

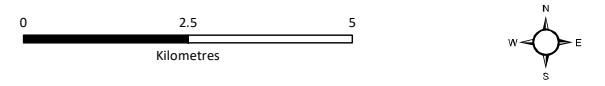
Crown Mountain Coking Coal Project

Figure 15.7-12
Spring Wetland Bird Average Abundance and Species Richness

LEGEND

Average Species Richness	Average Abundance
● 0 (No Birds Detected)	○ 0 (No Birds Detected)
● 0.1 - 1.9 (Lowest)	○ 0.1 - 9.9 (Lowest)
● 2 - 3.9	○ 10 - 19.9
● 4 - 5.9	○ 20 - 29.9
● 6 - 7.9 (Highest)	○ 30 - 39.9 (Highest)

- ▭ Terrestrial Local Study Area
- ▭ Project Footprint
- Highway
- Arterial/Collector Road
- Local/Resource Road
- Railway
- - - Transmission Line
- Watercourse
- Waterbody
- Wetland
- - - Watershed
- Provincial Park/Protected Area
- ▭ British Columbia/Alberta Border



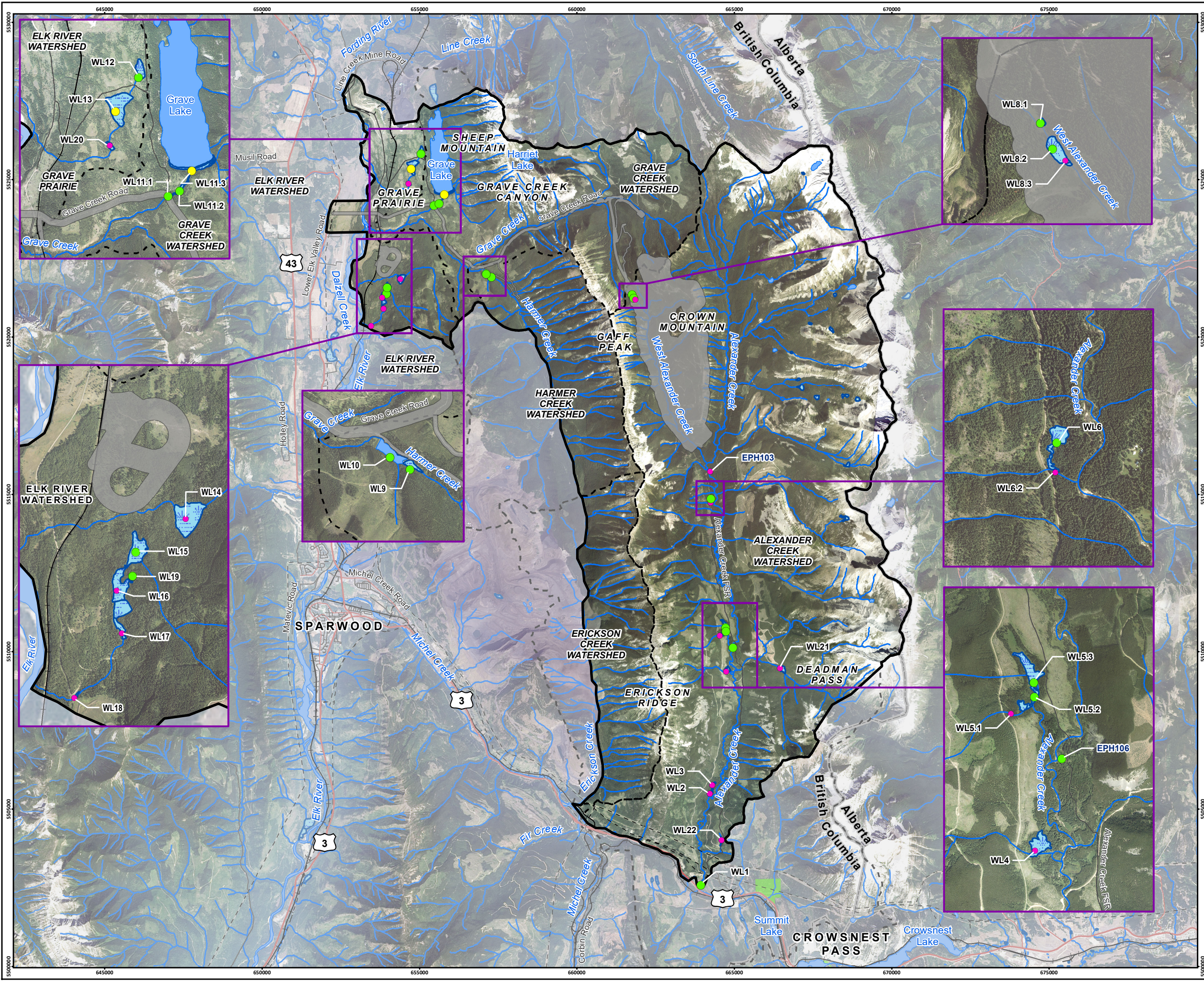
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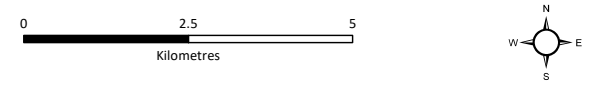
Crown Mountain Coking Coal Project

Figure 15.7-13
Summer Wetland Bird Average Abundance and Species Richness

LEGEND

Average Species Richness	Average Abundance
● 0 (No Birds Detected)	○ 0 (No Birds Detected)
● 0.1 - 1.9 (Lowest)	○ 0.1 - 9.9 (Lowest)
● 2 - 3.9	○ 10 - 19.9
● 4 - 5.9	○ 20 - 29.9
● 6 - 7.9 (Highest)	○ 30 - 39.9 (Highest)

- ▭ Terrestrial Local Study Area
- ▭ Project Footprint
- Highway
- Arterial/Collector Road
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Riverine Bird Surveys

Eighty-three riverine birds and 11 nests were observed in the Terrestrial LSA across 28.3 km of creek habitat assessed over the surveys years. Spotted Sandpiper were the most abundant riverine bird species observed in the Terrestrial LSA, followed by American Dipper and Harlequin Duck (Table 15.7-8). No riverine birds were observed in Grave Creek upstream of the confluence with Harmer Creek or in the unnamed creek in Deadman Pass, and Alexander Creek had the highest riverine bird abundance, species richness, and diversity in the Terrestrial LSA, particularly the middle and lower reaches in the southern portion of the Terrestrial LSA. Survey observations for each year are shown on Figure 15.7-14 to Figure 15.7-16.

Four Spotted Sandpiper egg tissue samples were collected in the summers of 2017 and 2018. The mean concentration of selenium in bird egg tissues collected in the Terrestrial LSA was 4.6 mg/kg dw, with samples ranging in concentration from 2.8 to 14 mg/kg dw. The selenium concentrations measured in the Spotted Sandpiper egg samples were below provincial guidelines and regional benchmark values in three of the four samples analyzed, with the 2017 tissue sample from Harmer Creek having a selenium concentration above the provincial guideline and 10% effect size for the regional benchmark. For more detailed riverine bird survey results, refer to Appendix 15-E.

15.7.2.3 Modelling

15.7.2.3.1 Methods

Habitat availability and distribution was quantified using habitat suitability models. Habitat suitability was modelled for each species using one of two approaches: occupancy model or habitat suitability index model (HSI). The occupancy models were developed using field observations and 40 to 60 environmental predictor variables. Variables selected for modelling were chosen based on *a priori* knowledge of factors influencing species survival and reproduction. Variables seek to account for variation of food resources, prey capture, reproduction and nesting habitat, movement, security and thermal habitat, and anthropogenic disturbance. HSI models were constructed for bird species where data were insufficient to develop an empirical occupancy model and followed provincial habitat rating standards (RISC, 1999b). Details on the habitat variables and modelling methods are provided in Appendix 15-C.

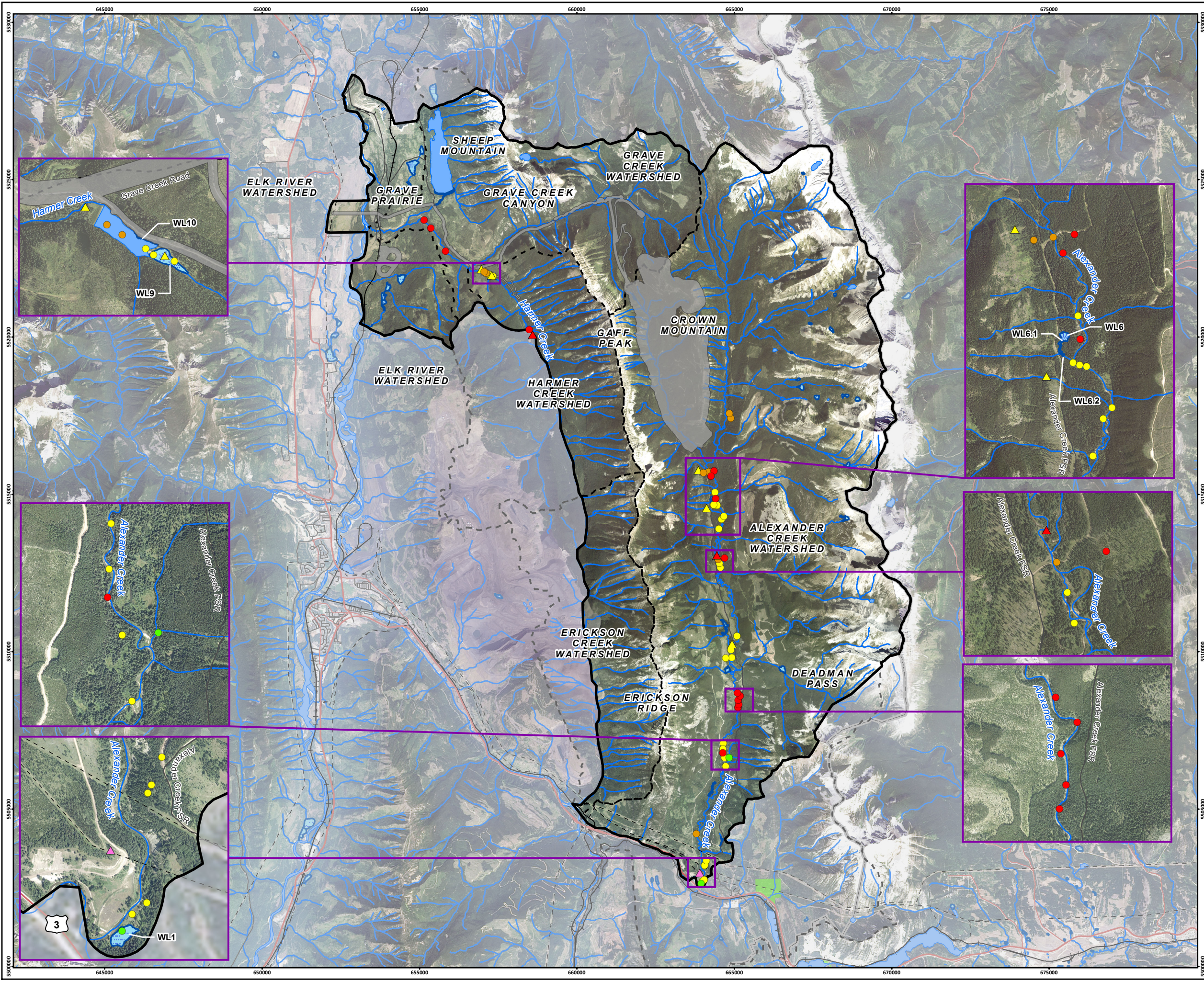
The occupancy models were used to predict the occupancy (probability of occurrence) across the Terrestrial LSA and Birds, Bats, and Amphibians RSA using the model coefficients and the mapped environmental variables for each bird VC. The resulting map data show probability of occurrence and are interpreted as a measure of habitat suitability. Values (from 0-1) were grouped in to six classes (very high, high, moderate, low, very low, and unclassified) for summary purposes.

A habitat suitability model was not developed for Barn Swallow. Baseline surveys found no occurrences of Barn Swallow in or directly adjacent to the Project footprint and only one incidental observation at the southern periphery of the Terrestrial LSA near Highway 3. An occupancy model could not be constructed with one observation. An HSI model based on Barn Swallow habitat relationships described in the literature could have been constructed as an alternative. However, since Barn Swallow predominately nest in human structures and their foraging habitat is in close proximity to nest locations, a habitat model would be of limited utility for assessment of habitat loss when there are few or no suitable structures and no known occurrences within the Project footprint.

Table 15.7-8: Results of the Riverine Bird Surveys, 2017 to 2019

Creek Name	Year	Length Surveyed (km)	Number Observed					Total Number Observed	Comments
			American Dipper	Belted Kingfisher	Harlequin Duck	Osprey	Spotted Sandpiper		
Alexander Creek	2017	9.2	10	2	4	0	19	35	1 American Dipper and 3 Spotted Sandpiper nests observed; 1 Osprey nest observed; 2 Spotted Sandpiper nests suspected; 1 Spotted Sandpiper brood observed
	2018	2.0	2	0	3	2	12	19	1 Spotted Sandpiper nest with 4 eggs observed; 1 Osprey nest observed
	2019	1.7	2	0	0	0	0	2	1 American Dipper nest observed
Alexander Creek Total		12.9	14	2	7	2	31	56	-
West Alexander Creek	2017	1.3	0	0	0	0	0	0	-
	2018	0.4	0	0	0	0	3	3	-
	2019	2.9	2	0	3	0	0	5	1 American Dipper nest observed
West Alexander Creek Total		4.6	2	0	3	0	3	8	-
Grave Creek	2017	5.1	3	0	0	0	0	3	-
	2018	0.5	1	0	0	0	2	3	-
	2019	0.05	0	0	0	0	0	0	-
Grave Creek Total		5.7	4	0	0	0	2	6	-

Creek Name	Year	Length Surveyed (km)	Number Observed					Total Number Observed	Comments
			American Dipper	Belted Kingfisher	Harlequin Duck	Osprey	Spotted Sandpiper		
Harmer Creek	2017	3.0	1	0	0	0	0	1	1 American Dipper and 2 Spotted Sandpiper nests observed
	2018	0.7	2	0	2	0	8	12	-
Harmer Creek Total		3.7	3	0	2	0	8	13	-
Unnamed Creek in Deadman Pass	2019	1.5	0	0	0	0	0	0	-
Total		28.3	23	2	12	2	44	83	-

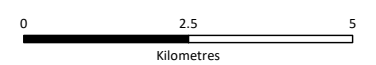


Crown Mountain Coking Coal Project

Figure 15.7-14
2017 Riverine Bird Observations

LEGEND

- American Dipper
- ▲ American Dipper Nest
- Belted Kingfisher
- Harlequin Duck
- Spotted Sandpiper
- ▲ Spotted Sandpiper Nest
- Terrestrial Local Study Area
- Project Footprint
- Highway
- Arterial/Collector Road
- Local/Resource Road
- +— Railway
- - - Transmission Line
- Watercourse
- Waterbody
- Wetland
- Watershed
- Provincial Park/Protected Area
- British Columbia/Alberta Border



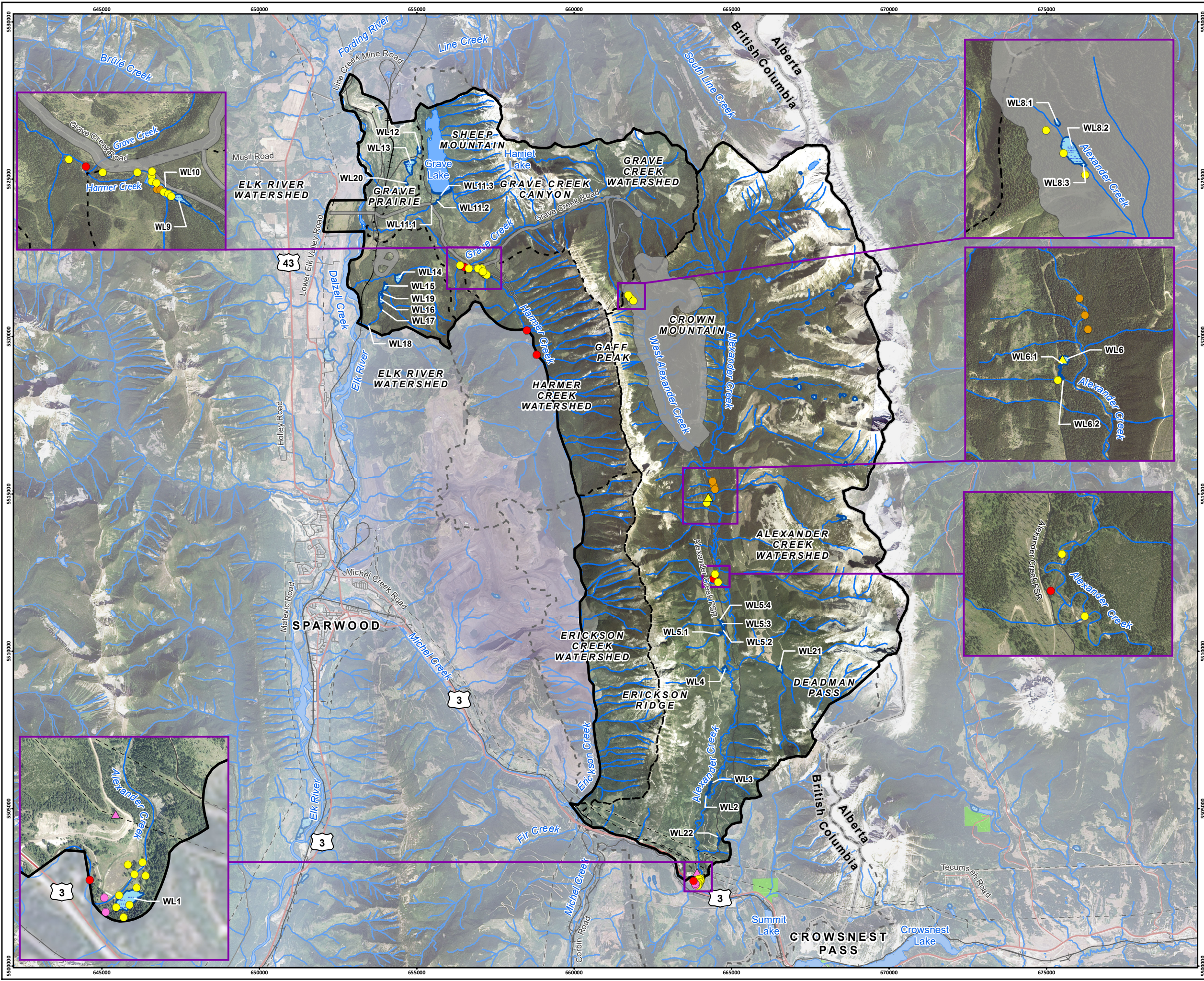
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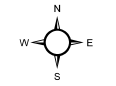
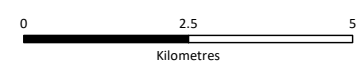


Crown Mountain Coking Coal Project

Figure 15.7-15
2018 Riverine Bird Observations

LEGEND

- American Dipper
- Harlequin Duck
- ▲ Osprey
- ▲ Osprey Nest
- Spotted Sandpiper
- ▲ Spotted Sandpiper Nest
- Terrestrial Local Study Area
- Project Footprint
- Highway
- Arterial/Collector Road
- Local/Resource Road
- Railway
- - - Transmission Line
- Watercourse
- Waterbody
- Wetland
- Watershed
- Provincial Park/Protected Area
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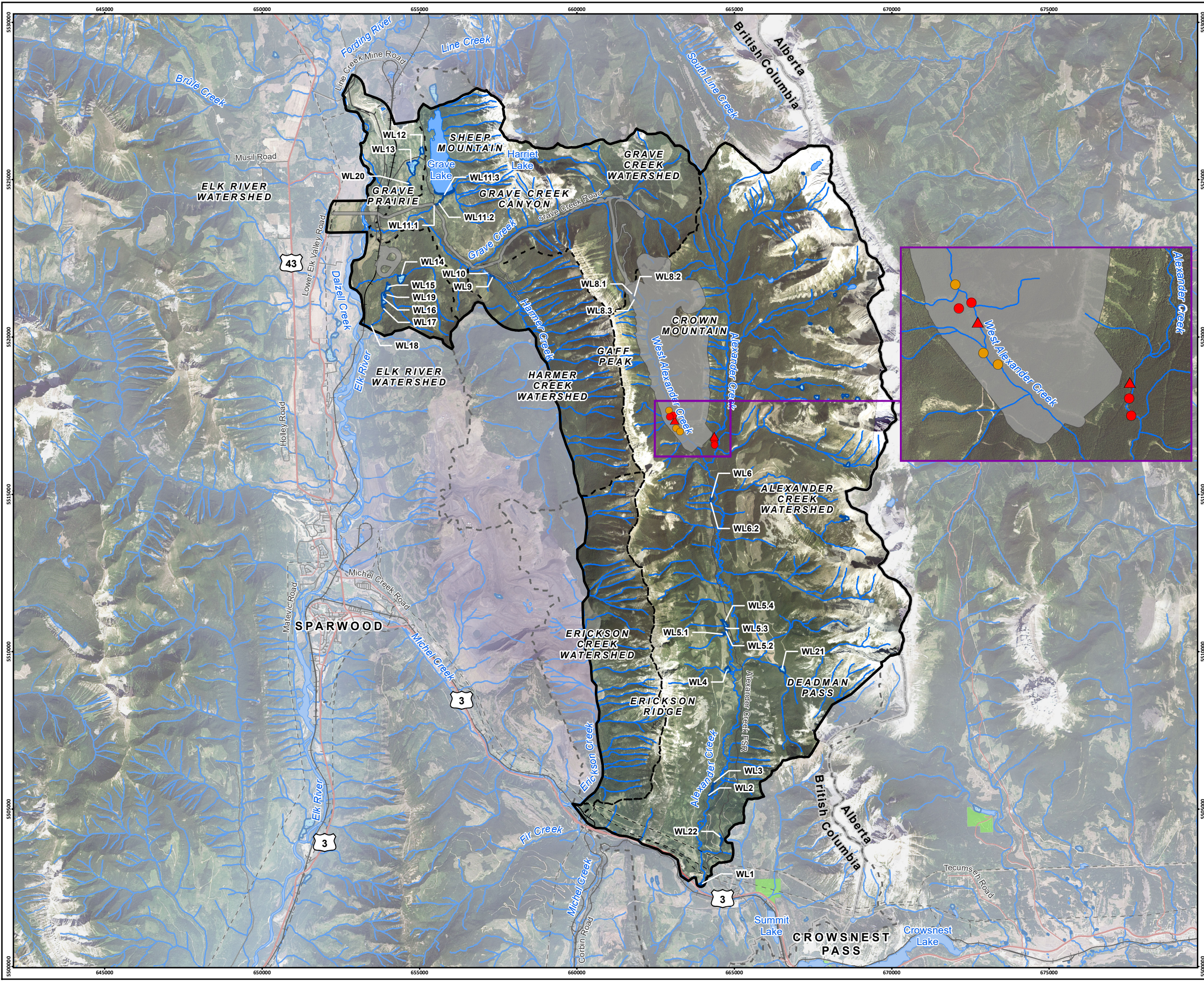
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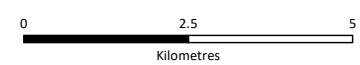


Crown Mountain Coking Coal Project

Figure 15.7-16
2019 Riverine Bird Observations

LEGEND

- American Dipper
- ▲ American Dipper Nest
- Harlequin Duck
- Terrestrial Local Study Area
- Project Footprint
- Highway
- Arterial/Collector Road
- Local/Resource Road
- Railway
- Transmission Line
- Watercourse
- Waterbody
- Wetland
- Watershed
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15.7.2.3.2 Results

Olive-sided Flycatcher

Olive-sided Flycatcher habitat suitability within the Project footprint, Terrestrial LSA, and Birds, Bats, and Amphibians RSA was predicted using an occupancy model. See Appendix 15-C for model details.

Habitat Use

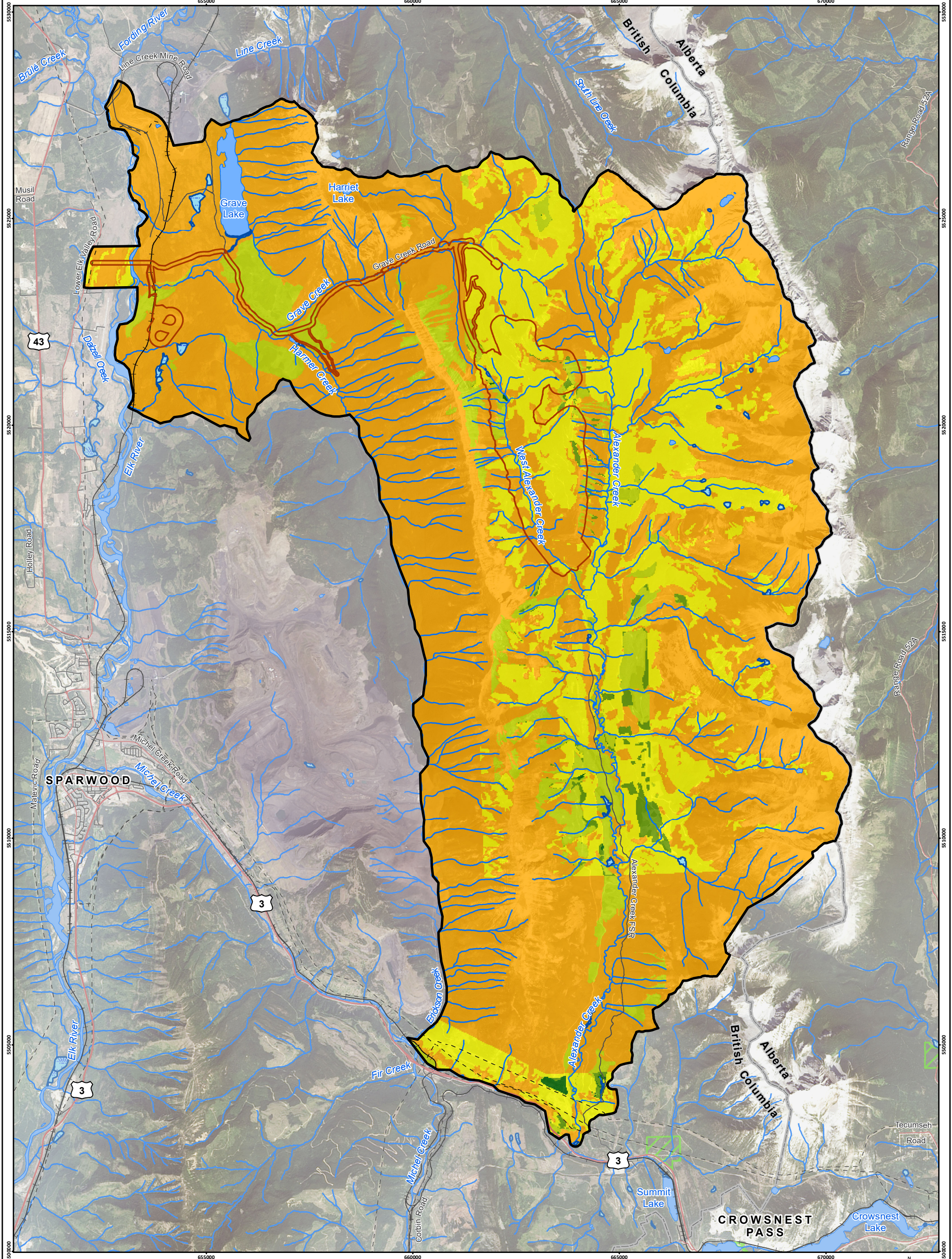
The overall estimate of Olive-sided Flycatcher occurrence was 0.44, or Olive-sided Flycatcher are potentially found in approximately 44% of the Terrestrial LSA. Olive-sided flycatcher were generally associated with primary rivers, early seral forests, and forests with high canopies and 51 to 70% canopy closure with high shrub cover (Appendix 15-C).

Habitat Suitability

The occupancy model indicates that the best Olive-sided Flycatcher habitats within the Terrestrial LSA are located along Alexander Creek and Grave Creek and in the Grave Prairie area (Figure 15.7-17). Approximately 16 ha of the Project footprint (1% of the total area of the Project footprint) was predicted as very high or high habitat suitability for Olive-sided Flycatcher (Table 15.7-9). Quality habitats for Olive-sided Flycatcher within the Project footprint are located on Crown Mountain. Approximately 227 ha of the Terrestrial LSA (1% of the total area of the Terrestrial LSA) was predicted as very high or high habitat suitability for Olive-sided Flycatcher. Areas of quality habitat for Olive-sided Flycatcher within the Terrestrial LSA are primarily located in the lower Alexander Creek drainage. Approximately 7,113 ha of the Birds, Bats, and Amphibians RSA (1% of the total area of the Birds, Bats, and Amphibians RSA) was predicted as very high or high habitat suitability for Olive-sided Flycatcher (Table 15.7-9).

Table 15.7-9: Olive-sided Flycatcher Habitat Suitability in the Project Footprint, Terrestrial LSA, and Birds, Bats, and Amphibians RSA

Habitat Suitability	Amount of Habitat in the Project Footprint		Amount of Habitat in the Terrestrial LSA		Amount of Habitat in the Birds, Bats, and Amphibians RSA	
	Area (ha)	% of Project Footprint	Area (ha)	% of Terrestrial LSA	Area (ha)	% of Birds, Bats, and Amphibians RSA
Very High (0.8-1)	2	<1	24	<1	35	<1
High (0.6-0.8)	14	1	203	1	7,078	1
Moderate (0.4-0.6)	120	9	1,664	7	30,832	2
Low (0.2-0.4)	541	42	4,902	20	415,032	33
Very Low (0-0.2)	606	47	17,427	72	809,859	64



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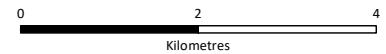
LEGEND

Habitat Suitability

- Very High
- High
- Moderate
- Low
- Very Low
- Unclassified
- Terrestrial Local Study Area
- Project Footprint

- Highway
- Arterial/Collector Road
- Local/Resource Road
- Railway
- Transmission Line
- Watercourse
- Waterbody
- Wetland
- Provincial Park/Protected Area

British Columbia/Alberta Border



Scale 1:85,000

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Woodpeckers

Woodpecker habitat suitability within the Project footprint, Terrestrial LSA, and Birds, Bats, and Amphibians RSA was predicted using an occupancy model. See Appendix 15-C for model details.

Habitat Use

The overall estimate of woodpecker occurrence was 0.64, or woodpeckers potentially use approximately 64% of the Terrestrial LSA. Woodpeckers showed strong selection for canopy closure and avoided steep slopes, rugged, and elevated habitats. Woodpeckers avoided areas of dense conifer forest and open canopy forest, they were weakly associated with primary and secondary rivers (Appendix 15-C).

Habitat Suitability

The habitat model indicates that the best woodpecker habitats within the Terrestrial LSA are located along the Alexander Creek drainage, in addition to portions of the west side of the Continental Divide (Figure 15.7-18).

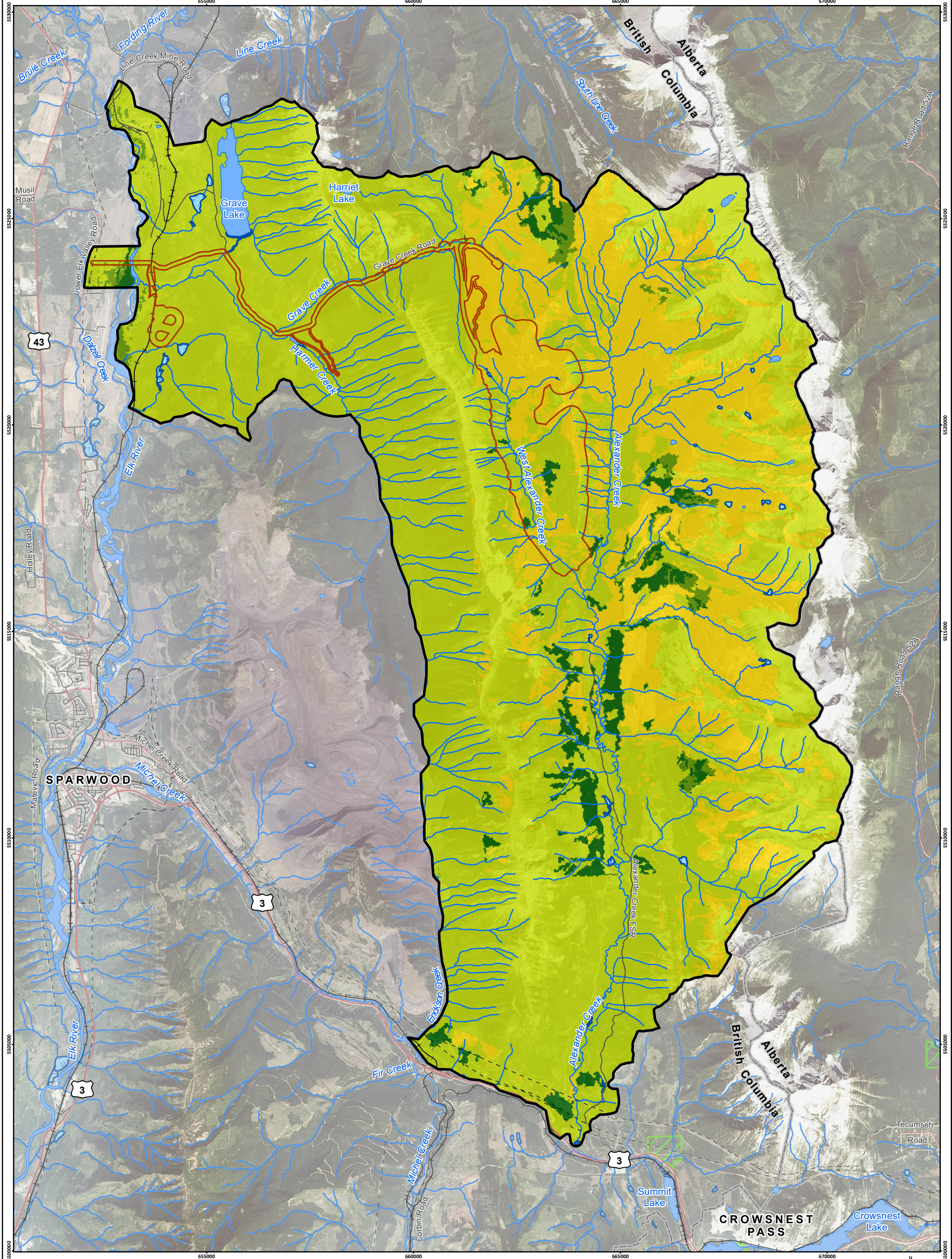
Table 15.7-10: Woodpecker Habitat Suitability in the Project Footprint, Terrestrial LSA, and Birds, Bats, and Amphibians RSA

Habitat Suitability	Amount of Habitat in the Project Footprint		Amount of Habitat in the Terrestrial LSA		Amount of Habitat in the Birds, Bats, and Amphibians RSA	
	Area (ha)	% of Project Footprint	Area (ha)	% of Terrestrial LSA	Area (ha)	% of Birds, Bats, and Amphibians RSA
Very High (0.8-1)	27	2	688	3	106,952	8
High (0.6-0.8)	3	<1	299	1	82,604	7
Moderate (0.4-0.6)	748	58	17,637	73	630,156	50
Low (0.2-0.4)	505	39	5,597	23	424,845	34
Very Low (0-0.2)	0	0	0	0	17,240	1

Approximately 30 ha of the Project footprint (2% of the total area of the Project footprint) was predicted as very high habitat suitability for woodpeckers (Table 15.7-10). Quality habitats for woodpeckers within the Project footprint are located on Crown Mountain and the east side of Erickson Ridge (Figure 15.7-18). Approximately 987 ha of the Terrestrial LSA (4% of the total area of the Terrestrial LSA) was predicted as very high or habitat suitability for woodpeckers. Areas of quality habitat for woodpeckers within the Terrestrial LSA are primarily located along the Alexander Creek drainage, and along portions of the west side of the Continental Divide (Figure 15.7-18). Approximately 189,557 ha of the Birds, Bats, and Amphibians RSA (15% of the total area of the Birds, Bats, and Amphibians RSA) was predicted as very high or high habitat suitability for woodpeckers (Table 15.7-10).

Northern Goshawk

Northern Goshawk habitat suitability within the Project footprint, Terrestrial LSA, and Birds, Bats, and Amphibians RSA was predicted using a habitat suitability index model. See Appendix 15-C for model details.



Crown Mountain Coking Coal Project

LEGEND

Habitat Suitability

- Very High
- High
- Moderate
- Low
- Very Low
- Unclassified
- Terrestrial Local Study Area
- Project Footprint

- Highway
- Arterial/Collector Road
- Local/Resource Road
- Railway
- Transmission Line
- Watercourse
- Waterbody
- Wetland
- Provincial Park/Protected Area

British Columbia/Alberta Border

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Figure 15.7-18
 Woodpecker Spring-Summer Habitat Suitability
 in the Terrestrial Local Study Area

Habitat Use

The overall estimate for suitable habitat (medium and high quality) for Northern Goshawk based on the habitat suitability index model was 6,410 ha, covering 26% of the Terrestrial LSA. Habitats assumed to contribute most towards suitability in the area included old growth forests with crown closure, which is considered core habitat. Mid seral forests were assumed to be used and early seral stages relatively unused by Northern Goshawks. Utilization of mid and early seral habitats is dependent on proximity to old growth and the availability of prey within these habitats. High elevation habitats with a high proportion of subalpine fir were assumed low quality habitats for goshawk. For further details see, Appendix 15-C.

Habitat Suitability

The habitat model indicates that the best Northern Goshawk habitats within the Terrestrial LSA are located along portions of the Alexander Creek drainage, Grave Creek drainage, the confluence of West Alexander Creek, Grave Creek Canyon, portions of Sheep Mountain and Erickson Ridge, and the forested mountain passes on the Continental Divide (e.g., Deadman Pass; Figure 15.7-19).

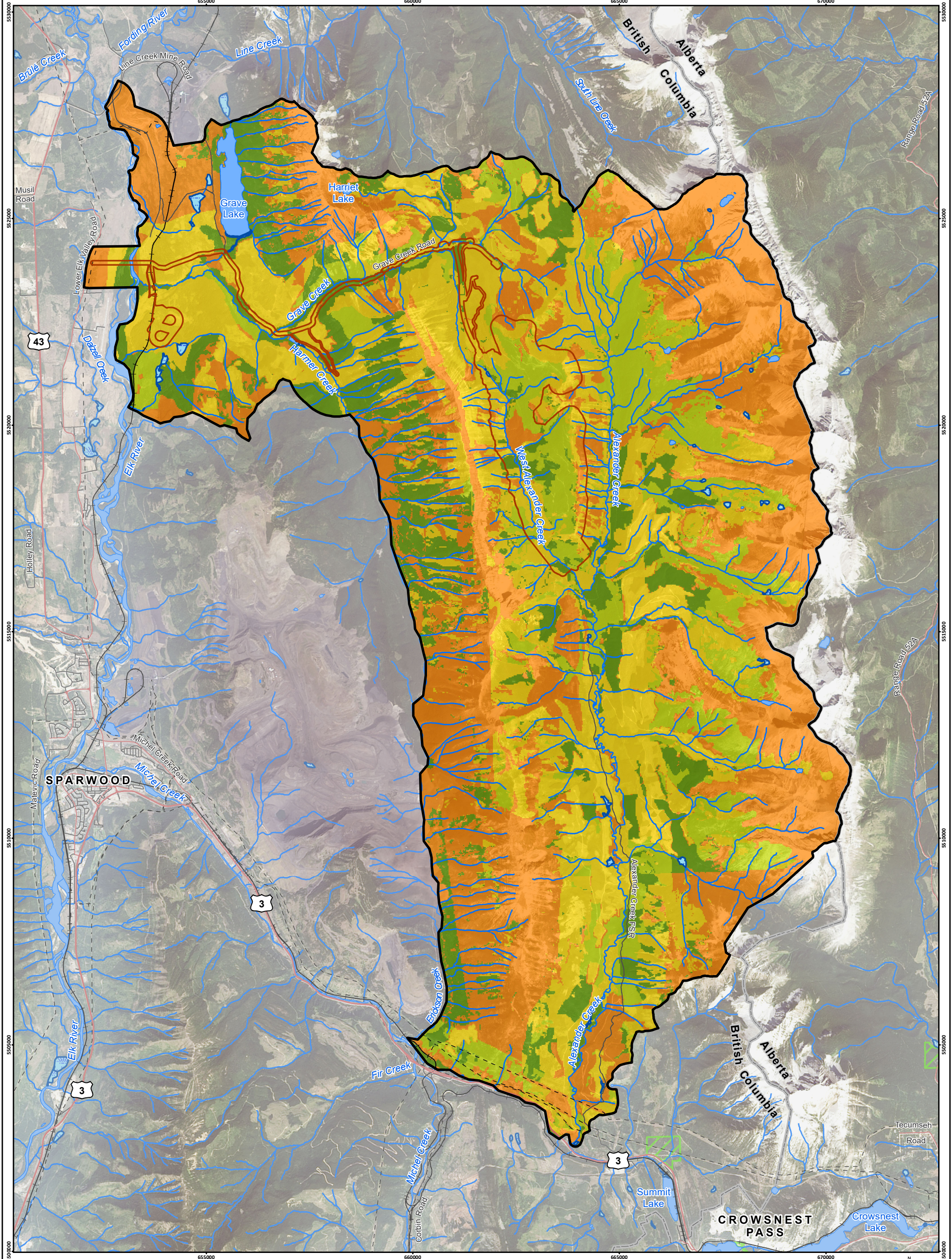
Approximately 162 ha of the Project footprint (13% of the total area of the Project footprint) was predicted as high-quality habitat for Northern Goshawk (Table 15.7-11). Quality habitats for Northern Goshawk within the Project footprint are located on Crown Mountain and portions of West Alexander Creek, Grave Creek Canyon, and near the natural gas pipeline (Figure 15.7-19). Approximately 3,214 ha of the Terrestrial LSA (13% of the total area of the Terrestrial LSA) was predicted as high-quality habitat for Northern Goshawk. Areas of quality habitat for Northern Goshawk within the Terrestrial LSA are primarily located along the Alexander Creek drainage, the confluence of West Alexander Creek, the Grave Creek drainage, Grave Creek Canyon, along the western slopes of Sheep Mountain, portions of Erickson Ridge, and the forested mountain passes on the Continental Divide (Figure 15.7-19). Approximately 153,258 ha of the Birds, Bats, and Amphibians RSA (12% of the total area of the Birds, Bats, and Amphibians RSA) was predicted as high-quality habitat for Northern Goshawk (Table 15.7-11).

Table 15.7-11: Northern Goshawk Habitat Suitability in the Project Footprint, Terrestrial LSA, and Birds, Bats, and Amphibians RSA

Habitat Suitability	Amount of Habitat in the Project Footprint		Amount of Habitat in the Terrestrial LSA		Amount of Habitat in the Birds, Bats, and Amphibians RSA	
	Area (ha)	% of Project Footprint	Area (ha)	% of Terrestrial LSA	Area (ha)	% of Birds, Bats, and Amphibians RSA
High (>20)	162	13	3,214	13	153,258	12
Moderate (10-20)	409	32	3,196	13	228,961	18
Low (0-10)	562	44	7,803	32	219,122	17
Unclassified	149	12	10,008	41	661,830	52

American Dipper

American Dipper habitat suitability within the Project footprint, Terrestrial LSA, and Birds, Bats, and Amphibians RSA was predicted using a habitat suitability index model. See Appendix 15-C for model details.



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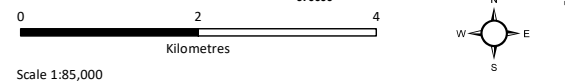
LEGEND

Figure 15.7-19
Northern Goshawk Spring-Summer Habitat Suitability in the Terrestrial Local Study Area

Habitat Suitability

- High
- Moderate
- Low
- Very Low
- Terrestrial Local Study Area
- Project Footprint
- Highway
- Arterial/Collector Road

- Local/Resource Road
- Railway
- Transmission Line
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Map Created By: RB
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Habitat Use

The overall estimate for suitable habitat (moderate and high quality) for American dipper based on the habitat suitability index model was 636 ha, covering 3% of the Terrestrial LSA. Habitats assumed to contribute most towards suitability in the area included upland second and third order streams, particularly when streams flow over rugged terrain; these habitats provide forage and breeding habitat for the species. Other stream orders are considered of less importance, and streams with fine sediments to have lower abundance of invertebrates and less foraging opportunities. For further details, see Appendix 15-C.

Habitat Suitability

Based on the habitat suitability index model, the best American Dipper habitats within the Terrestrial LSA are located along portions of the Alexander Creek and Grave Creek drainages and drainage lines from Sheep Mountain, Erickson Ridge, and the west side of the Continental Divide (Figure 15.7-20).

Approximately 41 ha of the Project footprint (3% of the total area of the Project footprint) was predicted as high suitability habitat for American Dipper (Table 15.7-12). Quality habitats for American Dipper within the Project footprint are located along Alexander Creek and drainage lines from Erickson Ridge (Figure 15.7-20). Approximately 499 ha of the Terrestrial LSA (2% of the total area of the Terrestrial LSA) was predicted as high-quality habitat for American Dipper. Quality habitats within the Terrestrial LSA are primarily located in the Alexander Creek and Grave Creek drainages and drainage lines from Sheep Mountain, Erickson Ridge, and the west side of the Continental Divide. Approximately 30,470 ha of the Birds, Bats, and Amphibians RSA (2% of the total area of the Birds, Bats, and Amphibians RSA) was predicted as high-quality habitat for American Dipper (Table 15.7-12).

Table 15.7-12: American Dipper Habitat Suitability in the Project Footprint, Terrestrial LSA, and Birds, Bats, and Amphibians RSA

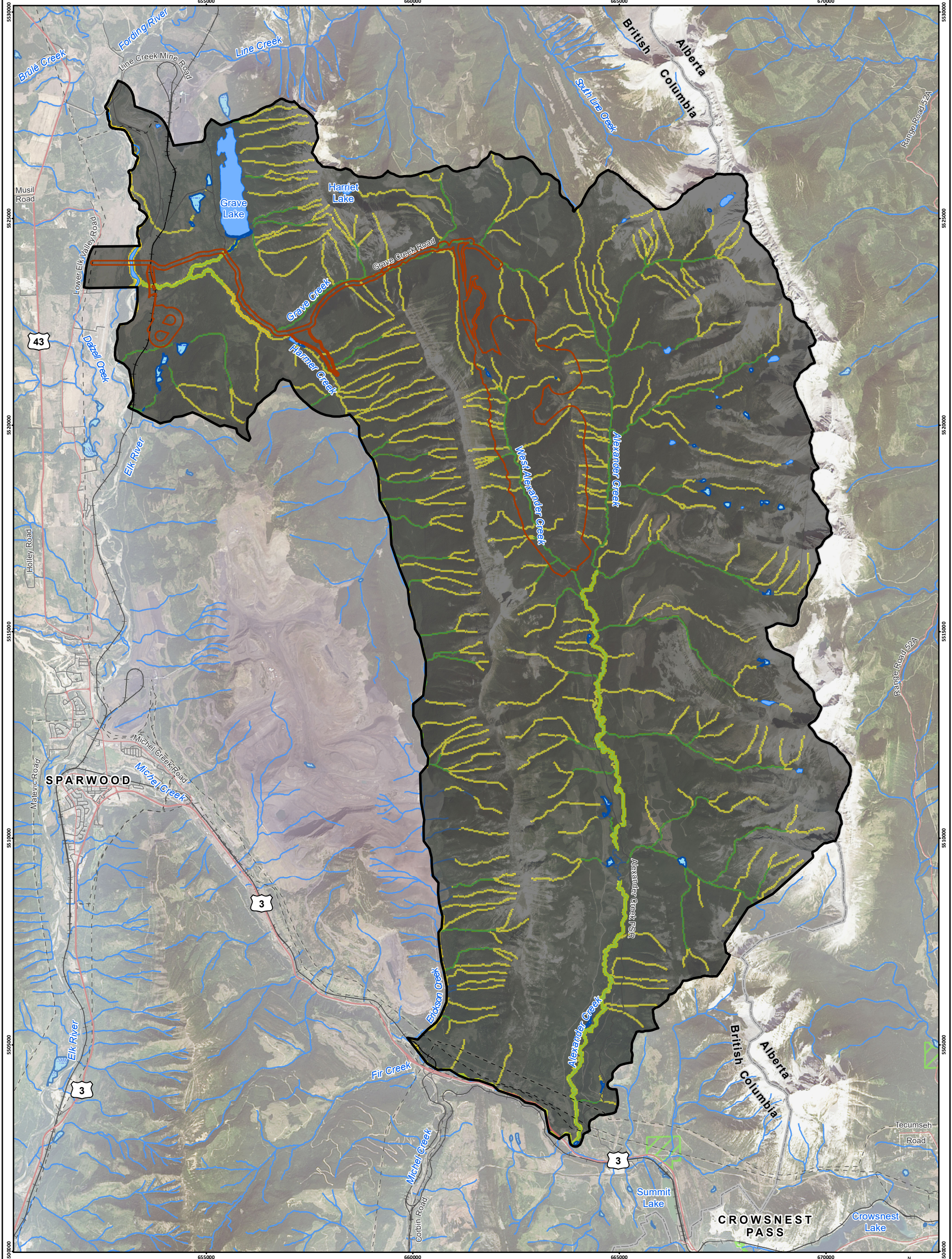
Habitat Suitability	Amount of Habitat in the Project Footprint		Amount of Habitat in the Terrestrial LSA		Amount of Habitat in the Birds, Bats, and Amphibians RSA	
	Area (ha)	% of Project Footprint	Area (ha)	% of Terrestrial LSA	Area (ha)	% of Birds, Bats, and Amphibians RSA
High (>2)	41	3	499	2	30,470	2
Moderate (1-2)	1	<1	239	1	22,523	2
Low (0-1)	74	6	1,528	6	86,980	7
Unclassified	1,166	91	21,955	91	1,123,198	89

Mallard

Mallard habitat suitability within the Project footprint, Terrestrial LSA, and Birds, Bats, and Amphibians RSA was predicted using a habitat suitability index model. See Appendix 15-C for model details.

Habitat Use

The overall estimate of suitable habitat (moderate and high quality) for Mallard in the Terrestrial LSA based on the habitat suitability index model is 1,871 ha (8% of the Terrestrial LSA). Mallard are dabbling ducks and were primarily expected to use shallow waters, mostly limited to within 50 m of the margins of



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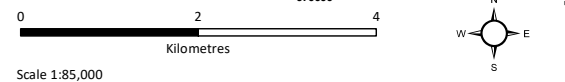
LEGEND

Figure 15.7-20
American Dipper Spring-Summer Habitat Suitability in the Terrestrial Local Study Area

Habitat Suitability

- High
- Moderate
- Low
- Unclassified
- Terrestrial Local Study Area
- Project Footprint
- Highway
- Arterial/Collector Road

- Local/Resource Road
- Railway
- Transmission Line
- Watercourse
- Waterbody
- Wetland
- Provincial Park/Protected Area
- British Columbia/Alberta Border



Scale 1:85,000

Map Drawing Information:
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waterbodies. Habitats contributing most towards suitability in the area include areas within 200 m of wetlands and lakes, which are used for foraging and reproduction for Mallards year-round. Areas within 100 m of primary and secondary streams are of medium suitability. Croplands are also used as wintering habitat for foraging. For further details, see Appendix 15-C.

Habitat Suitability

The habitat model indicates that the best Mallard habitats within the Terrestrial LSA are located on Grave Lake, wetlands near the rail loadout, Harriet Lake, portions of the Alexander Creek drainage, and numerous lakes along the west side of the Continental Divide. Model results are presented in Table 15.7-13 and Figure 15.7-21.

Table 15.7-13: Mallard Habitat Suitability in the Project Footprint, Terrestrial LSA, and Birds, Bats, and Amphibians RSA

Habitat Suitability	Amount of Habitat in the Project Footprint		Amount of Habitat in the Terrestrial LSA		Amount of Habitat in the Birds, Bats, and Amphibians RSA	
	Area (ha)	% of Project Footprint	Area (ha)	% of Terrestrial LSA	Area (ha)	% of Birds, Bats, and Amphibians RSA
High (>2)	18	1	1,005	4	47,685	4
Moderate (1-2)	20	2	830	3	69,290	5
Low (0-1)	532	41	8,884	37	476,131	38
Unclassified	713	56	13,502	56	670,064	53

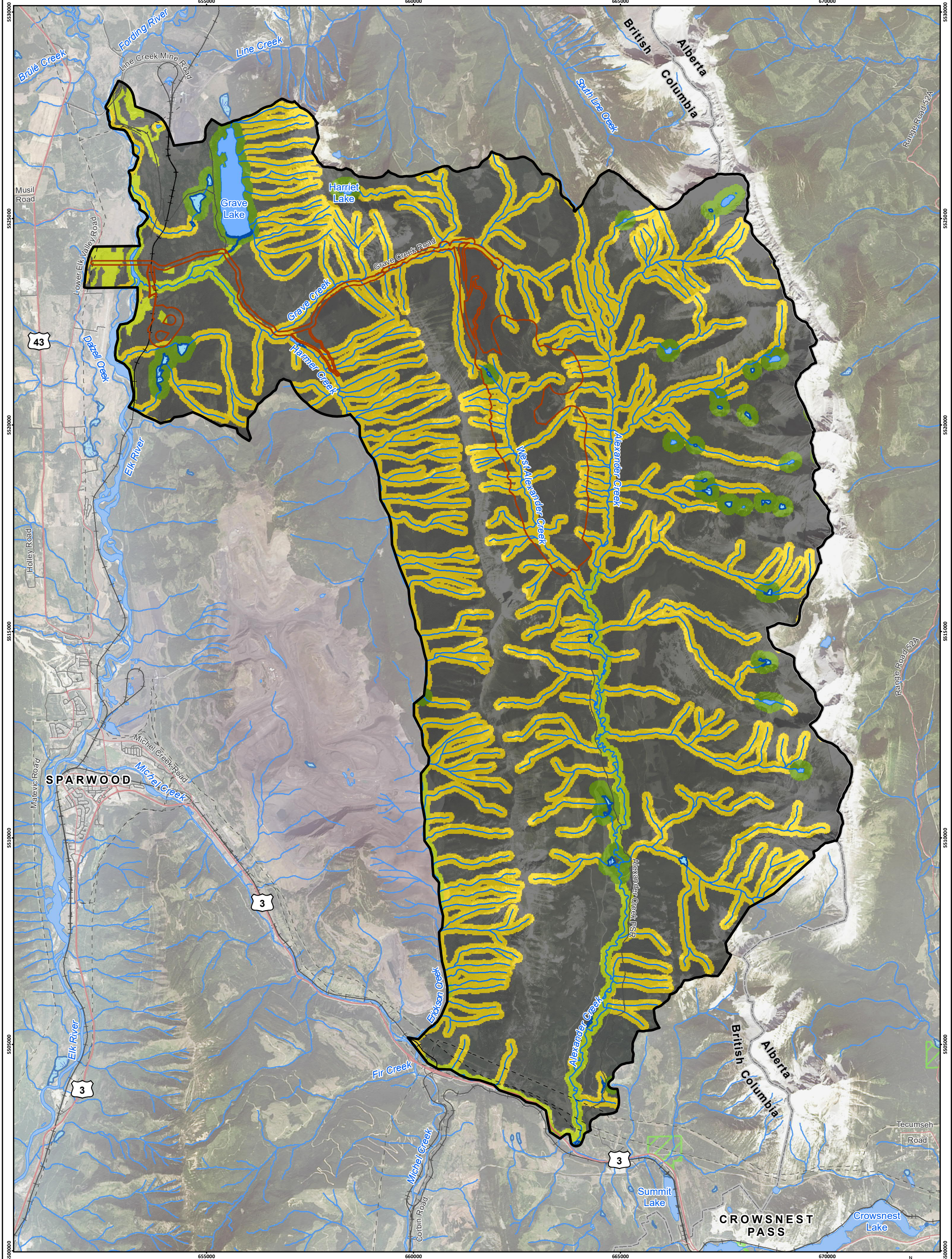
Approximately 18 ha of the Project footprint (1% of the total area of the Project footprint) was predicted as high habitat suitability for Mallard. Quality habitats for Mallard within the Project footprint are located at the headwaters of West Alexander Creek (Figure 15.7-21). Approximately 1,005 ha of the Terrestrial LSA (4% of the total area of the Terrestrial LSA) was predicted as high habitat suitability for Mallard. Areas of quality habitat within the Terrestrial LSA are primarily located on Grave Lake, Harriet Lake, portions of the Alexander Creek drainage, and numerous lakes along the west side of the Continental Divide (Figure 15.7-21). Approximately 47,685 ha of the Birds, Bats, and Amphibians RSA (4% of the total area of the Birds, Bats, and Amphibians RSA) was predicted as high-quality habitat for Mallard (Table 15.7-13).

Harlequin Duck

Harlequin Duck habitat suitability within the Project footprint, Terrestrial LSA, and Birds, Bats, and Amphibians RSA was predicted using a habitat suitability index model. See Appendix 15-C for model details.

Habitat Use

The estimate of suitable habitat (medium and high quality) for Harlequin Duck in the Terrestrial LSA based on the habitat suitability index model is 2,037 ha. Habitats expected to contribute most towards suitability in the area include braided streams with nearby vegetation cover, which constitute optimum breeding and foraging habitat for Harlequin Duck. Lake and wetland margins, where they lie in proximity to riverine water features, also provide potential breeding and foraging habitat (medium suitability where there is surrounding vegetation cover, low suitability where there is no surrounding vegetation cover). Streams flowing over fine sediments are expected to have low invertebrate densities and are less suitable. For further details, see Appendix 15-C.



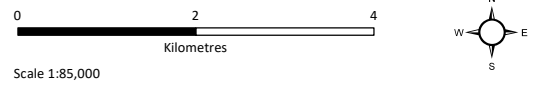
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LEGEND

Habitat Suitability

- High
- Moderate
- Low
- Unclassified
- Terrestrial Local Study Area
- Project Footprint
- Highway
- Arterial/Collector Road

- Local/Resource Road
- Railway
- Transmission Line
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Figure 15.7-21
 Mallard Spring-Summer Habitat Suitability in the Terrestrial Local Study Area



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Habitat Suitability

The habitat suitability index habitat model indicates that the best Harlequin Duck habitats within the Terrestrial LSA are located along the lower Alexander Creek drainage and the confluence of Grave Creek with the Elk River (Figure 15.7-22).

Table 15.7-14: Harlequin Duck Habitat Suitability in the Project Footprint, Terrestrial LSA, and Birds, Bats, and Amphibians RSA

Habitat Suitability	Amount of Habitat in the Project Footprint		Amount of Habitat in the Terrestrial LSA		Amount of Habitat in the Birds, Bats, and Amphibians RSA	
	Area (ha)	% of Project Footprint	Area (ha)	% of Terrestrial LSA	Area (ha)	% of Birds, Bats, and Amphibians RSA
High (>2)	0	0	69	<1	4,025	<1
Moderate (1-2)	118	9	1,968	8	95,265	8
Low (0-1)	0	0	349	1	43,423	3
Unclassified	1,165	91	21,835	90	1,120,457	89

No habitat within the Project footprint was predicted as high suitability for Harlequin Duck (Table 15.7-14). Moderate suitability habitats for Harlequin Duck within the Project footprint are located in portions of West Alexander Creek (Figure 15.7-22). Approximately 69 ha of the Terrestrial LSA (<1% of the total area of the Terrestrial LSA) was predicted as high quality for Harlequin Duck. Areas of quality habitat for Harlequin Duck within the Terrestrial LSA are primarily located in the lower Alexander Creek drainage and the confluence of Grave Creek with the Elk River (Figure 15.7-22). Approximately 4,025 ha of the Birds, Bats, and Amphibians RSA (<1% of the total area of the Birds, Bats, and Amphibians RSA) was predicted as high-quality habitat for Harlequin Duck (Table 15.7-14).

Red-winged Blackbird

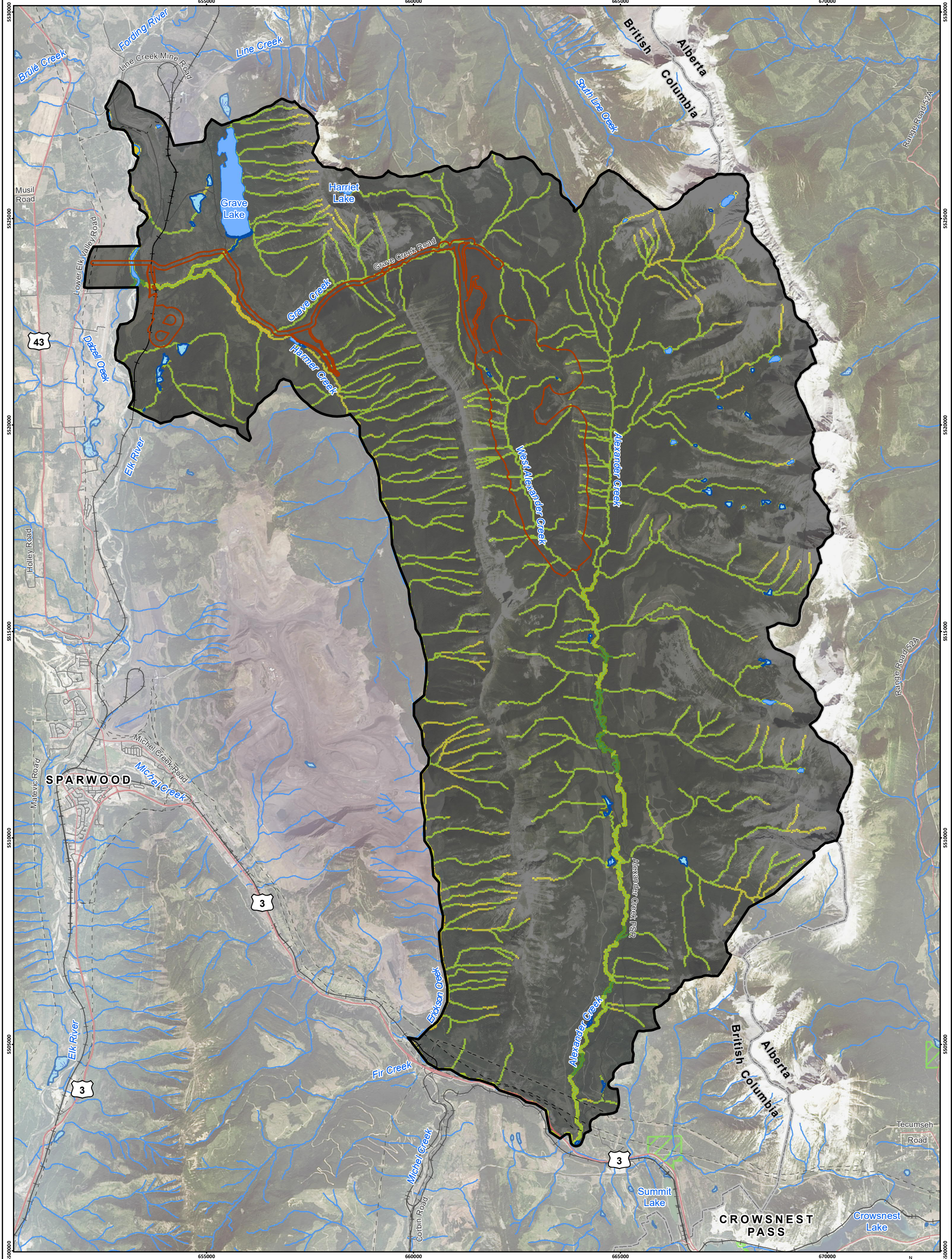
Red-winged Blackbird habitat suitability within the Project footprint, Terrestrial LSA, and Birds, Bats, and Amphibians RSA was predicted using an occupancy model. See Appendix 15-C for model details.

Habitat Use

The overall estimate of Red-winged Blackbird occurrence was 0.27, or Red-winged Blackbird potentially use approximately 27% of the Terrestrial LSA. Red-winged Blackbird showed strong selection of habitats closer to secondary rivers and were generally associated with shrub cover and closed canopy forest (Appendix 15-C).

Habitat Availability

The habitat model indicates that the best Red-winged Blackbird habitats within the Terrestrial LSA are located along the Alexander Creek drainage, the confluence of West Alexander Creek, and portions of the Grave Creek drainage (Figure 15.7-23). Approximately 101 ha of the Project footprint (8% of the total area of the Project footprint) was predicted as high habitat suitability for Red-winged Blackbird (Table 15.7-15); there were no areas of very high habitat suitability in the Project footprint. Quality habitats for Red-winged Blackbird within the Project footprint are located along the West Alexander Creek drainage (Figure 15.7-23). Approximately 3,460 ha of the Terrestrial LSA (14% of the total area of the Terrestrial LSA) was predicted as very high or high habitat suitability for Red-winged Blackbird. Areas of very high-quality



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LEGEND

Habitat Suitability

- High
- Moderate
- Low
- Unclassified
- Terrestrial Local Study Area
- Project Footprint
- Highway
- Arterial/Collector Road

- Local/Resource Road
- Railway
- Transmission Line
- Watercourse
- Waterbody
- Wetland
- Provincial Park/Protected Area
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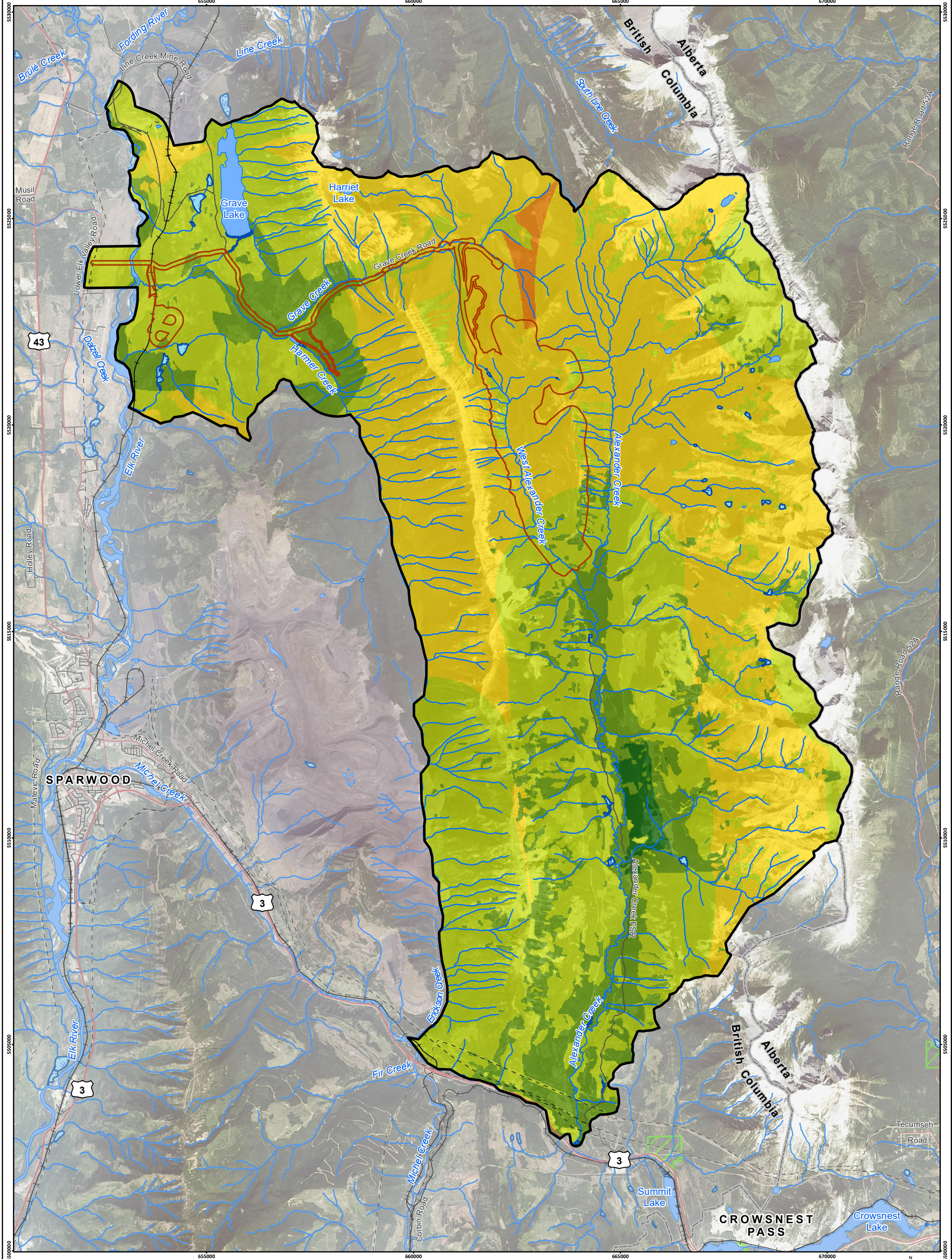
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Figure 15.7-22
 Harlequin Duck Spring-Summer Habitat Suitability in the Terrestrial Local Study Area

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Figure 15.7-23
Red-winged Blackbird Year-round Habitat Suitability in the Terrestrial Local Study Area

LEGEND

Habitat Suitability

- Very High
- High
- Moderate
- Low
- Very Low
- Unclassified
- Terrestrial Local Study Area
- Project Footprint

- Highway
- Arterial/Collector Road
- Local/Resource Road
- Railway
- Transmission Line
- Watercourse
- Waterbody
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Scale 1:85,000
0 2 4
Kilometres

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habitat for Red-winged Blackbird within the Terrestrial LSA are primarily located along the Alexander Creek drainage, the confluence of West Alexander Creek, and portions of the Grave Creek drainage (Figure 15.7-23). Approximately 103,803 ha of the Birds, Bats, and Amphibians RSA (8%) was predicted as very high or high habitat suitability for Red-winged Blackbird (Table 15.7-15).

Table 15.7-15: Red-winged Blackbird Habitat Suitability in the Project Footprint, Terrestrial LSA, and Birds, Bats, and Amphibians RSA

Habitat Suitability	Amount of Habitat in the Project Footprint		Amount of Habitat in the Terrestrial LSA		Amount of Habitat in the Birds, Bats, and Amphibians RSA	
	Area (ha)	% of Project Footprint	Area (ha)	% of Terrestrial LSA	Area (ha)	% of Birds, Bats, and Amphibians RSA
Very High (0.8-1)	0	0	194	1	897	<1
High (0.6-0.8)	101	8	3,266	13	102,906	8
Moderate (0.4-0.6)	416	32	10,373	43	797,352	63
Low (0.2-0.4)	762	59	10,235	42	353,461	28
Very Low (0-0.2)	5	<1	153	1	8,300	1
Unclassified	0	0	0	0	0	0

Spotted Sandpiper

Spotted Sandpiper habitat suitability within the Project footprint, Terrestrial LSA, and Birds, Bats, and Amphibians RSA was predicted using a habitat suitability index model. See Appendix 15-C for model details.

Habitat Use

The overall estimate for suitable habitat (medium and high quality) for Spotted Sandpiper based on the habitat suitability index habitat model was 304 ha, covering 1.3% of the Terrestrial LSA. Habitats predicted to contribute most towards suitability in the Terrestrial LSA include shorelines and shallows of primary streams; upland second and third order streams, particularly when streams flow over rugged terrain; lakes; and wetlands represent optimal (high suitability) habitats for foraging and breeding. Areas with low vegetation and woody cover are valuable for nesting and predator avoidance. Secondary and tertiary streams have limited medium to low value, respectively (Appendix 15-C).

Habitat Suitability

Based on the habitat suitability index model, the best Spotted Sandpiper habitats within the Terrestrial LSA are located along portions of the Alexander Creek and Grave Creek drainages and along the shores of Grave Lake and small lakes on the west side of the Continental Divide (Figure 15.7-24).

Approximately 1 ha of the Project footprint (<1% of the total area of the Project footprint) was predicted as high suitability habitat for Spotted Sandpiper (Table 15.7-16). Quality habitats for Spotted Sandpiper within the Project footprint are located along the Elk River near the natural gas pipeline (Figure 15.7-24). Approximately 77 ha of the Terrestrial LSA (<1% of the total area of the Terrestrial LSA) was predicted as high-quality habitat for Spotted Sandpiper. Areas of quality habitat for Spotted Sandpiper within the Terrestrial LSA primarily include the Alexander Creek and Grave Creek drainages and along the shores of Grave Lake and small lakes on the west side of the Continental Divide (Figure 15.7-24).