Williamson's Sapsucker Relative Abundance Monitoring, East Kootenay 2017

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ABSTRACT

Long-term monitoring of the Endangered Williamson's Sapsucker (WISA) relative abundance in focus areas began in 2014 in the East Kootenay region in B.C. This second round of monitoring in 2017 simplified the 400-m Call Playback (CPB) point grid of 2014 to an 800-m grid. Six focus areas totalling 50.75 km^2 in area were sampled by 73 CPB points from April 25-27, 2017, that represented half of the total known WISA nesting territories in the East Kootenay. Twenty-two WISA were detected from the CPB points in four of the focus areas, while none were detected in Kimberley Nature Park or Meadow Creek. Relative abundance averaged 0.301 WISA detected per CPB point (n = 73, SD 0.147). Sampling of the six focus areas using an 800-m CPB point grid during April proved to be a simple and logistically efficient method that should be useful for long-term monitoring.

The CPB points sampled in 2017 were compared to the same points sampled in 2014. In two of the focus areas (Strauss and Caven Junction), Coefficient of Variation (CV = SD/Mean) from 2014 to 2017 was 28-33%. Power analysis to detect population trends in the East Kootenay using an estimated CV of 30% in each area should allow for monitoring to detect a statistically significant net population decline of 56% over a 10 year-period in each area. The estimated CV of 30% was based on a small sample and only two of the focus areas, and remains to be confirmed.

These monitoring results cannot be extrapolated to the population of the entire East Kootenay AO because the areas were not selected randomly, and so will only apply to the focus areas. These six focus areas accounted for half of the known WISA nesting territories in the East Kootenay. Only wider area sampling, which was tried in 2010-2012 and proved to be very inefficient, can still address the population as a whole.

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Acknowledgments

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INTRODUCTION

Williamson's Sapsucker (WISA) has been designated as Endangered in Canada (COSEWIC 2005), and is listed under Schedule 1 of the Species at Risk Act. Population monitoring in the East Kootenay region of BC was undertaken in 2010-2012 first by random sampling (2010) and then by Dual-Frame sampling (2011-2012) (Ohanjanian et al. 2012). In the Dual-Frame sampling, the List Frame consisted of the previously known nests, all of which were checked for occupancy each year, and an Area Frame that was sampled randomly, stratified either by habitat and/or by road access. The sampling proved expensive and did not collect enough data to provide a reliable population estimate with only one nest found in the Area Frame sampling in the two years.

In March 2014, a WISA-monitoring workshop was sponsored by CWS. At that workshop, it was decided to limit the areas regularly monitored in the East Kootenay to only those areas where WISA was known to have nested, or occurred in numbers, i.e., not just single isolated nests. In 2014, sampling consisted of Call and Drum Playbacks (CPB) at 400-m grid spacing in four areas each known to have several previously occupied WISA nests (Ohanjanian 2014). The sampling was only partially completed (129 out of about 180 planned points) because of weather problems, and logistical and funding limits.

To attempt to simplify the monitoring, roadside CPB monitoring was attempted in the East Kootenay in 2016 by Les Gyug and Ted Antifeau. This was similar in scope and design to the monitoring underway in the Okanagan and West Regions (e.g., Gyug 2014). However, the 108 CPB points within 300 m of Low or better suitability habitat only sampled four WISA on the first round and one WISA on the second round. This low count was insufficient upon which to base a reliable long-term monitoring program.

In 2017, the 2014 long-term monitoring scheme was revived but using an 800-m point grid spacing. The 400-m grid spacing is too close for WISA as a given WISA will frequently respond on more than one point, and the points will not be independent. 800-m point grid spacing was used in the Okanagan and West in 2014 (Gyug 2014). Two other sampling areas were added to the four areas monitored in 2014.

METHODS

In 2017, the same four focus areas (Kiahko, Caven Junction, Strauss Road, Meadow Creek) as 2014 were sampled (Figure 1). However, only every 4th point was resampled in 2017 so that the sampling scheme was an 800-m point grid, rather than the 400-m grid attempted in 2014. Two other focus areas (Kimberley Nature Park and Plumbob Burn) were added to the monitoring where at least two WISA had nested within 1 km of each other in the same year. All focus areas were on Crown land. The intent was to sample as early in the breeding season as possible, preferably in early to mid-April, while WISA were establishing territories and tend to be very responsive.

CPB points were renamed from 2014 to be consistent with the Okanagan and West naming scheme. These were labelled FM (for focused CPB monitoring), EK (for East Kootenay), followed by two letters for the area (see Table 1), a dash, and then a three digit number. The final three digit number was retained from 2014 if the point had been planned to be sampled in 2014.

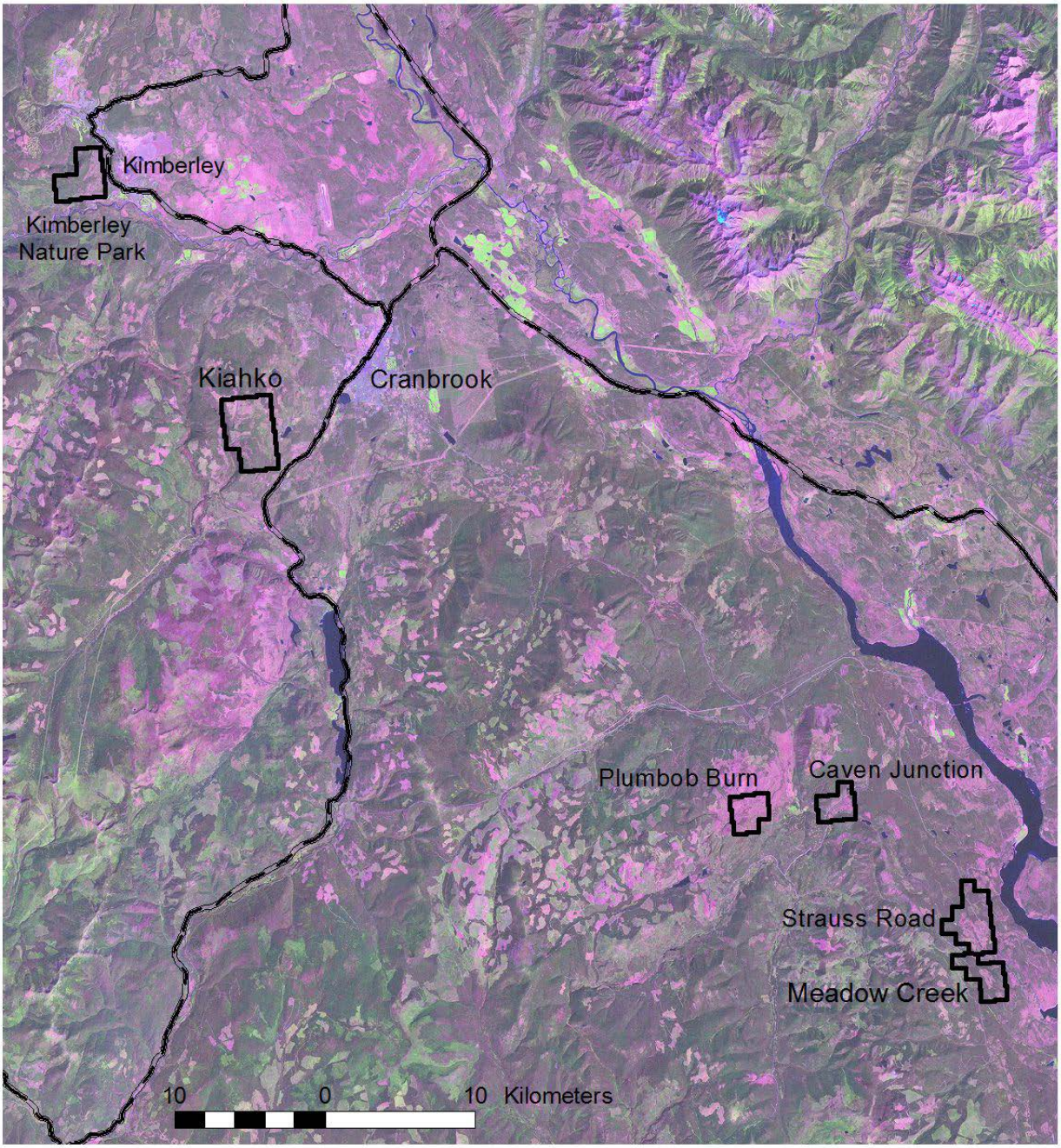

Figure 1. The six focus areas for long-term monitoring of Williamson's Sapsucker relative abundance in the East Kootenay, 2017. Background image is 2006 Landsat.

Call playback equipment used included FoxPro electronic game caller units through large external FoxPro speakers with front bell dimensions of 25-cm x 17-cm or 21-cm diameter. Using this equipment, the CPB could easily be heard by a person at 400 m, and sometimes at 800 m, and under still conditions the drum portion of the CPB could be heard up to 1.1 km. WISA can generally be heard if they respond by loud calling or drumming within 400 m if there are no competing sounds, e.g. wind, water, or traffic, even in densely forested stands. Loud drumming can sometimes be heard at further distances up to 700 m or more if there is no intervening topography and no intervening dense forest. The distances at which softer drumming or calling can be heard is highly variable, but can generally be heard within 200 m.

Points were sampled by CPB in the planned grid locations with one exception. One pre-selected point (FMEKCP-001) was moved 50 m to the east away from a rushing creek which did not allow for any responses to be heard. Recorded at each CPB point were: date, time of day, ambient temperature, consistent wind speed (Beaufort) and speed of the highest wind gust during the listening period, cloud cover (1-4 scale where 1 = clear, 2 = <50% clouds, 3 = >50% clouds, 4 = overcast) and precipitation (None, Drizzle). Sampling was conducted from sunrise until late afternoon, only if winds were <Beaufort 3, and not in rain. Each CPB point sample consisted of three broadcasts of a 10-15 second Williamson's Sapsucker drum and call combination repeated three times in three directions, and then a silent listening period of 3 minutes, for a total listening time of 4 minutes and 20 seconds.

For each WISA detection we recorded the time (sec) of the initial response from the beginning of the CPB. If we detected a WISA from a point before CPB started, it was given a time of 0 sec. CPB were still done at a point even if a WISA was detected before a CPB started because frequently the CPB prompted additional WISA to begin calling or drumming. We recorded the sex (male, female, unknown or pair), the number and the type of responses (visual, drum and/or call), the estimated distance (m) and direction (degrees from a compass reading) to each WISA. Both male and female WISA drum, so the type of response cannot be used to identify sex. WISA detected while walking between CPB points were recorded as incidental detections if they had not already been detected from a CPB point. If an incidentally detected WISA was detected at the next CPB point, then the incidental detection was not recorded in the final dataset.

Relative abundance per focus area and for the sampled areas in the region as a whole was the number of WISA detected divided by the number of CPB points. Field data was entered into a single WISA Excel file template designed for submission to the Wildlife Species Inventory (WSI) Species Inventory (SPI) system of the BC Ministry of Environment. This file has been quality checked for formatting and for data entry errors.

Table 1. East Kootenay WISA Relative Abundance in areas monitored by CPB sampling points on 800-m grid. Nominal area sampled was based on 450-m square buffer around all CPB points in each focus area.

Focus Area	Area Sampled (km^2)	N CPB Points	N WISA Detected	WISA/CPB
Caven Junction (CP)	4.97	7	3	0.429
Kiahko Creek (KI)	14.94	22	10	0.455
Kimberley Nature Park (KN)	8.36	12	0	0.000
Meadow Creek (MC)	6.42	9	0	0.000
Plumbob Burn (PB)	5.63	8	5	0.625
Strauss Road (ST)	10.43	15	4	0.267
Total	**50.75**	**73**	**22**	**0.301**

RESULTS

The six focus areas containing 73 CPB points in total were sampled from April 25-27, 2017, by two people working independently but in radio contact. Originally the sampling had been scheduled for April 18-21 but snow melt was about two weeks behind normal in 2017 so the sampling was delayed by one week to allow for access to the sites. The starting points for all the focus areas could be accessed by road but roads were not yet open in the majority of Kiahko and Plumbob Burn areas. All access was by walking in Kimberley Nature Park. Snowshoes were only required for access in the highest areas (~1400 m and above) of the Kiahko area although late lying snowdrifts were encountered in some areas as low as 1200 m.

WISA were detected in four of the focus areas with a total of 22 WISA detected from CPB points (Table 1). In these areas, relative abundance ranged from 0.267 to 0.625 WISA detected per CPB point. The overall mean for 2017 of all CPB points (not separated by area) was 0.301 WISA detected per CPB point (n = 73, SD 0.147, CV 62%, where CV = SD/Mean). If each of the six areas were considered independent samples, the mean relative abundance was 0.296 WISA detected per CPB point (n = 6, SD 0.256, CV 86%, SE 0.104).

No WISA were found in two areas: Kimberley Nature Park and Meadow Creek. WISA have not been found in the Kimberley Nature Park since they were found nesting there in 2009. Nests were known in the park from 2004-2009 but the area no longer appears to be occupied. At least one pair of WISA nested in Meadow Creek in 2012 but the 2014 sampling also found no WISA at Meadow Creek.

An additional four WISA were detected incidentally (3 in Kiahko and 1 in Plumbob Burn) between points that seemed to be different WISA that were not detected from the CPB points.

DISCUSSION

Sampling the six areas with CPB in April on an 800-m grid proved to be a logistically simple and manageable approach to long-term WISA monitoring in the East Kootenay. Sampling the 73 CPB points in the areas with two surveyors working independently only took 3 field days in a row, although two of the field days were 12 hours long as suitable weather conditions for sampling continued into the late afternoon. In comparison, the sampling of 129 points in 2014 took 14 field days by two surveyors working together between April 19 and May 21. Both sampling schemes detected about the same number of WISA (22 in 2017, 19 in 2014) even though fewer points were sampled in 2017. By mid-May, many WISA have started incubating eggs in nests, and response rates appear to drop dramatically (Gyug et al. 2014). It would appear to be more efficient to sample fewer points earlier than attempt more points but have to string them out over a longer period because of potential weather delays.

To estimate the power of this sampling to determine long-term trends, I compared the 2017 relative abundance to the 2014 400-m grid CPB sampling (Table 2). I also compared the 2017 sampling to relative abundances detected in prior years (Table 2). For that comparison, I only included areas if there were at least 6 CPB points in any given year, and discarded closely spaced (<300 m) CPB points. CPB sampling before 2014 had been surveyor-choice or at 200 m or 400 m distances along roads or trails rather than any particular sampling design so not statistical comparisons were attempted.

CV was in the range of 28 – 90% for the three focus areas where WISA occurred, and that were sampled in both 2014 and 2017. If the Kiahko CV of 90% is considered an aberration, i.e., the site was relatively poorly sampled in 2014, then the inter-annual CV is most likely in the range of 28-33%. This is likely to be the minimum CV for each area, as well as for the region as a whole, even if each area achieves this CV. However, the estimate of CV was based on limited sampling and will need to be confirmed with future sampling.

For power analysis to detect long-term trends, I assumed CV of 30%, alpha of 0.10, desirable power (1-beta) of 0.80, a constant CV (i.e., SD varies with the mean), and considered the net change in population over a 10-year period. Using Monitor v11.0.0 software (Gibbs and Ene 2010), applying the 2017 sampling methods in each area, or in the region as a whole, and one sampling round per year, we could expect to be able to detect a statistically significant change of 8.8% per year, or net decline of 56% in 10 years, or a net increase of 113% in 10 years. Conducting two sampling sessions per year would allow us to detect a significant change of 6.0% per year, or net decline of 43% in 10 years, or net increase of 70% in 10 years. Doubling the sampling effort by sampling two rounds per year does not result in a halving of the net change that could be detected, and does not appear to be an efficient use of resources.

Table 2. East Kootenay WISA Relative Abundance Coefficient of Variation (Std. Deviation/Mean) for area monitoring by CPB. 2017 was based on 800-m point grid spacing, 2014 on 400-m grid (but not all CPB were completed-the total number planned is in parentheses), and surveyor-choice sampling in prior years. 2014-2017 Mean, SD and CV calculated using the same point sets as closely as possible given that some points were not sampled in 2014.

Area	Year	N CPB	N WISA	WISA /CPB	SD	CV% (SD/Mean)
Caven Junction	2008	8	6	0.750		
	2012	6	0	0.000		
	2014	22	6	0.273		
(same points as 2017)	2014	7	2	0.286		
	2017	7	3	0.429		
2014-2017 Mean				**0.358**	**0.101**	**28%**
Kiahko	2006	56	17	0.304		
	2007	19	3	0.158		
	2008	44	21	0.477		
	2012	6	1	0.167		
	2014	38(83)	4	0.105		
(same points as 2017)	2014	10	1	0.100		
	2017	22	10	0.455		
2014-2017 Mean				**0.278**	**0.251**	**90%**
Kimberley Nature Park	2006	24	4	0.167		
	2007	16	1	0.063		
	2008	10	0	0.000		
	2017	12	0	0.000		
Meadow Creek	2006	14	0	0.000		
	2008	9	1	0.111		
	2014	27(36)	0	0.000		
	2017	9	0	0.000		
Plumbob Burn	2017	8	5	0.625		
Strauss	2007	27	5	0.185		
	2008	17	15	0.882		
	2012	18	2	0.111		
	2014	42(56)	9	0.214		
(same points as 2017)	2014	12	2	0.167		
	2017	15	4	0.267		
2014-2017 Mean				**0.217**	**0.071**	**33%**

These long-term monitoring area results cannot be extrapolated to the population of the entire East Kootenay AO because the areas were not selected randomly. Only wider area sampling, which was tried in 2010-2012 and proved to be very inefficient, can still address the population as a whole. The focus areas sampled in 2017 included 41 of the 72 known WISA nests in the East Kootenay (counting a nest more than once if known to be used in more than one year), and 24 of the 48 known nest territories. Therefore this focus area sampling may only address about half of the estimated population, but which is relatively efficient considering it only sampled 6 % of the Area of Occupancy (51 km^2 of 851 km^2).

In addition, as these focus areas may already be occupied at or near capacity, WISA numbers in each may be more likely to decrease rather than increase. So, it may be much more likely to detect a significant declining trend rather than an increasing trend. Only wider area sampling would be able to determine if any trend detected is region wide, or specific to these particular focus areas. At some point in the future, wider area sampling may still be required, which is likely to be very expensive to sample with an acceptable level of confidence.

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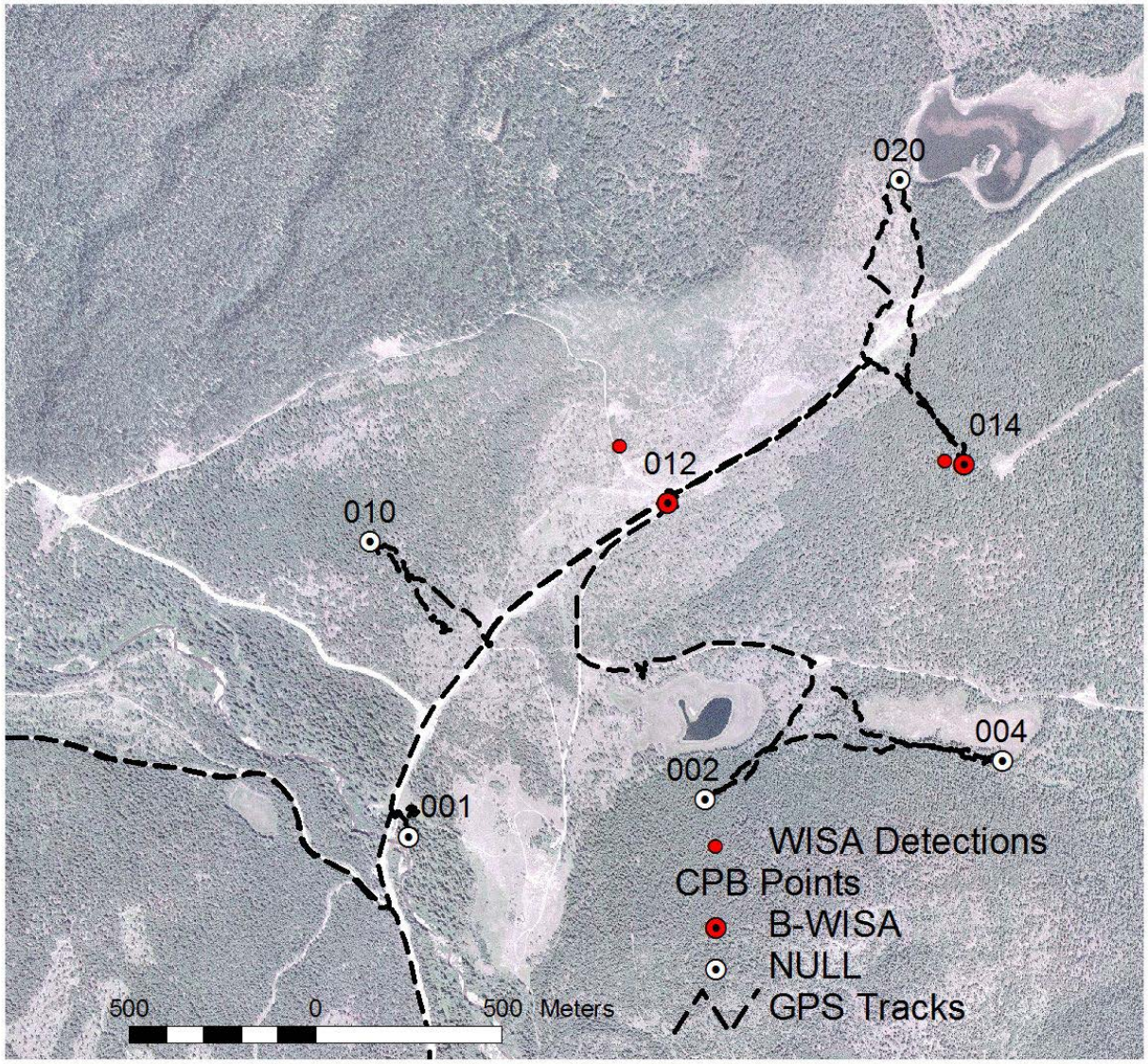
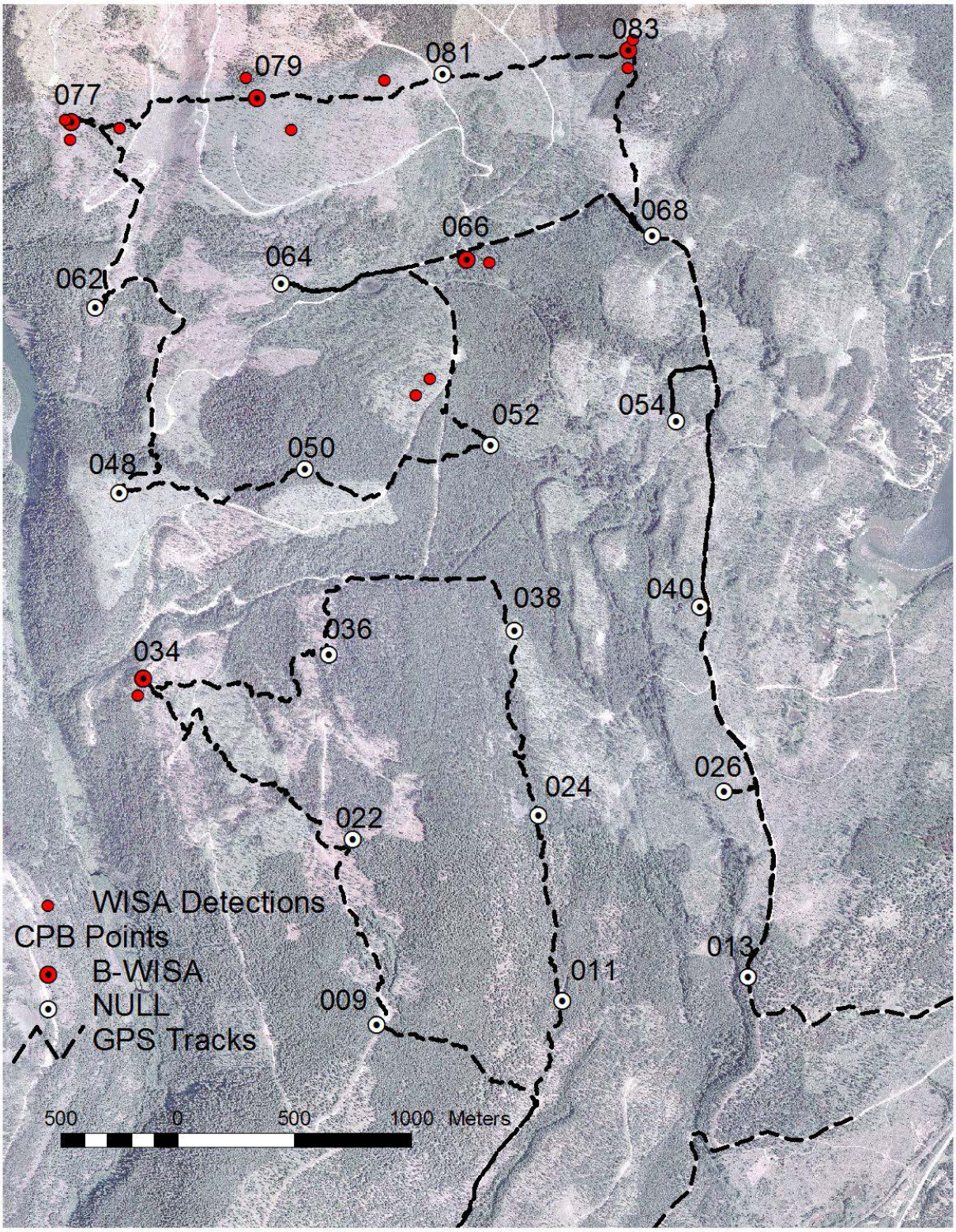
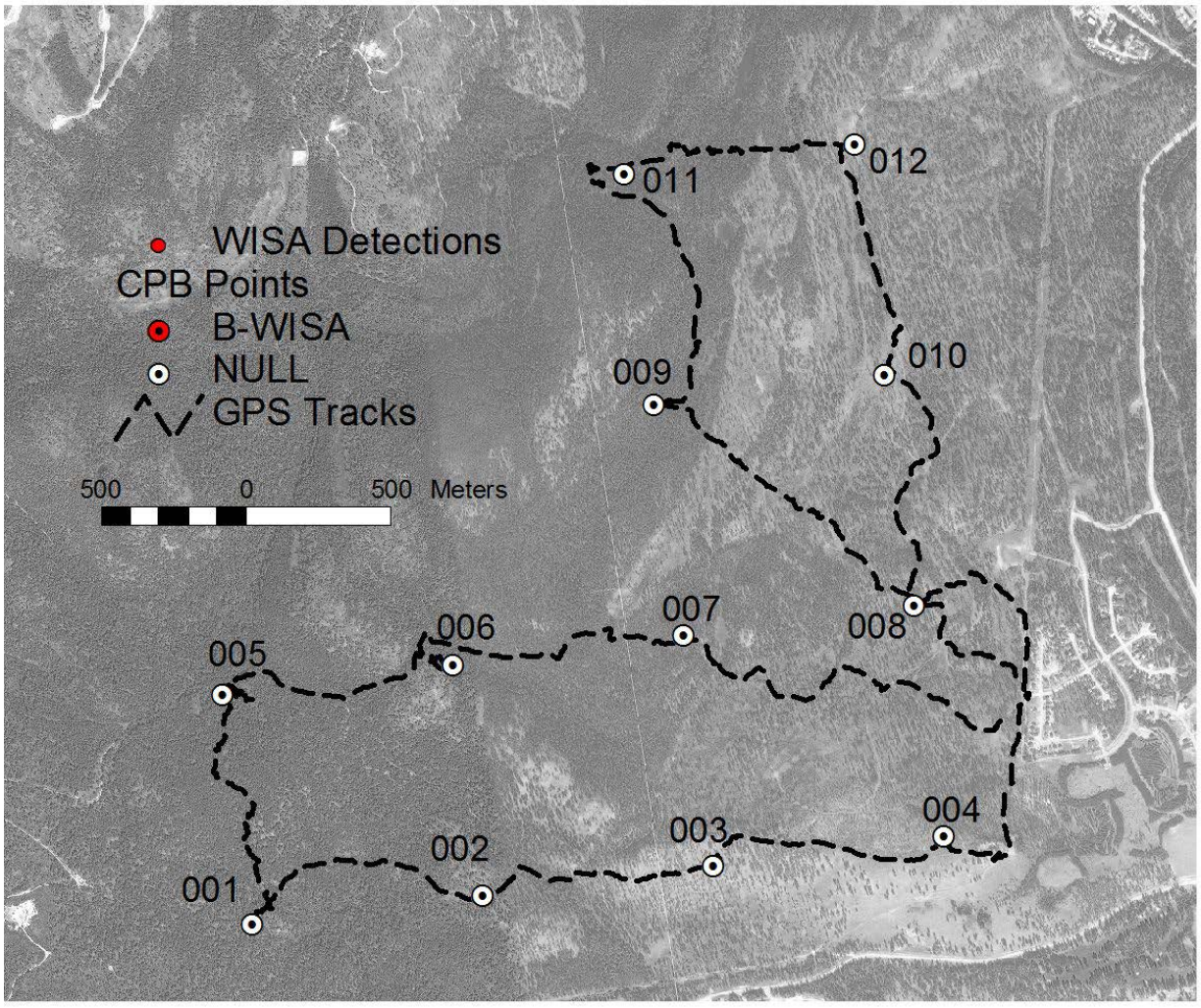
APPENDIX 1. Focus Area Maps



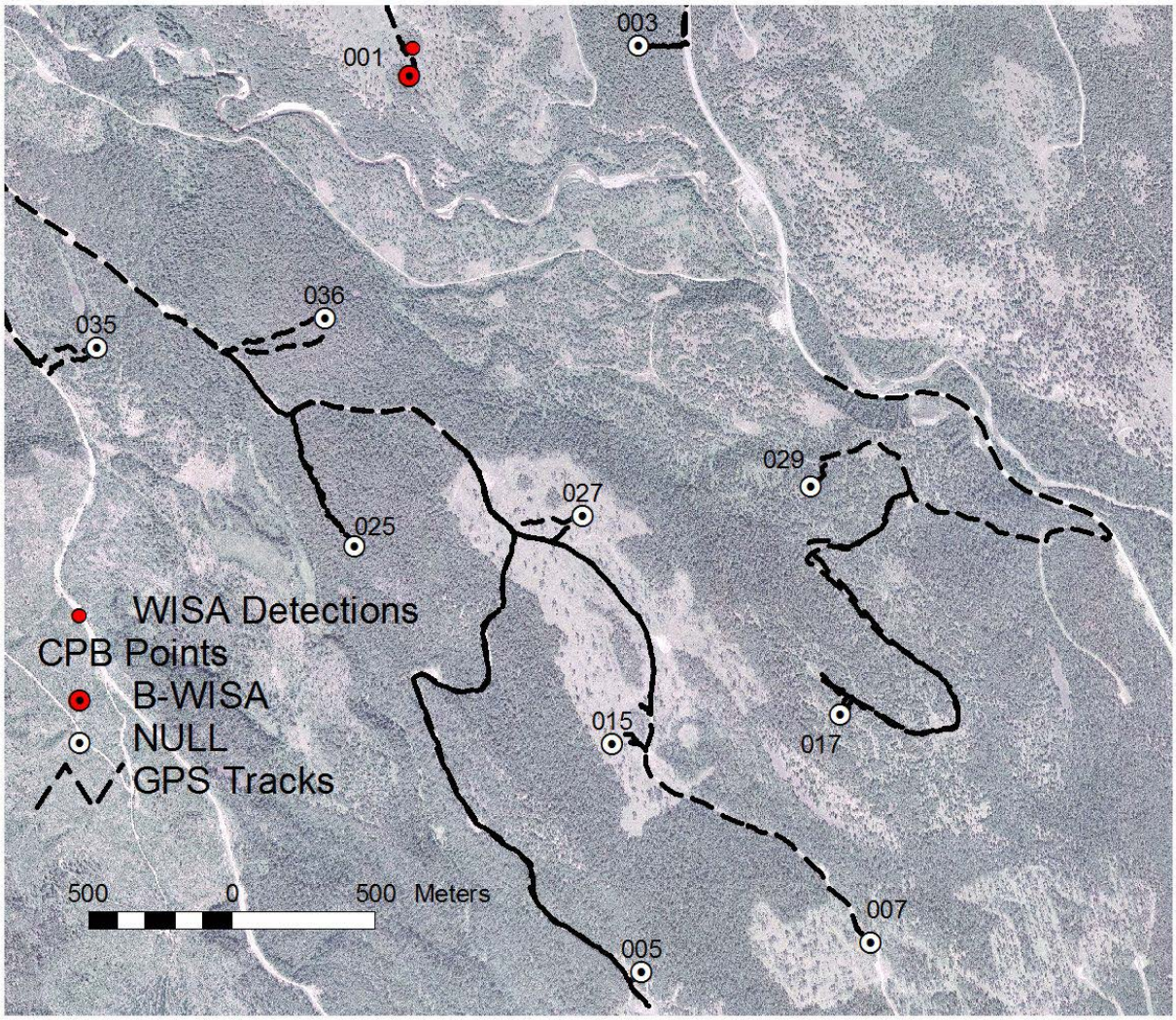
Map 1. Caven Junction WISA CPB sampling, April 26, 2017. 2004 Orthophoto image background. The main forestry roads were snow-free and drivable on the sampling date.



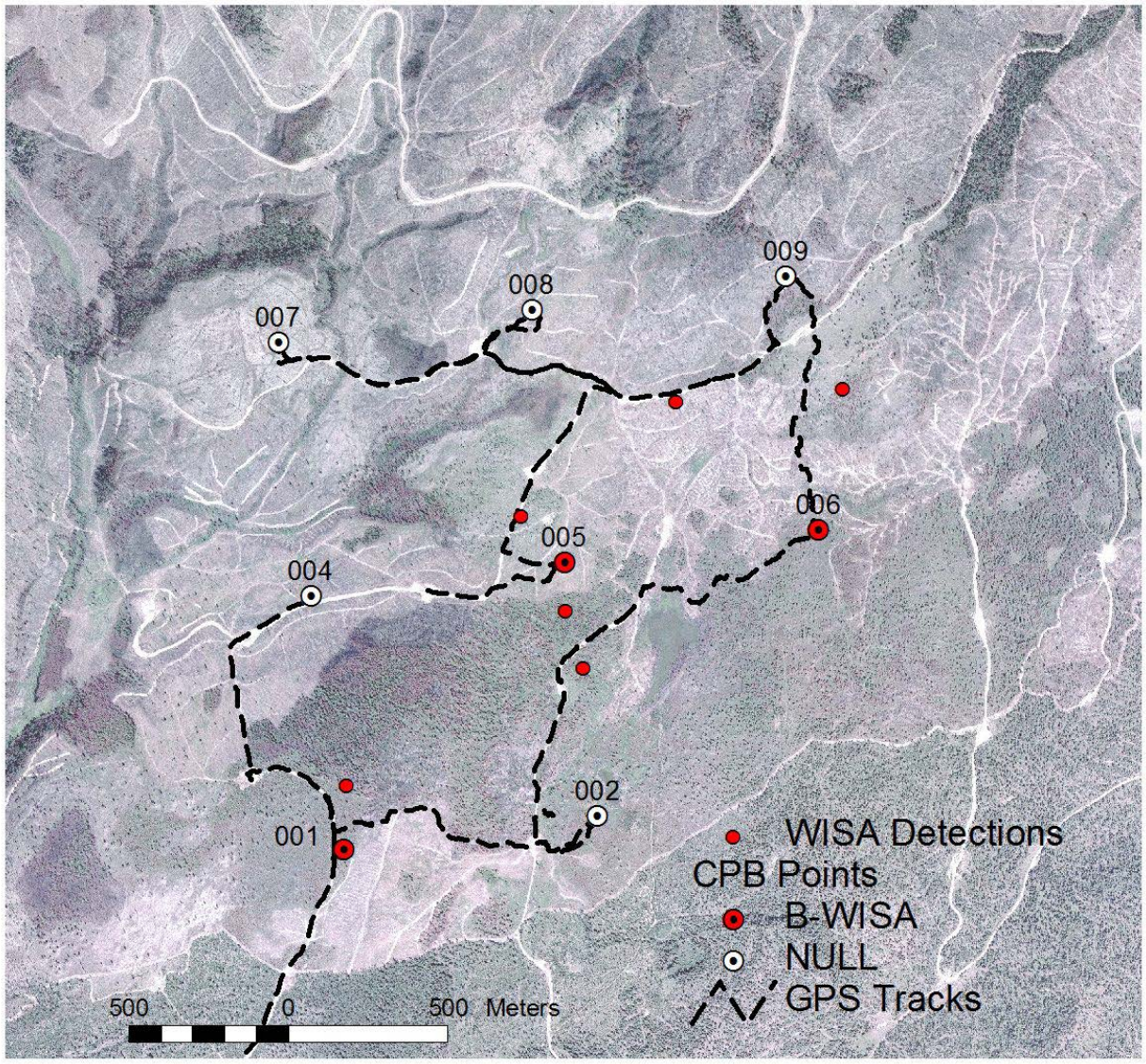
Map 2. Kiahko WISA CPB sampling, April 25, 2017. 2004 Orthophoto image background. The only drivable roads on April 25, 2017, were to a point about 400 m south of Pt 011, and the road between pts 013 and 068.



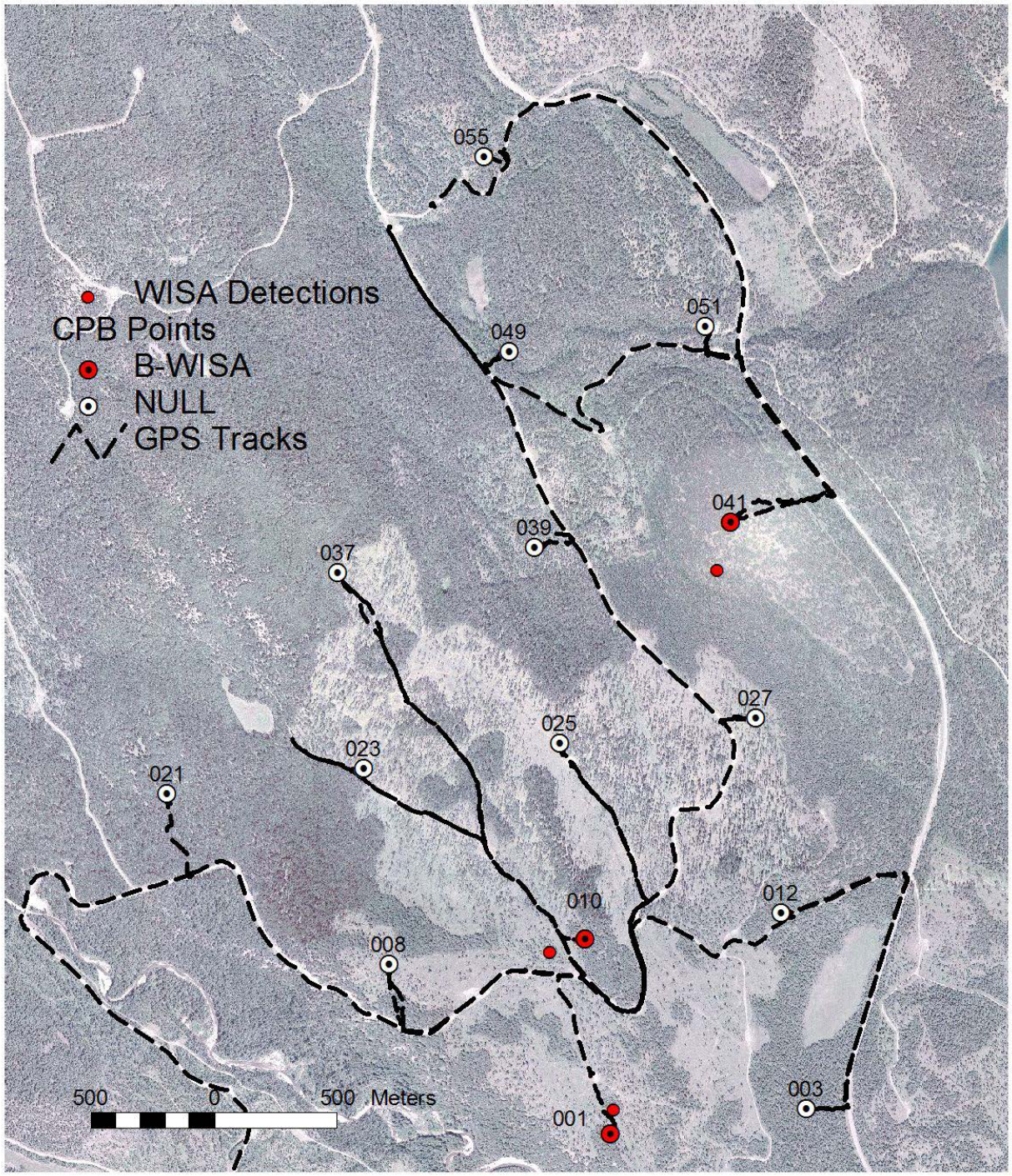
Map 3. Kimberley Nature Park WISA CPB sampling, April 26, 2017. 2004 Orthophoto image background. There are no roads in Kimberley Nature Park.



Map 4. Meadow Creek WISA CPB sampling, April 27, 2017. 2004 Orthophoto image background. All roads were drivable except for the road to within 600 m of Pt 007.



Map 5. Plumbob Burn WISA CPB sampling, April 27, 2017. 2004 Orthophoto image background. The only drivable road on the sampling date was to Pt 001 and for a short distance beyond; all other roads were foot access only.



Map 6. Strauss Road WISA CPB sampling, April 27, 2017. 2004 Orthophoto image background. All main roads were snow free in the sampling area on April 27.