

**Half-moon Hairstreak (*Satyrium semiluna*) Inventory in the Southern
Okanagan Valley, British Columbia, 2009 - FINAL**



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Cover illustration: Half-moon Hairstreak (*Satyrium semiluna*) sitting on grey horsebrush (*Tetradymia canescens*) taken by Vicky Young and Dawn Marks, taken at White Lake Basin, June 12, 2009.

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EXECUTIVE SUMMARY

The Half-moon Hairstreak (*Satyrium semiluna*) is listed as Endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). The BC Conservation Framework ranks it Priority 1 for Goal 3 (Maintain the diversity of native species and ecosystems). Habitat protection is recommended.

A BC Conservation Corps crew was tasked with conducting inventories of Half-moon Hairstreaks within the Southern Okanagan in 2009 to identify sites for habitat protection. A crew of two conducted presence/not detected surveys from June 12th – June 29th, during the adult Half-moon Hairstreak flight period. Four areas were surveyed over 4 days for a total search effort of 42 hectares and 31hrs 38min. This resulted in 182 adult Half-moon Hairstreak detections. These surveys reconfirmed presence of this species at several previously known sites and extended the known area of occupancy. Given the short flight period of this species and factors that influence surveys, such as weather conditions, future inventory attempts would benefit from more surveyors to cover larger areas at once.

ACKNOWLEDGMENTS

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INTRODUCTION

The Half-moon Hairstreak (*Satyrium semiluna*) is listed as Endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and the Species at Risk Act (SARA) (BC CDC 2008). In British Columbia it is Red-listed (S1) by the Conservation Data Centre (BC CDC 2008). The BC Conservation Framework (CF) (2009) ranks it Priority 1 for Goal 3 (Maintain the diversity of native species and ecosystems). The CF recommends habitat protection as a key action.

The Half-moon Hairstreak also is listed as Identified Wildlife under the Forest and Range Practices Act, Identified Wildlife Management Strategy (IWMS 2004). IWMS allows for the establishment of Wildlife Habitat Areas (WHAs) to provide additional protection from forest and range practices.

The draft recovery action plan for this species recommends inventory and monitoring (Orville Dyer pers. comm. 2009) and inventory is required to identify important sites for habitat protection, including WHAs.

In BC, the Half-moon Hairstreak is found in the southern Okanagan Valley where it is associated with sagebrush/bluebunch wheatgrass (*Artemisia* spp./*Pseudoroegneria spicata*) habitats where lupines (*Lupinus* spp.) are present (COSEWIC 2006). The BC populations occur from the Canada/USA border north to White Lake and represent one of only two locations for this species in Canada (COSEWIC 2006). The other location is in Waterton Lakes Park in Alberta. In BC this species is threatened by loss of native sagebrush grasslands habitat (COSEWIC 2006).

Half-moon Hairstreak adults fly from early to late June when they lay their eggs on lupines (*Lupinus* spp.) which are larval food plants (COSEWIC 2006). It is thought that presence of larval food plants may be a limiting factor in the distribution of this species (COSEWIC 2006). A mutualistic relationship between Lycaenid butterflies and ants (myrmecophily), which has been observed in some *Satyrium* species and may occur in *S. semiluna*, may also explain this species' patchy distribution in areas of seemingly suitable habitat (COSEWIC 2006).

The BC Conservation Corps grassland species inventory crew conducted presence/not detected surveys for Half-moon Hairstreaks within the South Okanagan Valley in June, 2009. The objectives of this inventory and monitoring project were to:

- Document the continuing presence of Half-moon Hairstreaks at previously detected sites, including proposed Wildlife Habitat Areas.
- Clarify the distribution of Half-moon Hairstreaks and suitable habitat adjacent to known sites to identify sites for protection and
- Record habitat attributes, especially host and nectar plants, where Half-moon Hairstreaks were found.

STUDY AREA

This inventory was conducted in the southern Okanagan Valley of British Columbia on selected Crown land parcels, protected areas and properties owned by the Nature Trust of BC (Figure 1).

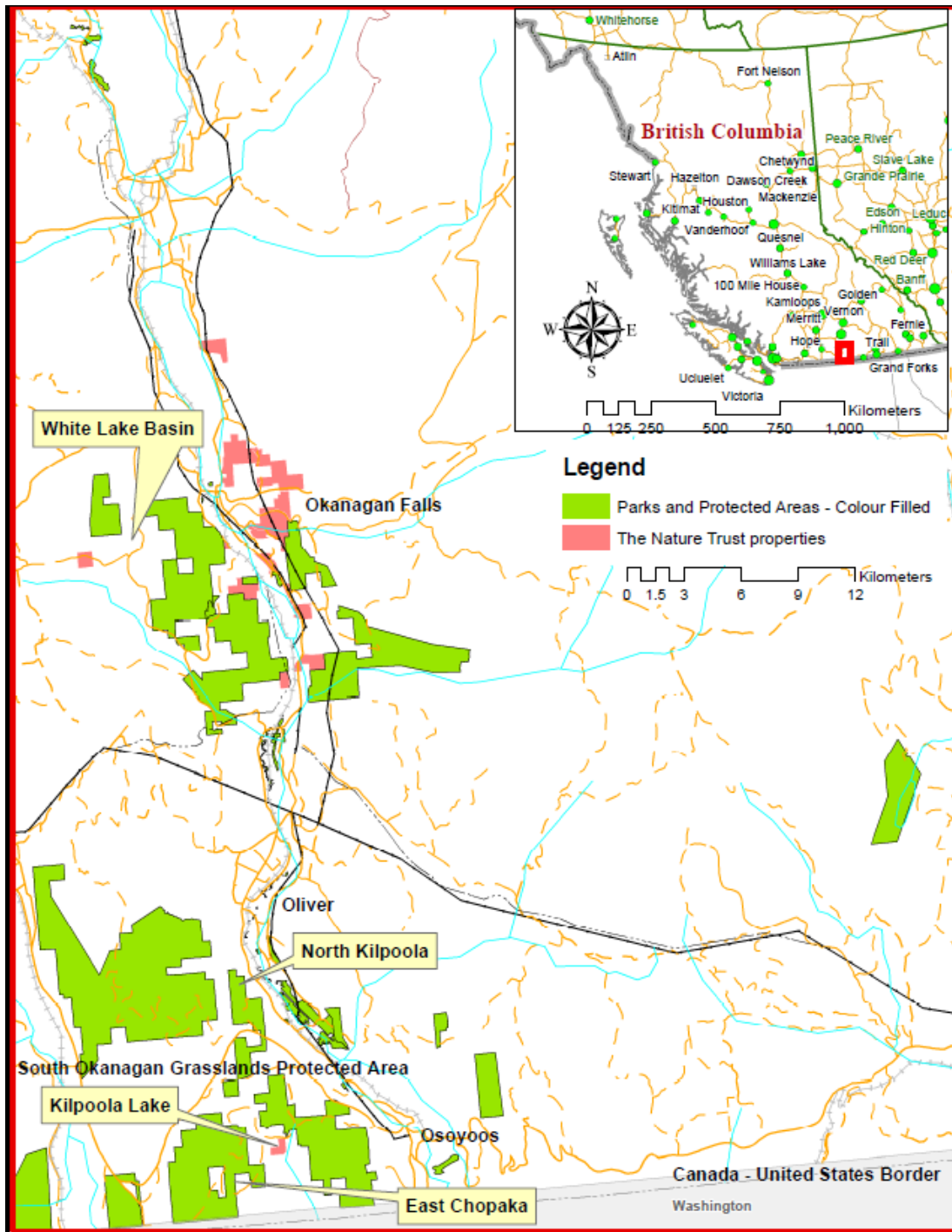


Figure 1. General location of Half-moon Hairstreak 2009 inventory by the BC Conservation Corps crew.

METHODS

The crew received training from Dennis St. John, local lepidopterist, in identification of the Half-moon Hairstreak and its habitat. Half-moon Hairstreaks were distinguished from other Lycaenids, especially the Blues (subfamily Plyommatae) by four primary characteristics.

1. The upper wings and body had no blue colour, which distinguishes them from Blues.
2. The ventral wing surfaces had more diffuse (as opposed to clearly defined) or no clear spots and the discal cell spot was much less distinct than the Boisduval's Blue.
3. They rarely perched with their wings open to bask as blues often did.
4. The background colour of the ventral fore and hindwings were equally sooty in colour on the Hairstreaks while differing on the Blues.

Inventory in 2009 focused search effort by returning to previous detection sites in the White Lake Basin, and South Okanagan Grassland Protected Area (SOGPA) – North Kilpoola and East Chopaka. By searching in these areas surveyors were able to document the continuing presence of Half-moon Hairstreaks at these sites, and to clarify the distribution of Half-moon Hairstreaks and suitable habitat adjacent to known sites.

Surveys were conducted between 0900 and 1600 hours on warm, sunny days during the Half-moon Hairstreak's flight period (mid June). Surveys were not attempted during inclement weather and were cut short, if necessary. Wandering transects were used to survey potential habitat. Wandering transects have no fixed direction and allow surveyors to target suitable habitat that occurs sporadically throughout the landscape.

Half-moon Hairstreaks often were observed nectaring or perching on vegetation and did not fly immediately upon approach so accurate identification of the species was possible without capturing the individual. This also allowed surveyors the opportunity to photograph individuals easily and cancelled the need for collecting sample specimens for proper identification. Photographs were taken of some detected individuals and any uncertain identification was confirmed by D. St. John. Non-target butterfly species encountered during the surveys were not formally identified or recorded but photographs were taken of selected species to assist future surveys. Surveyors did make note of areas that contained large patches of flowering plants where Half-moon Hairstreaks were not detected.

Given the Half-moon Hairstreak's predictable behaviour of perching/nectaring on flowering plants, surveyors targeted patches of nectar plants within the sagebrush/bluebunch wheatgrass habitat. Important Half-moon Hairstreak nectar plants, as identified during training, included parsnip-flowered buckwheat (*Eriogonum heracleoides*), grey horsebrush (*Tetradymia canescens*), and yarrow (*Achillea millefolium*). These plants are showy, easily seen and identified within the sagebrush-bluebunch wheatgrass habitats. There are few other plants in bloom at the time. Lupines were also noted, but were often past flowering and so were not visually targeted during searches.

Weather conditions were noted throughout the surveys including at the start and end times.

When a Half-moon Hairstreak was observed the following information was recorded: date, time, number of individuals, location (UTM NAD 83), vegetation used, behaviour upon sighting (nectaring, flying, perching), species and percent cover of the shrub layer and dominant flowering plants (up to three species) and general habitat notes.

While in the field, surveyors used handheld Garmin GPS (GPSmap 60Cx and GPSmap76Cx) to record their detections and wandering transect tracks. Tracks were recorded, using the Track log function of the GPS units, by each surveyor and consisted of a UTM point automatically placed every 10 metres. All UTM locations were downloaded using the Garmin MapSource 6.15 mapping program, saved as a .txt file and imported into a Microsoft Excel 2003 spreadsheet. The Excel files were then converted to a shapefile using ESRI ArcMap 9.2.

Shapefiles of the Garmin Track logs were used to clearly document and calculate search area. A 10 meter buffer was drawn around each surveyor's tracks using ESRI Arcmap 9.2. ArcMap was used to calculate searched area, which was then rounded to the nearest hectare. Ten metres was selected because surveyors were visually targeting flowering nectar plants which are easily seen from that distance. Surveyors also kept track of survey time which has been doubled here to represent the effort of two surveyors.

All results, including spreadsheets and reports, were uploaded onto the Ministry of Environment's Wildlife Species Inventory database.

RESULTS

Surveys were conducted between June 12th and June 29th and consisted of 4 days of survey effort by two individuals resulting in the detection of 182 Half-moon Hairstreaks. Four areas within the south Okanagan were surveyed (Figure 1) and results are broken down by area (Table 1).

Most detections (94%) were of Half-moon hairstreaks nectaring (171/182) with the remaining perching on vegetation (10/182) or flying (2/182). Those nectaring were found only on parsnip-flowered buckwheat (39%: 67/171), yarrow (32%: 54/171) and grey horsebrush (29%: 50/171).

Table 1. Locations surveyed during the BCCC 2009 Half-moon Hairstreak inventory including detections and quantified search effort.

Location	Date	Half-moon Hairstreak Detections	Search Area (ha)	Search Time (total for two surveyors)
1. White Lake Basin	June 12 & 17, 2009	14	6	6hrs 30min
2. *SOGPA – North Kilpoola	June 16, 2009	71	12	10hrs 50min
3. *SOGPA – East Chopaka	June 26 & 29, 2009	97	20	12hrs 20min
4. Kilpoola Lake - TNT	June 29, 2009	0	4	2hr
Total:		182	42	31 hrs 40 min

*SOGPA (South Okanagan Grasslands Protected Area)

Survey Locations

White Lake Basin

Half-moon Hairstreaks were present at the well known colony site in 2009, and were visited by the BCCC crew during training. The butterflies seen at the colony site were not all marked or counted – the visit to the colony site was primarily for training and providing the surveyors with an appropriate search image. Three points have been included in Figure 2 to represent the colony detections, however these individuals were not included into our final count of Half-moon Hairstreaks (as presented in Table 1). Although surveys were limited by time constraints and weather, 14 individuals were detected over two dates (June 12th and June 17th) (Figure 2).

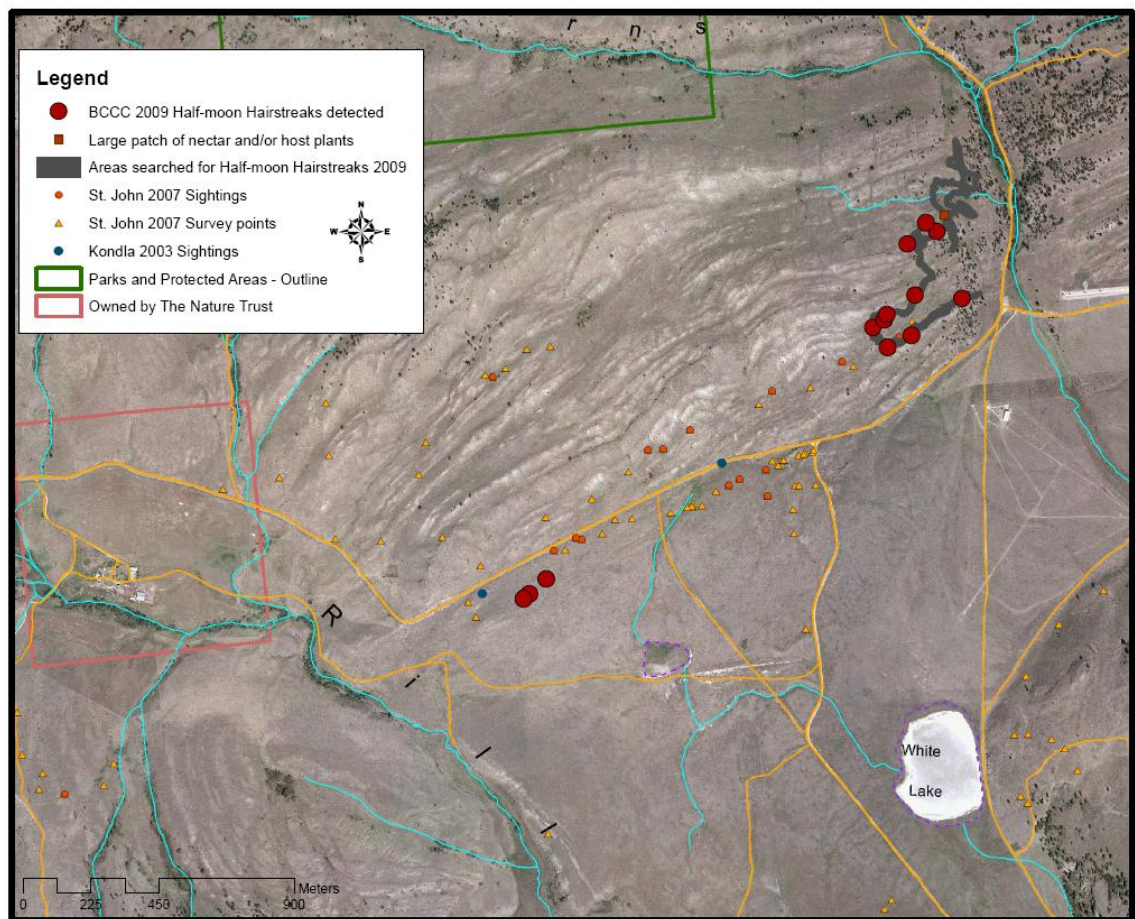


Figure 2. White Lake Basin: Areas surveyed for Half-moon Hairstreaks and detections 2003-2009

SOGPA – North Kilpoola

Much of the suitable habitat within this land parcel north of the previous detections was surveyed. Surveyors located 71 adult Half-moon Hairstreaks over an area of 12 hectares (Figure 3).

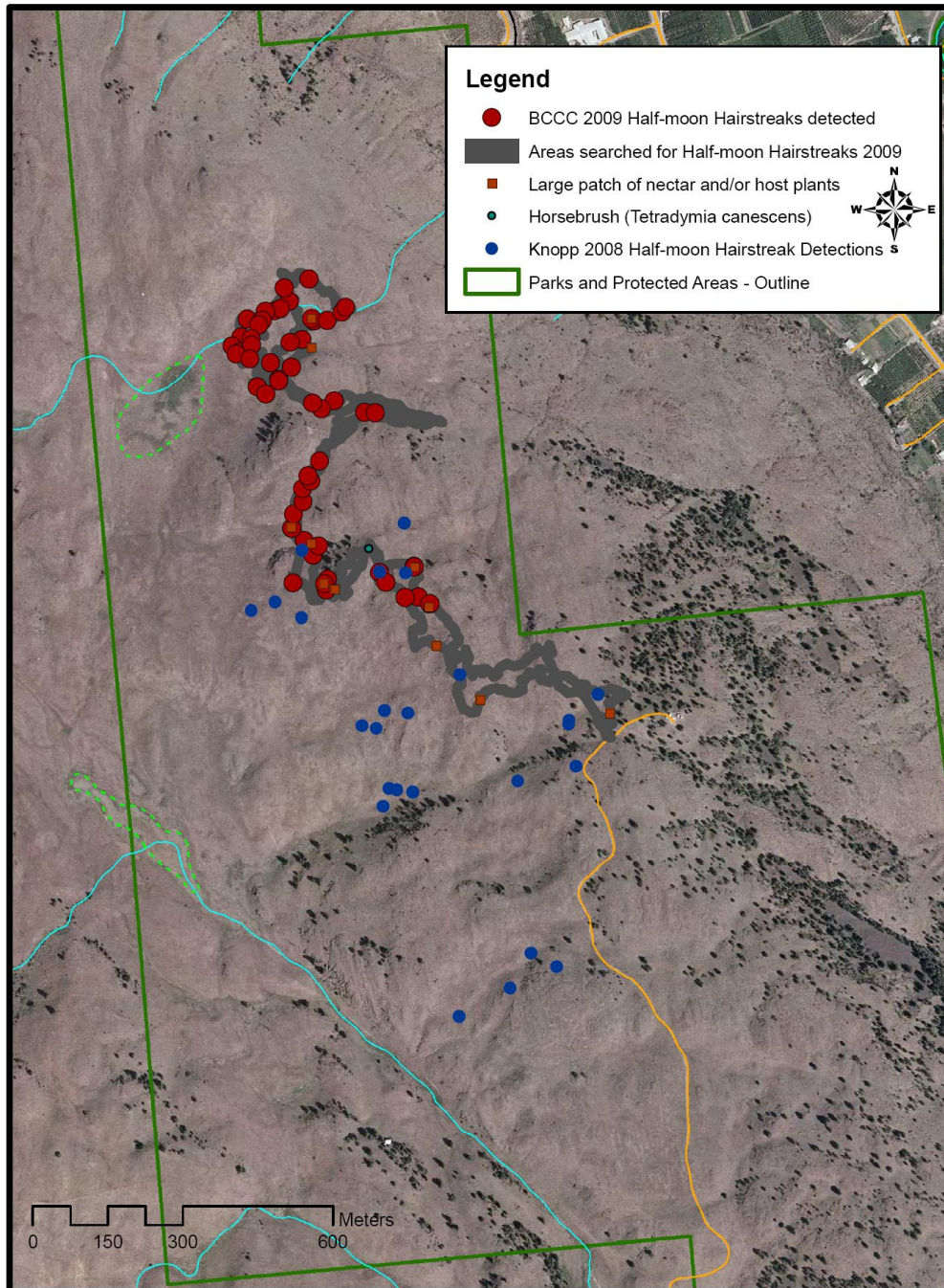


Figure 3. South Okanagan Grasslands Protected Area - North Kilpoola: Areas surveyed for Half-moon Hairstreaks and detections 2008-2009.

The North Kilpoola area consisted of sporadic patches of flowering parsnip-flowered buckwheat and yarrow as well as lupine, mostly in seed (Figures 4 and 5). Half-moon Hairstreaks generally were observed within large patches of these flowering plants. All but two Half-moon Hairstreak detections were of individuals nectaring on parsnip-flowered buckwheat (15/69) or yarrow (54/69). The remaining butterflies were perched on *Artemisia* bushes.



Figure 4. Half-moon Hairstreak habitat in SOGPA - North Kilpoola parcel, *Eriogonum heracleoides*, Lupine, and two butterflies.



Figure 5. Half-moon Hairstreak habitat in SOGPA - North Kilpoola parcel, swale with *Achillea millefolium* and Lupine. Several Half-moon Hairstreaks were observed here.

SOGPA – East Chopaka

The East Chopaka area was surveyed over two days. This is a large land parcel within the SOGPA complex comprised of sagebrush/grassland habitat. On June 26th the south-west

site, which had large amounts of flowering grey horsebrush, was surveyed (Area A in Figure 6). Surveyors also had visited this site on June 10th while conducting surveys for another species and observed 1 Half-moon Hairstreak perched on an *Artemesia* shrub (this individual was not included in our total count). Fifty Half-moon Hairstreaks were observed, all nectaring on grey horsebrush (Figure 6).

Additional surveys that day found 30 Hairstreaks at a previously known detection site within a draw that had large patches of flowering parsnip-flowered buckwheat (Area B in Figure 5).

Surveyors revisited East Chopaka on June 29th and searched an area within the eastern portion of this parcel. Most of the parsnip-flowered buckwheat at this site was past flowering and no Half-moon's were detected (Area C in Figure 5). Northeast of Area C, 17 individuals were detected in habitat consisting of large patches of blooming parsnip-flowered buckwheat located on the slopes along the road (Area D in Figure 5).

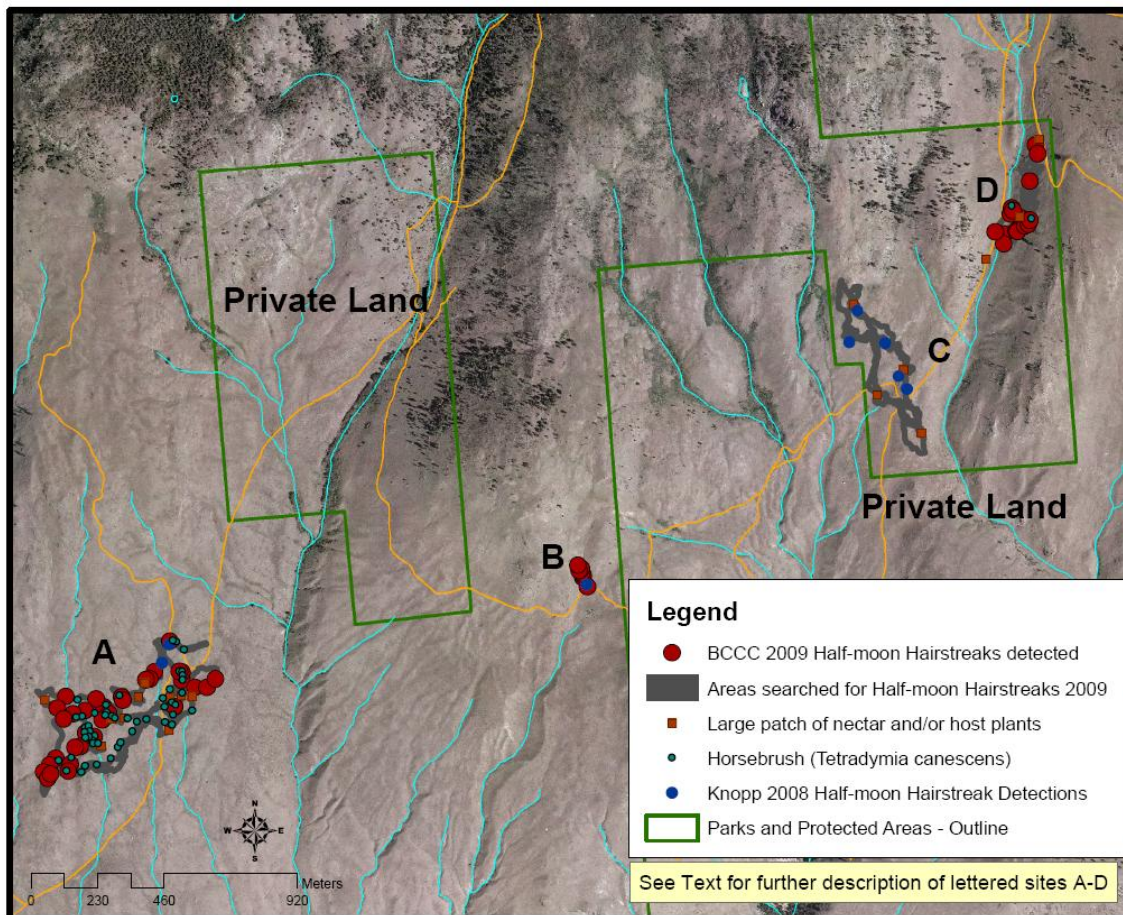


Figure 6. South Okanagan Grasslands Protected Area - East Chopaka: Half-moon Hairstreak survey areas and detections 2008-2009.

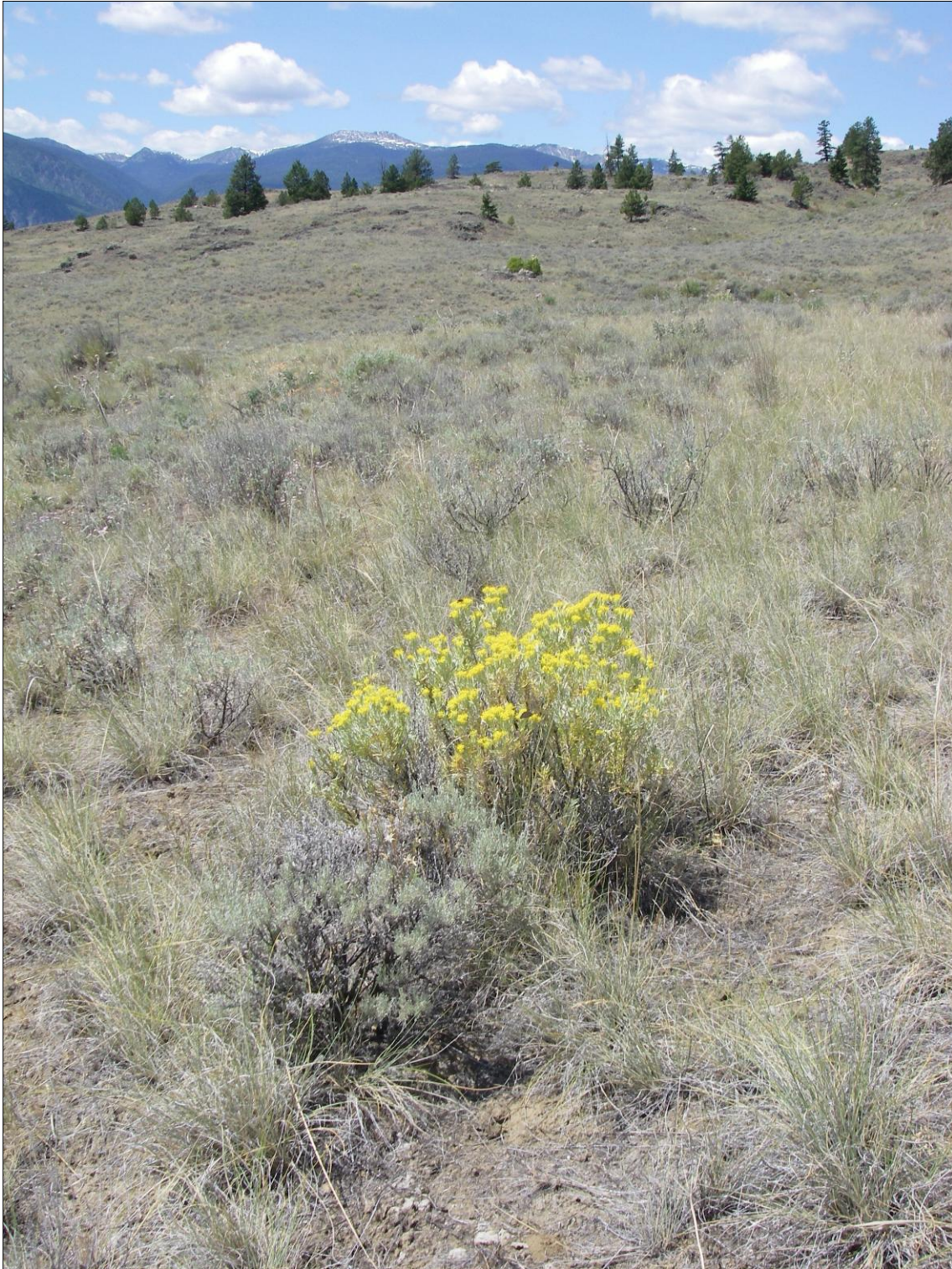


Figure 7. Half-moon Hairstreak habitat in SOGPA - East Chopaka parcel, Area A. Note flowering grey horsebrush (*Tetradymia canescens*) (yellow shrub in photograph) and Half-moon Hairstreak.

Kilpoola Lake – TNT property

Most of the flowering plant patches within this property were searched on June 29th, 2009

but no Half-moon Hairstreaks were found. Much of the parsnip-flowered buckwheat and yarrow was nearing the end of flowering so may have affected detectability.

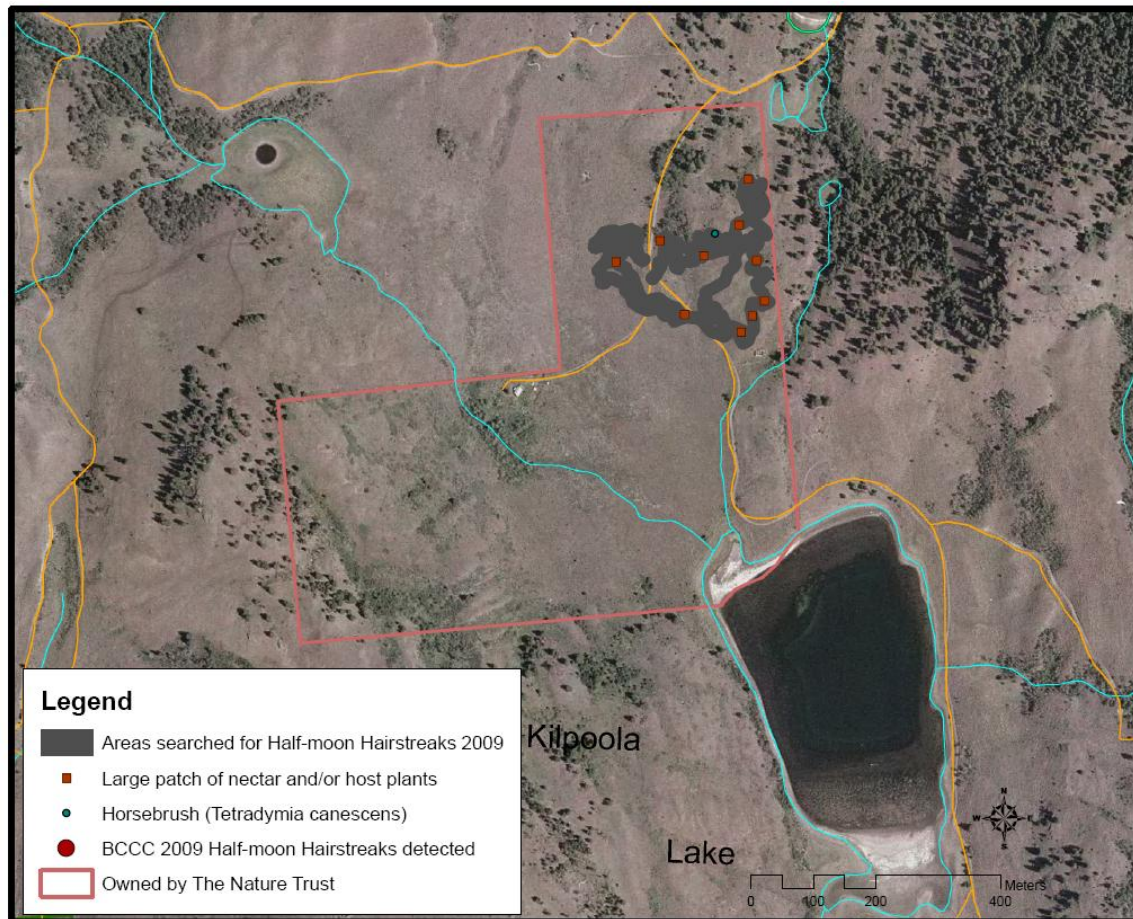


Figure 8. Kilpoola Lake TNT Property: Areas searched for Half-moon Hairstreak 2009.

As a result of the 2009 surveys three draft Wildlife Habitat Areas (WHAs) were proposed (Figures 9 and 10). These WHAs are at an internal draft stage and may be revised before proceeding to the consultation phase.

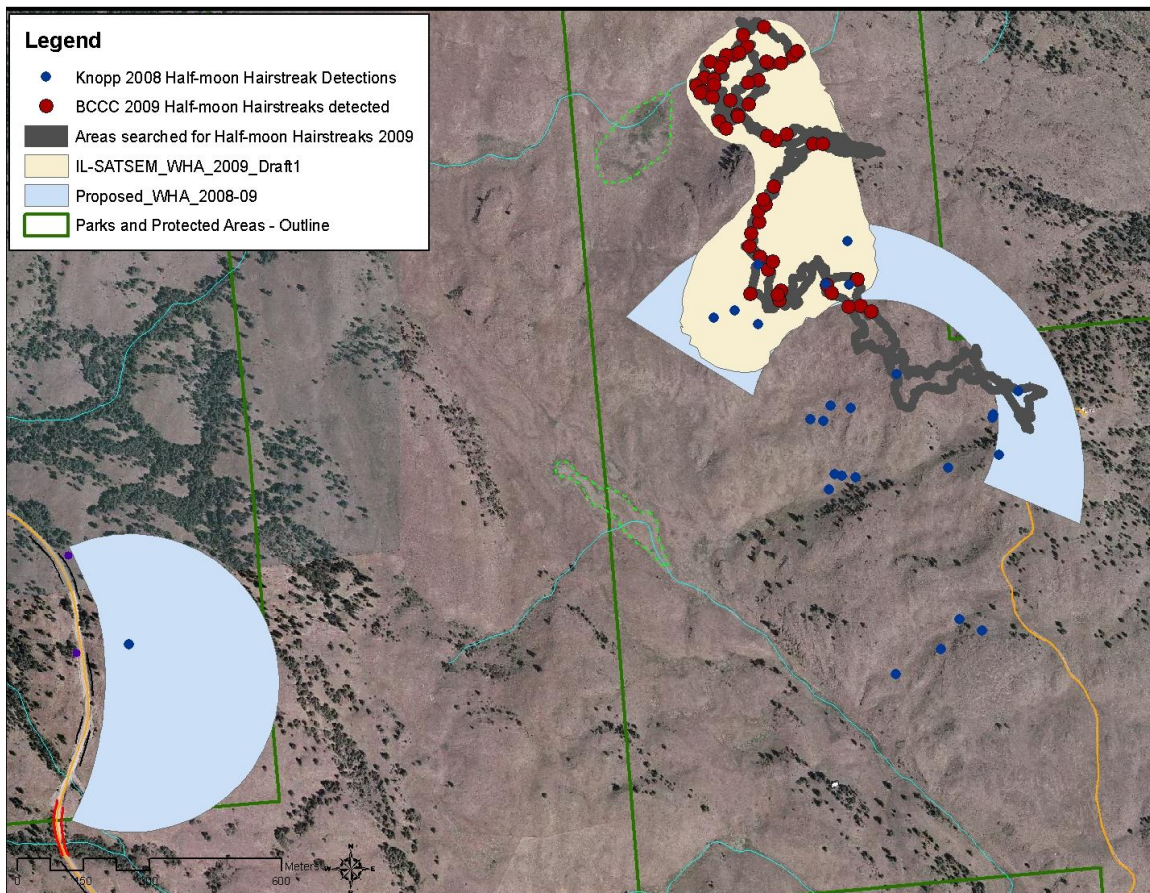


Figure 9. Draft Wildlife Habitat Area based on 2009 BCCC survey data at SOGPA - North Kilpoola. Previously drafted WHAs (2008-09) also are included on this map.

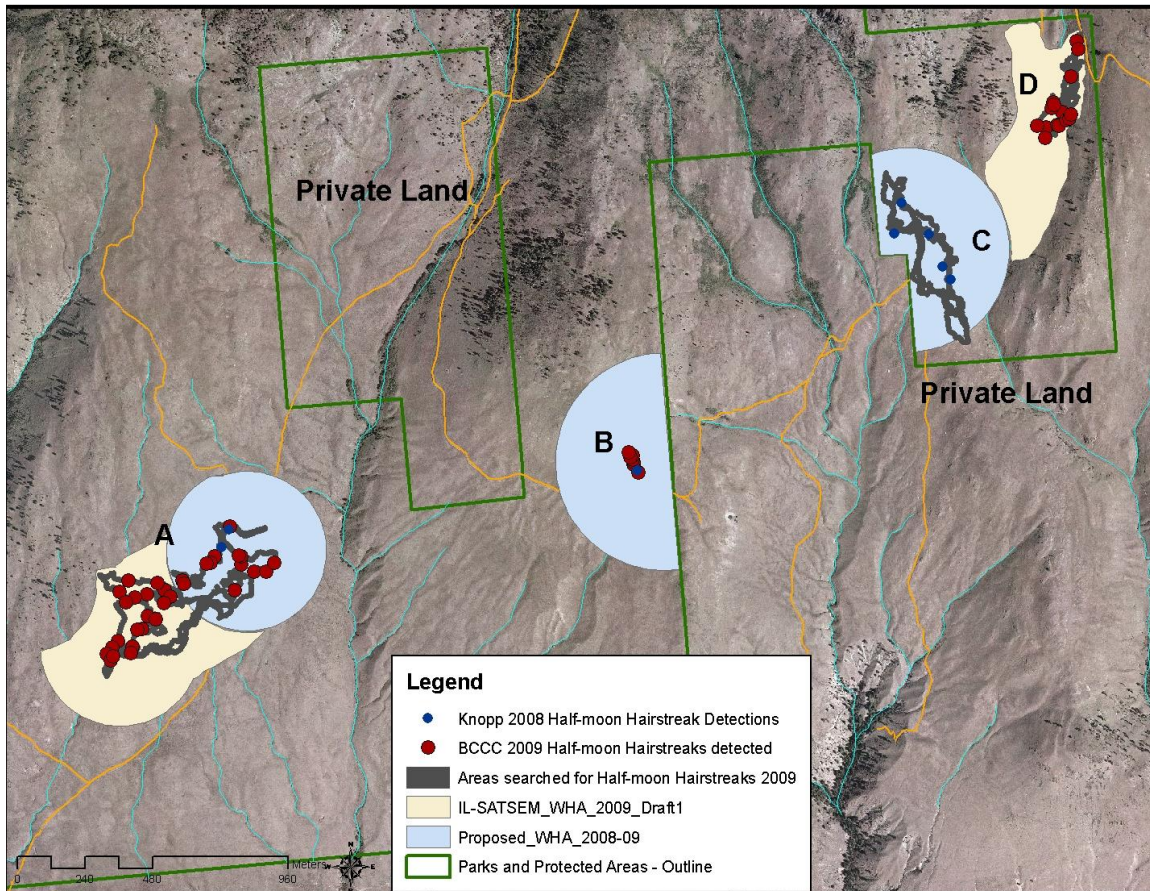


Figure 10. Draft Wildlife Habitat Area based on 2009 BCCC survey data at SOGPA – East Chopaka. Previously drafted WHA (2008-09) also are included on this map.

Photographs of Half-moon Hairstreaks and co-occurring butterfly species are provided in Appendix 1.

DISCUSSION

This third consecutive year of Half-moon Hairstreak surveys helped confirm their continued presence at certain sites within the southern Okanagan.

Half-moon Hairstreaks were detected in the White Lake basin during Kondla's 2003 surveys (COSEWIC 2006). Additional surveys were conducted by Dennis St. John in 2007 in order to better determine the extent of the White Lake Basin colony (Scott et. al. 2007). Our 2009 inventories reconfirmed the presence of Half-moon Hairstreaks within this basin.

The North Kilpoola area was surveyed on June 16th and 27th in 2008 with 56 detections (Knopp et al. 2009). In 2009 surveyors searched the north half of the previous detections and beyond and found 71 Half-moon Hairstreaks over 12 hectares.

Half-moon Hairstreaks had been detected in East Chopaka in 2008 at various locations:

15 individuals over two dates, June 26 and 29 (Knopp et al. 2009). Surveyors in 2009 found 97 Half-moon Hairstreaks at three sites within this parcel over two dates, June 26 and 29. At the western portion of this parcel (site A) 2009 surveys extended further south than 2008 surveys (Figure 6). The 2008 surveys did not note Half-moon Hairstreaks on grey horsebrush plants in this area, while in 2009 all individuals at site A were observed to be on grey horsebrush plants. In 2008, five observations occurred in an area here labeled site C; in 2009 no individuals were observed at this site (Figure 6), and most of the nectar plants were past flowering. Site D, surveyed in 2009, was not reported to have been surveyed in 2008. Much of East Chopaka has not been surveyed and may have suitable habitat. Surveys in future years should focus on potential habitat between known sightings.

The main focus of this inventory was to determine the presence of Half-moon Hairstreaks at survey sites. Surveyors used the wandering transect approach to target important nectaring plant patches in the area. Searched areas, therefore, were highly influenced by the distribution of nectar plants that were flowering at the time of surveys. The flowering time for plants is greatly influenced by seasonal weather patterns and should be considered when determining future survey methods and strategies.

Future inventories should reconsider the necessity for detailed habitat descriptions at each detection and the effect that collecting such data has on survey time effort per area. Half-moon Hairstreaks appear to choose nectar plants opportunistically as opposed to specifically (St. John, pers. comm. 2008 in Knopp et. al. 2009). Our observations showed individuals were found equally on each of three nectar plants (parsnip-flowered buckwheat, grey horsebrush and yarrow) rather than one preferentially. Collecting this data reduces search time. However, nectar plant preferences cannot be conclusively demonstrated based on the 2009 surveys since sites often had only one dominant nectar plant present per site.

The 2009 inventory did not encompass all previously known occupied sites for the Half-moon Hairstreak. Additional areas include Anarchist Mountain, Blind Creek and other areas within the White Lake basin (detected by Kondla in 2003). Some of these sites are on private land, requiring landowner contact and permission to survey. Time was not available for landowner contact this year so no attempts to survey on private land were made.

Given the short flight period of this species, timing is essential in surveying for Half-moon Hairstreaks. On June 29th surveyors searched the TNT Kilpoola Lake property extensively and found no Half-moon Hairstreaks. This area seemed to have suitable Half-moon habitat (large patches of flowering parsnip-flowered buckwheat) and could be considered for future surveys. Note that large patches of lupine were not observed at this site, in part because they had finished flowering and were no longer showy. The presence of lupine should be confirmed on this property before future Half-moon Hairstreak surveys are planned here.

In 2009 many of the plant species associated with Half-moon Hairstreaks were nearing the end of flowering by June 29th and by this date the flight window for this species was

over (St. John, pers. comm. 2009). Adult flight windows are greatly influenced by local weather and elevation and should also be considered in the timing for future survey planning.

This information is valuable in addressing the Conservation Framework's recommendations for this species. The 2009 BCCC surveys also were successful in documenting Half-moon Hairstreaks and their habitat at known locations beyond the extent of previously surveyed areas. This suggests a need for more extensive searches of these and other known locations.

RECOMMENDATIONS

- Survey sites with previous detections that were not addressed during this inventory.
- Employ several surveyors to cover an entire area at once. This would provide a better estimate of the total number of individuals, the extent of the population and suitable habitat at each location.
- Survey and document entire extent of suitable habitat at known locations.
- Compare habitat features (nectar plant presence and abundance) between sites where Half-moon Hairstreaks were detected and sites without detections (null data).
- Complete and submit additional Half-moon Hairstreak WHAs.

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Appendix 1: Butterfly photographs for future training purposes



Half-moon Hairstreak



Half-moon Hairstreak



Half-moon Hairstreak



Boiduvall's Blue



Silvery Blue



Boiduvall's Blue