Clifford Creek	6239	24.21	0.06	4.76	0.19	0.05	5.06	20.89	Moderate
KISP-32	Steep Canyon Creek	6240	36.61	0.05	4.37	0.00	0.00	4.41	12.06	Moderate
KISP-33	Kispiox River	6258	35.86	0.48	11.00	0.82	1.23	13.52	37.72	High

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KISP-34	Skunsnat Creek	6238	26.47	0.09	4.81	0.07	0.01	4.97	18.78	Moderate
KISP-35	McCully Creek	6230	33.29	0.13	0.00	0.00	0.00	0.13	0.41	Low
KISP-36	Corral Creek	6237	28.69	0.10	6.80	0.00	0.01	6.91	24.07	High
KISP-37	Ironside Creek	6236	66.26	0.20	21.37	0.00	0.00	21.58	32.56	High
KISP-38	Cullon Creek	6233	33.56	0.10	6.16	0.00	0.00	6.26	18.64	Moderate
KISP-39	Cullon Creek	6232	81.61	0.34	37.76	0.00	0.01	38.10	46.69	High
KISP-40		6235	30.70	0.17	9.02	0.00	0.00	9.18	29.91	High
KISP-41		6234	37.94	0.40	9.63	0.00	0.00	10.03	26.43	High
KISP-42	Skeena River	6281	69.60	0.94	10.29	15.30	0.00	26.52	38.11	High
KISP-43	Shegunia River	6264	48.20	0.29	8.73	1.77	0.00	10.79	22.38	High
KISP-44	Skeena River	6284	38.61	0.35	5.86	0.13	0.00	6.34	16.43	Moderate
KISP-45	Pinenut Creek	6269	24.84	0.06	3.08	0.00	0.00	3.14	12.62	Moderate
KISP-46	Shegunia River	6266	43.44	0.24	3.14	0.00	0.00	3.38	7.79	Moderate
KISP-47	Shegunia River	6267	34.82	0.32	1.99	0.00	0.00	2.31	6.64	Moderate
KISP-48	Shegunia River	6268	83.75	0.04	0.00	0.00	0.00	0.04	0.05	Low
KISP-49	Kitsuns Creek	6212	35.39	0.00	0.01	0.00	0.00	0.01	0.02	Low
KISP-50		6211	51.59	0.00	0.00	0.00	0.00	0.00	0.00	Low
KISP-51	Kitsegucla River	6217	33.88	0.04	9.18	0.00	0.00	9.22	27.21	High
KISP-52	Kitsuns Creek	6206	76.76	0.19	5.79	0.00	0.00	5.98	7.80	Moderate
KISP-53		6207	64.75	0.16	4.97	0.00	0.00	5.13	7.93	Moderate
KISP-54		6213	26.07	0.05	11.26	0.00	0.00	11.32	43.41	High
KISP-55		6209	20.17	0.01	0.92	0.00	0.00	0.93	4.60	Low
KISP-56	Kitsegucla River	6216	34.35	0.09	7.89	0.00	0.00	7.99	23.24	High
KISP-57		6208	27.82	0.02	0.80	0.00	0.00	0.83	2.97	Low

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KISP-58		6204	57.80	0.11	2.99	0.00	0.00	3.10	5.36	Low
KISP-59	Kitseguella River	6201	22.15	0.22	4.60	0.57	0.00	5.40	24.36	High
KISP-60	Kitseguella River	6215	22.58	0.13	8.91	1.36	0.00	10.41	46.09	High
KISP-61	Deep Canyon Creek	6205	25.58	0.06	4.59	0.00	0.00	4.65	18.18	Moderate
KISP-62	Skeena River	6278	42.24	0.23	9.82	4.27	0.00	14.32	33.89	High
KISP-63	Juniper Creek	6202	60.50	0.37	0.96	0.21	0.00	1.54	2.54	Low
KISP-64	Brian Boru Creek	6203	32.22	0.00	0.00	0.00	0.00	0.00	0.00	Low
KISP-65	Skeena River	6279	64.72	1.19	0.49	7.10	0.04	8.82	13.63	Moderate
KISP-66	Andi Creek	6200	20.44	0.12	9.66	1.22	0.00	11.01	53.84	High
KISP-67		6182	52.71	0.52	15.80	0.00	0.00	16.32	30.97	High
KISP-68	Chicago Creek	6221	21.01	0.27	0.83	0.05	0.00	1.16	5.51	Low
KISP-69	Skeena River	6280	44.15	0.56	6.72	2.01	0.15	9.44	21.37	Moderate
KISP-70	Burdick Creek	6219	78.51	0.32	30.68	0.07	0.00	31.07	39.57	High
KISP-71	Hazelton Creek	6222	41.68	0.13	4.09	0.84	0.00	5.07	12.16	Moderate
KISP-72	Burdick Creek	6220	37.89	0.05	3.92	0.00	0.00	3.97	10.48	Moderate
KISP-73	Skeena River	6282	45.79	0.18	6.02	8.15	0.00	14.34	31.32	High
KISP-74	Date Creek	6224	87.75	0.22	6.01	0.25	0.00	6.48	7.39	Moderate
KISP-75	Kitwancool Creek	6189	40.26	0.00	0.00	0.00	0.00	0.00	0.00	Low
KISP-76	Kitwanga River	6198	66.48	0.40	16.95	0.07	0.01	17.43	26.22	High
KISP-77	Kitwancool Creek	6188	50.99	0.00	0.00	0.00	0.00	0.00	0.00	Low
KISP-78		6185	37.18	0.03	1.77	0.00	0.20	2.00	5.39	Low
KISP-79		6187	24.07	0.00	0.00	0.00	0.00	0.00	0.00	Low
KISP-80	Kitwanga River	6197	33.78	0.08	6.39	0.00	0.00	6.46	19.14	Moderate
KISP-81	Kitwancool Creek	6184	60.58	0.10	4.78	1.41	0.00	6.28	10.37	Moderate

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KLUM-08		6734	49.34	0.00	0.00	0.00	0.00	0.00	0.00	Low
KLUM-09		6735	22.14	0.00	0.00	0.00	0.00	0.00	0.00	Low
KLUM-10		6742	36.67	0.00	0.00	0.00	0.00	0.00	0.00	Low
KLUM-11	Wilson Creek	6738	30.88	0.07	2.16	0.03	0.00	2.27	7.34	Moderate
KLUM-12	Lorne Creek	6727	76.37	0.00	0.00	0.01	0.00	0.01	0.01	Low
KLUM-13	South Lorne Creek	6728	30.80	0.00	0.00	0.00	0.00	0.00	0.00	Low
KLUM-14	Skeena River	6752	67.50	0.97	5.51	1.39	0.00	7.87	11.67	Moderate
KLUM-15	Quill Creek	6729	74.47	0.05	2.21	0.00	0.00	2.26	3.04	Low
KLUM-16	Quill Creek	6731	32.41	0.00	0.00	0.00	0.00	0.00	0.00	Low
KLUM-17	Flint Creek	6732	24.90	0.16	1.70	0.07	0.00	1.93	7.76	Moderate
KLUM-18		6730	22.13	0.00	0.00	0.00	0.00	0.00	0.00	Low
KLUM-19	Skeena River	6754	38.26	1.16	3.21	1.22	0.05	5.64	14.75	Moderate
KLUM-20	Coyote Creek	6737	25.14	0.08	0.40	0.00	0.00	0.48	1.90	Low
KLUM-21	Insect Creek	6733	89.68	0.06	0.51	0.00	0.00	0.57	0.64	Low
KLUM-22		6739	22.46	0.01	0.21	0.00	0.00	0.22	0.96	Low
KLUM-23	Skeena River	6755	50.29	0.46	4.05	0.63	0.23	5.37	10.68	Moderate
KLUM-24	Skeena River	6753	40.39	0.17	2.68	0.33	0.00	3.18	7.88	Moderate
LNAR-01	Cranberry River	9034	40.16	0.38	13.98	0.10	0.01	14.46	36.02	High
LNAR-02	Weber Creek	9025	63.18	0.07	2.08	0.00	0.00	2.14	3.39	Low
LNAR-03		9027	31.75	0.00	0.00	0.00	0.00	0.00	0.00	Low
LNAR-04		9024	20.68	0.28	2.45	0.00	0.00	2.73	13.19	Moderate
LNAR-05		9026	22.83	0.00	0.00	0.00	0.00	0.00	0.00	Low
LNAR-06	Cranberry River	9033	117.46	1.13	20.90	1.35	0.00	23.37	19.90	Moderate
LNAR-07	Tsugwinseldak Creek	9023	37.66	0.08	3.89	0.03	0.00	4.01	10.64	Moderate
LNAR-08		9021	25.28	0.00	0.64	0.00	0.00	0.64	2.55	Low
LNAR-09	Aluk Creek	9020	46.51	0.17	4.96	0.18	0.00	5.32	11.44	Moderate

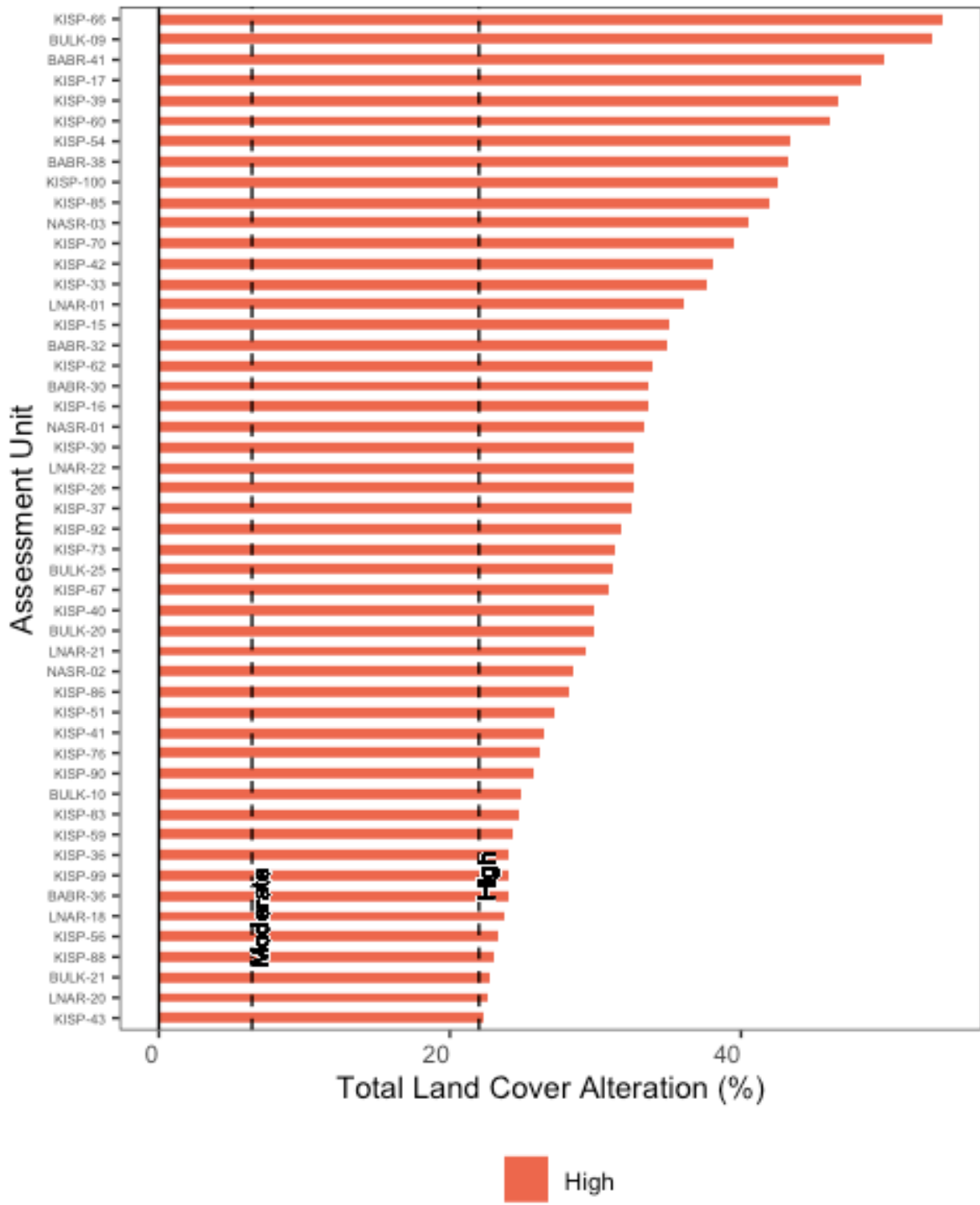
Reference AU	Sub-Watershed Name	FWA FID	Area (km ²)	Disturbed Area (km ²)				Total Disturbed Area (km ²)	Percent Disturbed (%)	Risk
				Roads	Harvested (Post 1959)	Other Disturbance	Fire Disturbance (Post 1994)			
LNAR-10	Kiteen River	8998	83.65	0.18	11.74	1.19	0.00	13.12	15.68	Moderate
LNAR-11		9029	46.97	0.00	0.00	0.00	0.00	0.00	0.00	Low
LNAR-12		9028	41.90	0.00	0.00	0.00	0.00	0.00	0.00	Low
LNAR-13	Cranberry River	9036	87.01	0.00	0.00	0.00	0.00	0.00	0.00	Low
LNAR-14	Cranberry River	9035	39.72	0.05	2.80	0.00	0.00	2.85	7.17	Moderate
LNAR-15	Weegett Creek	9022	22.38	0.03	2.87	0.00	0.00	2.89	12.92	Moderate
LNAR-16	Nass River	9047	67.51	1.90	5.12	0.00	0.00	7.02	10.40	Moderate
LNAR-17	Ginmiltkun Creek	9016	76.18	0.02	6.11	0.00	0.00	6.14	8.05	Moderate
LNAR-18	Cranberry River	9031	90.18	0.38	20.15	0.93	0.01	21.47	23.81	High
LNAR-19		9017	23.62	0.00	0.00	0.00	0.00	0.00	0.00	Low
LNAR-20	Cranberry River	9032	85.23	0.68	18.56	0.00	0.00	19.24	22.57	High
LNAR-21		9018	20.70	0.26	5.82	0.00	0.00	6.07	29.33	High
LNAR-22	Calmin Creek	9019	26.00	0.05	8.43	0.00	0.00	8.48	32.61	High
MSKE-01	Endless Creek	1107 6	57.26	0.00	0.00	0.00	0.00	0.00	0.00	Low
MSKE-02	Sicintine River	1108 6	48.48	0.00	0.00	0.00	0.00	0.00	0.00	Low
MSKE-03		1107 8	62.72	0.00	0.00	0.00	0.00	0.00	0.00	Low
MSKE-04		1107 7	26.32	0.00	0.00	0.00	0.00	0.00	0.00	Low
MSKE-05		1108 2	23.56	0.00	0.00	0.00	0.00	0.00	0.00	Low
MSKE-06	Skeena River	1114 6	48.99	0.08	2.22	0.00	0.00	2.30	4.70	Low
MSKE-07	Skeena River	1114 8	47.41	0.22	0.00	0.00	0.59	0.81	1.71	Low
MSKE-08	Skeena River	1114 7	58.16	0.00	0.00	0.00	0.87	0.87	1.50	Low
MSKE-09	Skeena River	1114 5	43.23	0.00	0.00	0.00	0.00	0.00	0.00	Low
MSKE-10	Sicintine River	1107 0	46.74	0.00	0.00	0.00	0.00	0.00	0.00	Low
MSKE-11	Sicintine River	1108 3	68.27	0.00	0.00	0.00	12.36	12.36	18.10	Moderate

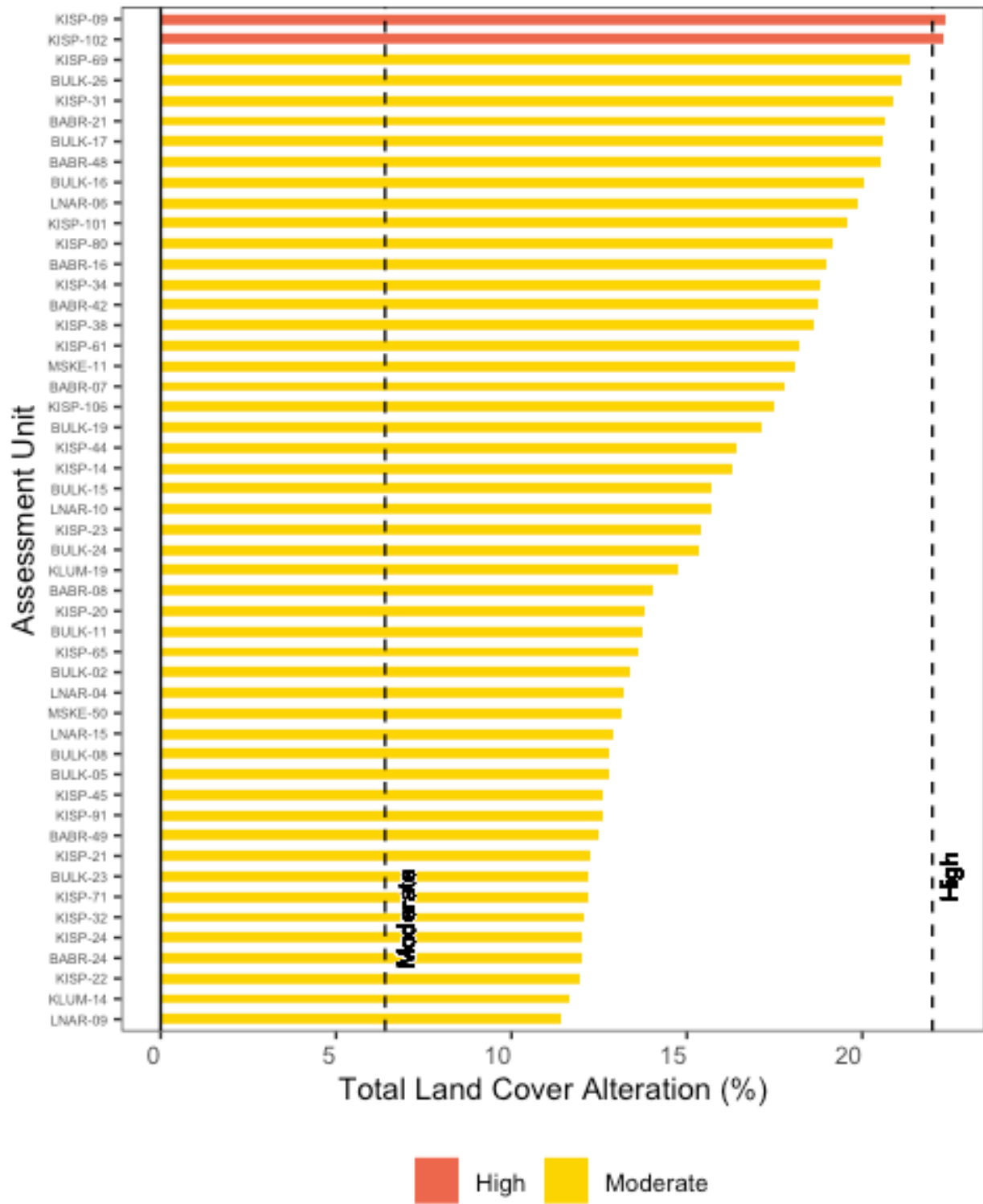
Reference AU	Sub-Watershed Name	FWA FID	Area (km ²)	Disturbed Area (km ²)				Total Disturbed Area (km ²)	Percent Disturbed (%)	Risk
				Roads	Harvested (Post 1959)	Other Disturbance	Fire Disturbance (Post 1994)			
MSKE-34		11048	23.98	0.00	0.00	0.00	0.00	0.00	0.00	Low
MSKE-35	Larkworthy Creek	11065	60.87	0.00	0.40	0.00	0.00	0.41	0.67	Low
MSKE-36	Skeena River	11144	35.99	0.36	2.60	0.96	0.00	3.92	10.90	Moderate
MSKE-37		11067	23.41	0.18	2.41	0.00	0.00	2.59	11.05	Moderate
MSKE-38	Skeena River	11140	35.09	0.17	3.17	0.00	0.00	3.34	9.52	Moderate
MSKE-39		11066	24.04	0.01	0.36	0.00	0.00	0.38	1.57	Low
MSKE-40	Kuldo Creek	11064	46.77	0.00	0.00	0.00	0.00	0.00	0.00	Low
MSKE-41		11060	20.32	0.00	0.00	0.00	0.00	0.00	0.00	Low
MSKE-42	Kuldo Creek	11063	33.79	0.00	0.00	0.00	0.00	0.00	0.00	Low
MSKE-43		11057	37.52	0.00	0.00	0.00	0.00	0.00	0.00	Low
MSKE-44	Kuldo Creek	11062	56.41	0.00	0.00	0.00	0.00	0.00	0.00	Low
MSKE-45		11052	58.36	0.00	0.45	0.00	0.00	0.45	0.77	Low
MSKE-46	Kuldo Creek	11053	57.62	0.05	1.07	0.00	0.00	1.12	1.94	Low
MSKE-47		11054	54.36	0.00	0.00	0.00	0.00	0.00	0.00	Low
MSKE-48		11051	34.68	0.00	0.00	0.00	0.00	0.00	0.00	Low
MSKE-49	Kuldo Creek	11061	58.40	0.04	1.81	0.00	0.00	1.85	3.17	Low
MSKE-50	Deep Canoe Creek	11049	53.85	0.30	6.77	0.00	0.00	7.07	13.13	Moderate
MSKE-51		11056	51.81	0.00	0.00	0.00	0.00	0.00	0.00	Low
MSKE-52		11050	20.56	0.01	0.28	0.00	0.00	0.28	1.38	Low
MSKE-53	Skeena River	11142	31.31	0.21	2.04	0.00	0.00	2.26	7.21	Moderate
MSKE-54	Sicintine River	11087	44.91	0.00	0.00	0.00	0.00	0.00	0.00	Low
NASR-01		11840	28.26	0.24	8.28	0.89	0.00	9.42	33.33	High

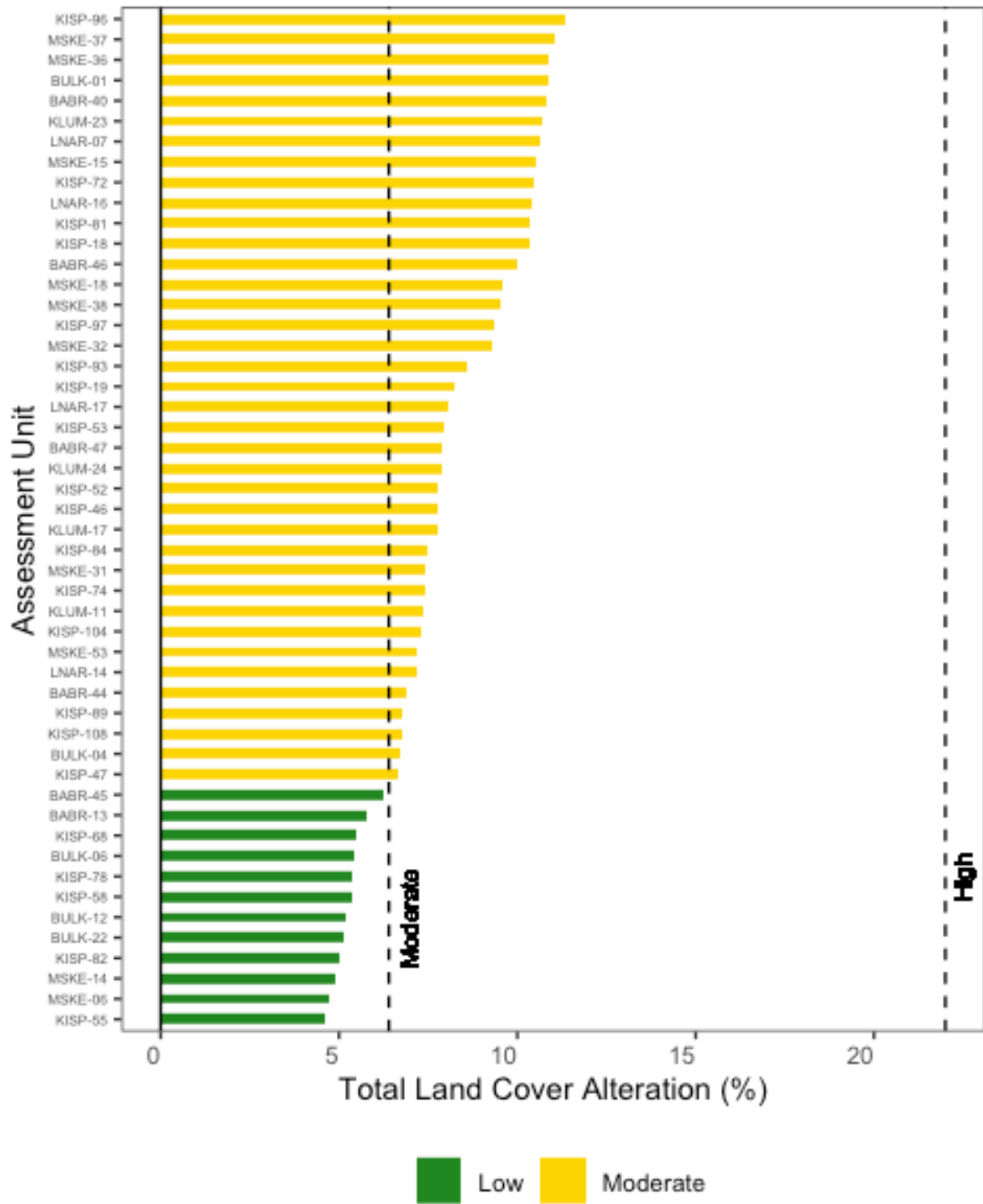
Reference AU	Sub-Watershed Name	FWA FID	Area (km ²)	Disturbed Area (km ²)				Total Disturbed Area (km ²)	Percent Disturbed (%)	Risk
				Roads	Harvested (Post 1959)	Other Disturbance	Fire Disturbance (Post 1994)			
NASR-02	Derrick Creek	1183 9	56.34	0.35	14.08	1.59	0.00	16.03	28.45	High
NASR-03	Nass River	1187 9	35.43	0.05	12.93	1.36	0.00	14.34	40.48	High

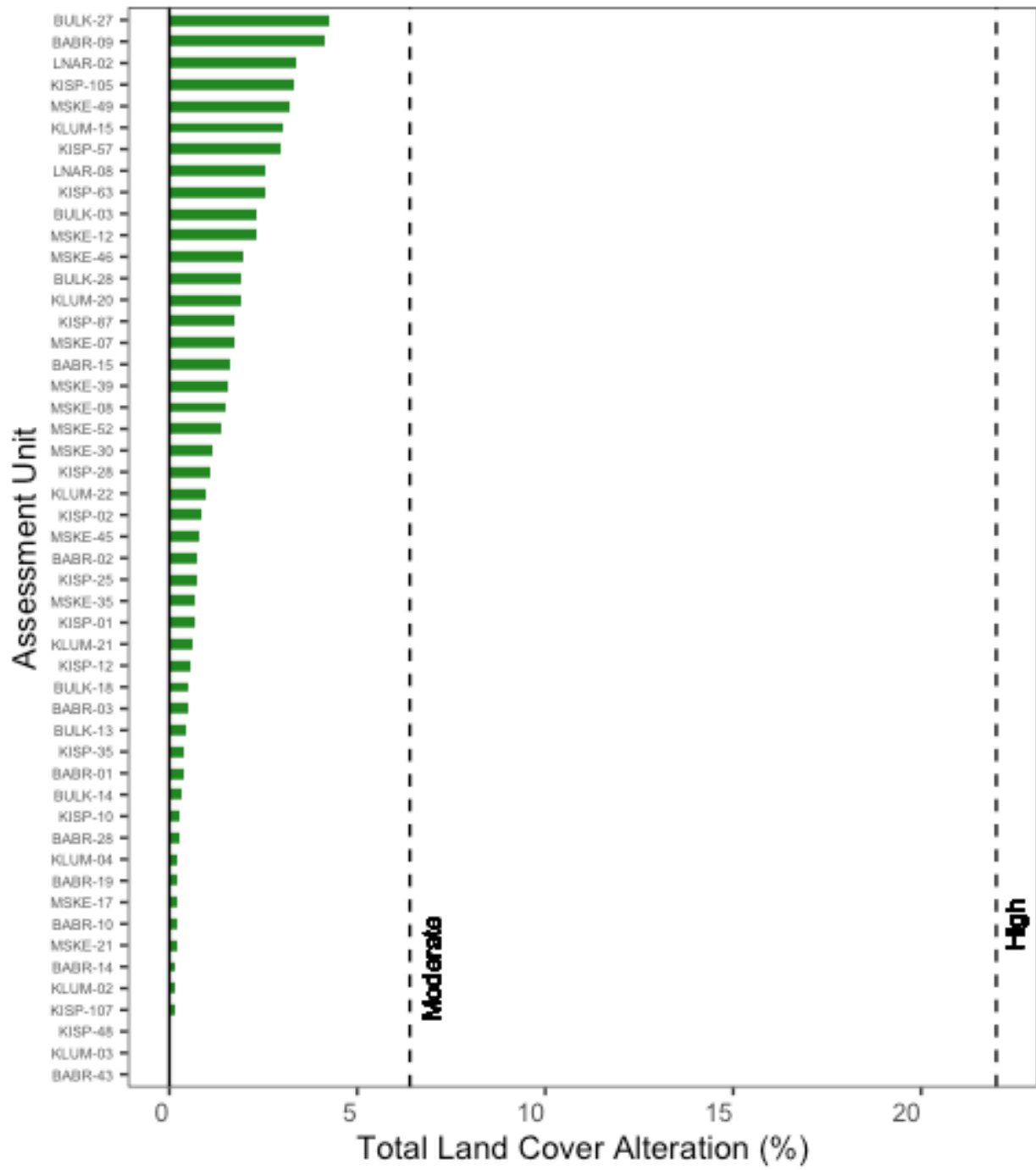
Appendix D: Results Distribution

The results are colorized by risk threshold (low risk < 6.4 % of land area altered, moderate risk 6.4 - 22 % of land area altered, high risk > 22% of land area altered).

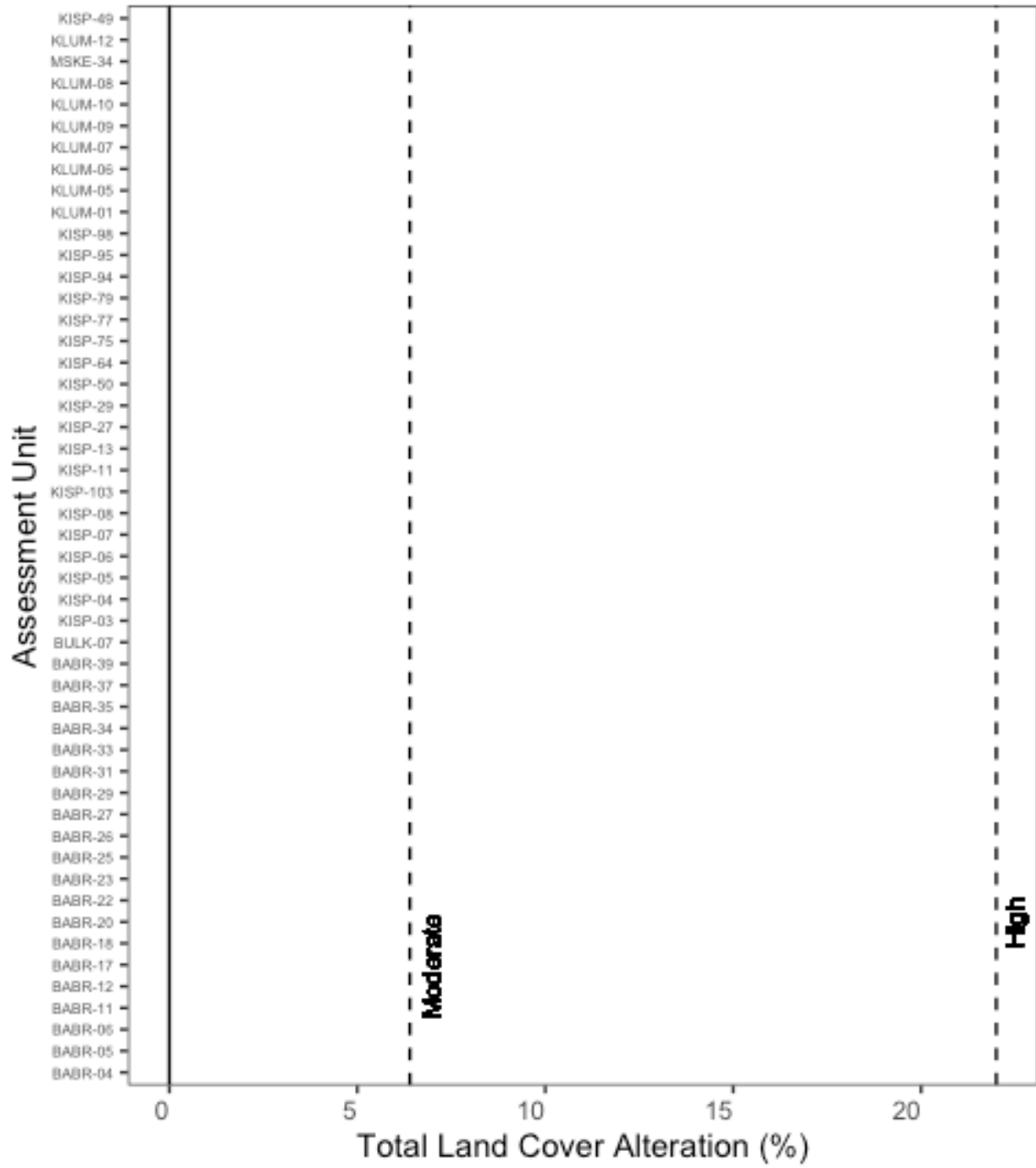




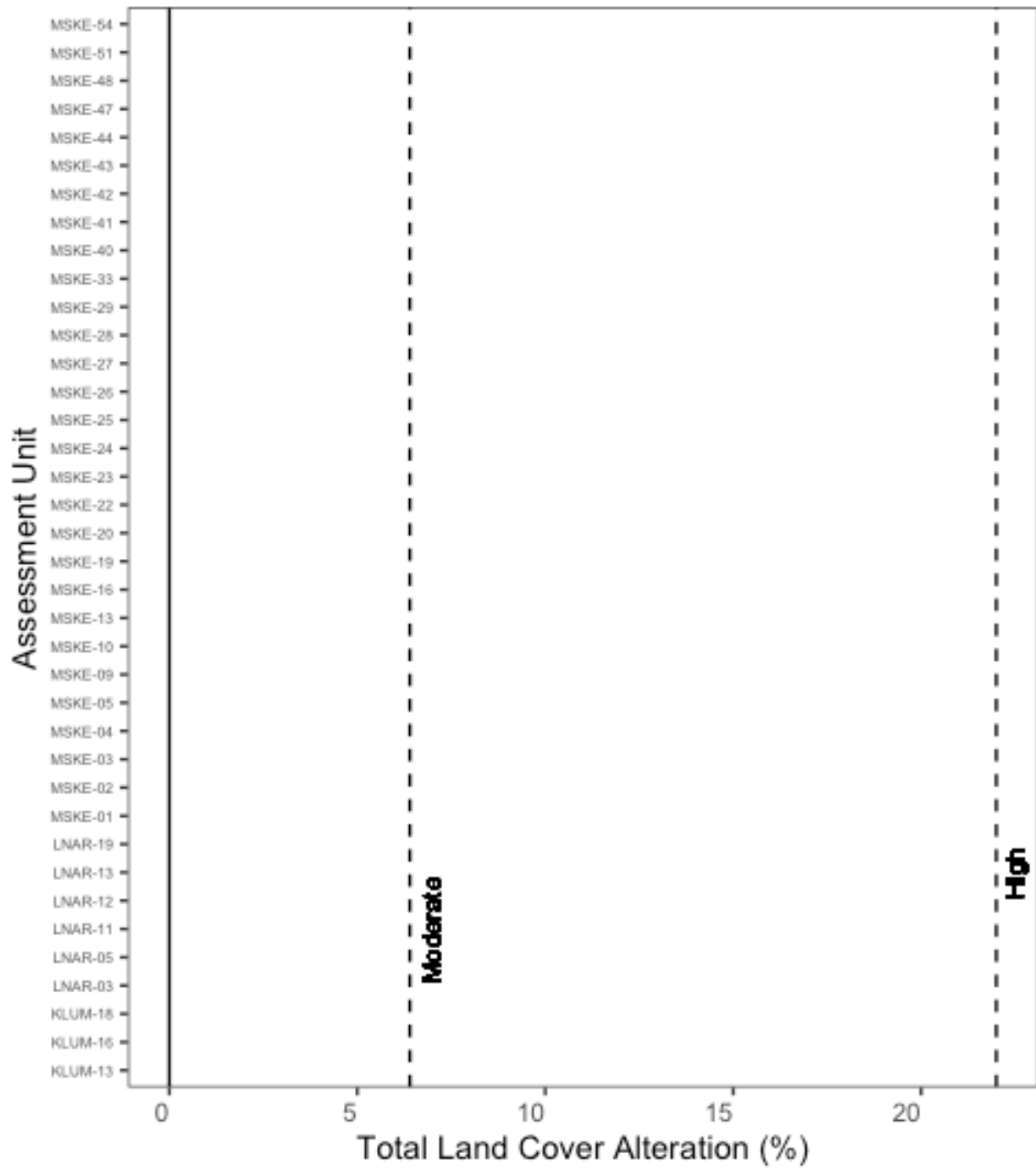




Low



 Low



 Low