Okanagan Grassland Species Inventory – Multi-species Report

By

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Cover illustration: Top Left: Half-moon Hairstreak (*Satyrium semiluna*) nectaring on parsnip-flowered buckwheat (*Eriogonum heracleoides*) taken by Vicky Young at White Lake Basin, June 12, 2009. Top Right: Sagebrush Tiger Beetle (*Cicindela pugetana*), taken by Dawn Marks at Skaha Lake, East Side TNT property, May 25, 2009. Bottom Right: Immaculate Green Hairstreak (*Callophrys affinis*) sitting on linear-leaved daisy (*Erigeron linearis*) taken by Vicky Young at White Lake Basin, May 21, 2009. Bottom Left: *Phidippus purpuratus* (spider) eating a male *Stenopogon inquiatus* (robber fly) on grey horsebrush (*Tetradymia canescens*). Taken by Vicky Young at South Okanagan Grasslands – East Chopaka, June 26, 2009. Centre Photo: Habitat at South Okanagan Grasslands – East Chopaka; big sagebrush (*Artemisia tridentata*), grey horsebrush (*Tetradymia canescens*) and bluebunch wheatgrass (*Pseudoroegneria spicta*) in the foreground. Taken by Dawn Marks, June 26, 2009.

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EXECUTIVE SUMMARY

The south Okanagan grasslands are home to several Red or Blue listed species. During the 2009 field season a BC Conservation Corps crew of two conducted presence/not-detected surveys under a multi-species approach. The crew surveyed for multiple species, across different taxa, while in the field. Target species included, at-risk butterflies (Immaculate Green Hairstreak, Half-moon Hairstreak, Sonora Skipper, Hoffman's Checkerspot and Mormon Fritillary, *erinna* subspecies), Tiger Beetles, Nuttall's Cottontail, *Efferia* robber flies, Grasshopper Sparrow, Lark Sparrow, Ground Mantid and Nuttall's Buckmoth. Species specific results and discussions can be obtained in individual species reports housed in the Ministry of Environment's Wildlife Species Inventory database.

This multi-species inventory was a new approach to addressing the information gap for many of these species in the south Okanagan. This report discusses methods and key findings that arose during the process. Although this approach presents unique challenges it can be particularly useful for areas such as the southern Okanagan region which supports a high number of species at risk. This report can be used to inform future multi-species initiatives.

ACKNOWLEDGMENTS

Funding for this project was provided by the BC Ministry of Environment through the BC Conservation Corps and through the BC Conservation Framework. We appreciate administrative support from the BC Conservation Foundation (Barb Waters). Guidance and mentorship was provided by Orville Dyer, Wildlife Biologist with the BC Ministry of Environment. Jennifer Heron, Invertebrate Specialist with the BC Ministry of Environment, provided additional advice. Rob Cannings, Curator of Entomology, Royal BC Museum, provided insect biodiversity, insect inventory, collection of voucher specimens and *Efferia* robber fly identification training. Training regarding butterfly identification and behaviour was provided by Dennis St. John. Training regarding bird identification and behaviour was provided by Michael Bezener. Leah Ramsay, BC Conservation Data Centre, Program Zoologist, joined the surveyors at certain sites and provided support. Andy Teucher, BC Conservation Data Centre, Zoologist, assisted with species identification of tiger beetles. Jerry Mitchell and Aaron Reid provided assistance with data templates and submissions for the Species Inventory database. We also wish to thank Carl MacNaughton of The Nature Trust of British Columbia (TNT) for providing access to their properties.

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INTRODUCTION

The Bunchgrass biogeoclimatic zone represents <1% of British Columbia's total area. It is one of four zones of provincial conservation concern and is ranked as Imperiled (at high risk of extinction due to very restricted range, steep declines, or other factors) (Kremsater 2007 in Austin et al. 2008). Twenty-one percent of this zone has been converted to urban and agricultural development. Some specific grassland ecosystems within the Bunchgrass zone have had even higher rates of loss. These ecosystems have been lost to agriculture and urban and rural development (Austin et al. 2008). As a result of grassland rarity and high impacts from development, grasslands support more than 30% of the species at risk in BC (Austin et al. 2008).

Several grassland species in the Okanagan were ranked high priority for inventory and implementation of habitat tools by the BC Conservation Framework (2009). Several of these species are Red or Blue listed by the BC Conservation Data Centre (2008). Inventory is important to help assess their status and to identify future conservation strategies.

In 2009, the BC Ministry of Environment, in cooperation with the BC Conservation Corps and the BC Conservation Foundation, began a multi-species inventory initiative. This project was designed to address monitoring and inventory needs for several species in the Okanagan including at-risk butterflies (Immaculate Green Hairstreak [*Callophrys affinis*], Half-moon Hairstreak [*Satyrium semiluna*], Sonora Skipper [*Polites sonora*], Hoffman's Checkerspot [*Chlosyne hoffmanni*], and Mormon Fritillary *erinna* subspecies [*Speyeria mormonia erinna*]), Nuttall's Cottontail (*Sylvilagus nuttallii*), Tiger Beetles (*Cicindela spp.*), *Efferia* robber flies, Ground Mantid (*Litaneutria minor*), Nuttall's Buckmoth (*Hemileuca nuttalli*), Lark Sparrow (*Chondestes grammacus*), and Grasshopper Sparrow (*Ammodramus savannarum*). The multi-species surveys were conducted in the Okanagan valley, Boundary region and Similkameen region, on selected provincial Crown lands including parks, ecological reserves and protected areas, as well as on privately protected properties owned by The Nature Trust of BC (Figure 1).

The primary focus of the project was to survey for select grassland species using a multi-species approach. The objective for the majority of these species was: conduct presence/not detected surveys within potentially suitable habitats, including those not previously surveyed. Under this approach surveyors could record the presence of more than one target species while in the field. Additionally there were some target species (Sonora Skipper, Hoffman's Checkerspot and Mormon Fritillary *erinna* subspecies) whose ranges took surveyors outside of grassland habitats. These species are only mentioned briefly in this report.

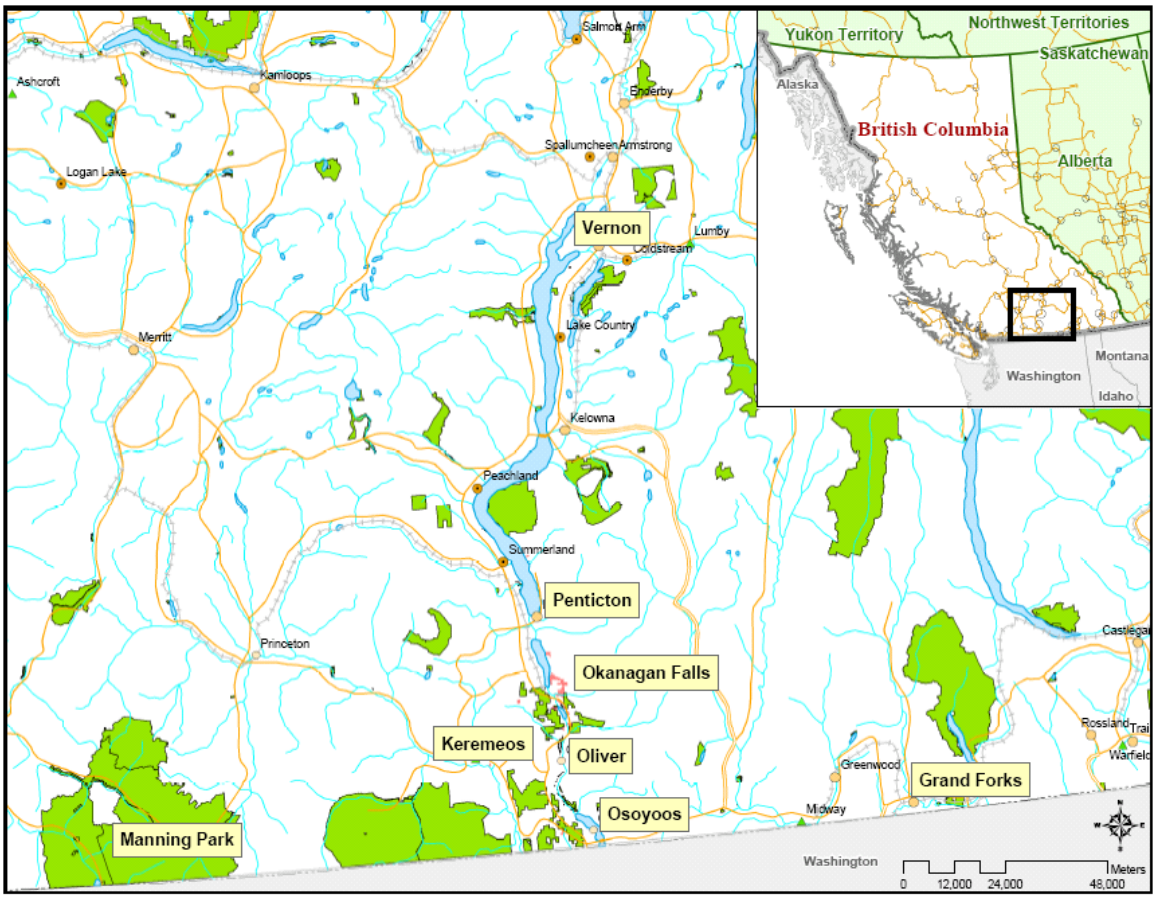

Figure 1. BCCC 2009 Okanagan Grasslands Species Inventory Study Areas.

METHODS

Training

Several training sessions were provided to surveyors prior to and throughout the multi-species inventory project. Sessions included specific training for each of the following:

- Insect diversity and inventory methods
- Voucher collection and pinning
- *Efferia* robber fly identification and catching
- Tiger Beetle identification and catching
- Nuttall's Cottontail pellet identification and survey protocol
- Sparrow identification and survey protocol with emphasis on Grasshopper Sparrows and Lark Sparrows
- Butterfly identification and behaviour for each targeted species

Training often consisted of at least one full day with experts for each species or species group. Butterfly training was provided throughout the survey season as new target species began to emerge for their flight period.

Surveys

Wandering transects and survey stations were used to inventory potential habitat for the target species. Wandering transects have no fixed direction, distance or speed, and allow surveyors to change course to target potentially suitable habitat that occurs sporadically across the landscape. Search stations or listening stations were positioned along wandering transects and/or roads.

When possible, surveyors would actively search for multiple species at once in an area. While in the field surveyors tried to target what they deemed suitable habitat for target species as it was encountered. This approach was only ideal for certain species for which suitable habitat was well defined. This suitable habitat was then surveyed more intensely than the surrounding areas (e.g. for Immaculate Green Hairstreaks, knolls with flowering plants were searched thoroughly, while the swales and draws surrounding them were passed through). For more discussion of habitat targeted for each species, see individual species reports.

Many of the targeted species had specific survey timing windows (Table 1). During these timing windows surveyors often shifted their survey focus to these species only. During all surveys, even those outside of suitable habitat and survey timing, surveyors were aware of target species and were prepared to note them if encountered.

Table 1. Target species and their survey timing windows.

Target Species	**Survey Timing**
Parowana Tiger Beetle(*Cicindela parowana*), Badlands Tiger Beetle (*Cicindela decemnotata*), and Sagebrush Tiger Beetle (*Cicindela pugetana*)	May and September
Efferia sp. unnamed (Cannings)	May to early June
Immaculate Green Hairstreak (*Callophrys affinis)*	Early May to early June
Grasshopper Sparrow (*Ammodramus savannarum*)	Late May to early June
Lark Sparrow (*Chondestes grammacus*)	Late May to early June
Half-moon Hairstreak (*Satyrium semiluna*)	June
Sonora Skiper (*Polites sonora*)	July
Hoffman's Checkerspot (*Chlosyne hoffmanni*)	Late June to late July
Mormon Fritillary (*Speyeria mormonia* ssp. *erinna*)	Mid to late August
Ground Mantid (*Litaneutria minor*)	Late August to early September
Nuttall's Buckmoth (*Hemileuca nuttalli*)	Late August to early September
Nuttall's Cottontail (*Sylvilagus nuttallii*) pellets	Throughout surveys

When a target species was observed the following information was recorded: date, time, location (UTM NAD 83), number of individuals (if possible), behaviour and general

habitat notes and other comments. For Half-moon Hairstreak surveys, species and percent cover of the tree layer, shrub layer and dominant flowering plants (up to three species) was also recorded. Weather conditions were also noted during surveys.

Surveyors used handheld Garmin GPS units (GPSmap 60Cx and GPSmap76Cx) to record detections; search stations and wandering transect tracks. Tracks were recorded by each surveyor and consisted of a UTM point automatically placed every 10 metres. For all species, tracks were saved as shapefiles and submitted to SPI to show where surveyors searched.

All UTM locations were downloaded using Garmin MapSource version 6.15, and imported into a Microsoft Excel 2003 spreadsheet. Data was then uploaded into ESRI ArcMap 9.2 as shapefiles. Survey data was entered into MoE Wildlife Species Inventory Reconnaissance templates for each species or species group.

GPS track log data was used to record where surveyors searched. When possible, search area was determined for a species by adding a buffer to GPS track log data in ArcMap 9.2 using parameters that were species specific. Surveyors also kept track of survey time to reflect search effort. Additional details can be found in species specific reports stored on the Ministry of Environment's Wildlife Species Inventory database (SPI).

Although target species were often surveyed for together they have been entered into SPI as separate surveys using the reconnaissance template to accommodate SPI requirements and allow for online species specific data searches.

Species

Three species of tiger beetles targeted during this inventory use similar habitats (grassland, shrub-steppe and open ponderosa pine) and have overlapping distributions in the Okanagan Region: Parowana Tiger Beetle, Badlands Tiger Beetle, and Sagebrush Tiger Beetle. Surveyors used a search and capture-with-net technique to survey for tiger beetles within suitable habitats.

Butterfly surveys were conducted throughout the field season, but surveys for each target species were held only within their flight periods. Many of the targeted butterfly species had associated nectar and host plants or micro-habitats such as moist meadows. Surveyors tried to target these habitats and concentrated their search efforts at these locations. A visual search and capture-with-net technique was used to survey for butterflies. Voucher specimens and pictures were taken of butterflies to verify identification of some species.

Grassland sparrow surveys started as close to sunrise as possible, typically 6am, and continued until no later than 4 hours after sunrise. Stations were usually placed along a road or walking trail at various distances to target suitable habitat or previous detections. Surveyors spent 10 minutes at each station listening for target species. Surveyors attempted to obtain visual confirmation of all aural detections to verify identification. The location of detected individuals was obtained by either approaching the individual or

projecting a location using a compass and estimated distance from surveys stations.

Nuttall's Cottontail pellet search stations were placed at semi-regular intervals 100-400 metres apart along wandering transects within habitats surveyed. Surveyors searched the ground intently within a 10 metre radius of a marked station. Searches targeted areas under the cover of bushes such as sage (*Artemisia tridentata*) and antelope-brush (*Purshia tridentata*) particularly near rocky outcrops and gullies. These surveys were conducted throughout the season when surveyors were in potential suitable habitat for Nuttall's Cottontail.

Surveyors were trained on the identification of *Efferia* robber flies by Rob Cannings Curator of Entomology, Royal BC Museum. Surveyors were asked to watch for a specific unnamed species of *Efferia* during surveys. A visual search and capture-with-net technique was used for this species.

The crew included wandering transects to survey for Nuttall's Buckmoth and Ground Mantid while in antelope-brush habitats in August and early September. Both species are associated with antelope-brush habitats.

In addition to the aforementioned target species surveyors noted any detections of listed species encountered while in the field as incidentals.

RESULTS

Results have been broken up by target group and have been discussed in species-specific reports. All data, results and reports have been submitted to the Ministry of Environment's Wildlife Species Inventory (WSI) SPI database and the BC Conservation Data Centre. Original copies are also housed with Orville Dyer at the BC Ministry of Environment, Penticton.

When surveyors were within grassland habitats they were aware of all potential listed grassland species. This comprised the bulk of the project initiative. Maps showing locations visited and areas searched during this time can be found in Appendix 2. As mentioned these do not include Sonora Skipper, Hoffman's Checkerspot and Mormon Fritillary *erinna* subspecies surveys. All other maps for the project are within the species or species group reports.

DISCUSSION

General multi-species surveys within a species group (i.e. songbird surveys) are not uncommon (e.g. Breeding Bird Surveys, Monitoring Avian Productivity and Survivorship (MAPS) banding surveys). An approach such as this one, targeting select species of insects, birds and mammals, is still in its infancy within the BC Ministry of Environment.

A multi-species approach allows surveyors to search for and document the presence of multiple species at once. This has the benefit of optimizing resources and addressing inventory data gaps for more than one species in one project. This can be especially advantageous for dealing with species of lesser concern that would not normally receive inventory funding or species about which very little information is known such as invertebrates.

A multi-species approach across taxa presents a unique set of challenges and considerations. The first aspect to be considered is the large amount of training time required. Surveyors need to be trained on survey techniques and correct identification of each target species (and of similar non-target species). Proper training by experts is essential for the success of such survey initiatives. While this large amount of training can be a wonderful opportunity for surveyors, it must be taken into account when planning for both monetary and time budgeting.

Differences in survey timing for certain species were a consideration. Song bird surveys needed to be conducted during early morning hours while beetle and butterfly surveys later in the day. These different taxa therefore could not be optimally surveyed for at the same time. Surveyors conducted some early morning songbird surveys but were mostly surveying later in the day. Songbirds were still encountered later in the day but most likely at a lower frequency.

The invertebrate focus for this project also presented certain challenges. *Efferia* robber flies and adult butterflies have limited activity windows throughout the season. For butterflies in particular these can be short periods and it is essential to conduct inventories during these timing windows. Efforts were shifted to a single species focus once the target butterflies began to emerge from mid June to mid August. Surveyors were still aware of other target species during this time but were not actively searching for them.

There was a greater amount of data to collect while in the field to address the data requirements of each species. As a consequence less area was searched at a time. This also resulted in increased time spent on data management and reporting.

The multi-species approach has the potential to complicate data management and the presentation of data and reports into the provincial Species Inventory Database (SPI). Under the approach adopted for this project target species encountered were always treated as detections and never as incidentals. This complicated the assumptions of search effort and presentation of “null” data.

Search effort (time and area searched) was difficult, and at times not possible to determine for individual target species. Suitable habitats for target species did not always overlap and often occurred sporadically throughout the landscape. Surveyors did not attempt to separate area and time spent searching for each individual species while at a site. As a consequence, search effort presented under the multi-species approach will not provide an accurate estimation of time spent actively searching for a specific species or the amount of each species’ suitable habitat within the landscape. Thus search area can only be discussed at a coarse level and has the potential to misrepresent search effort at a

species specific level.

Tracks were used to show where surveyors searched, implying “null” data. These tracks, as collected in the field, were too large to be submitted in a manageable SPI template. As such, they were filtered by distance and should only be used as a reference and not as an indicator of species specific suitable habitat.

Multi-species results (housed in MS Excel spreadsheets) can contain different data and reflect different search protocols for different species. Surveyors and project managers must be clear on the types of surveys and data to be collected for each species and the procedures required for effective data management prior to data collection.

The design of the 2009 project provided only presence/not detected information for each species. Further work at the planning level would be necessary if additional information was wanted from a multi-species approach such as this one.

This project was valuable in determining the effectiveness and issues relating to a multi-species inventory approach. Often much time is needed to search for rare species and hiring experts can be expensive. This type of multi-species approach can be particularly useful for areas such as the southern Okanagan region which supports a high number of species at risk. This multi-species initiative can be used to inform similar future projects.

RECOMMENDATIONS

- Choose target species based on overlap of habitats and survey timing.
- Ensure that expert training is provided to surveyors at the beginning of the survey season. Ensure that expert assistance and support is available throughout the inventory, to be accessed as needed.
- Have specific survey priorities and design for each species determined ahead of time and assess how well these will fit with other target species. This is especially important if there is a need for more than just presence information for each species.
- It may be useful to have portions of a survey focus on a particular target species. This can ensure, for example, that as much search effort as possible is targeted to a butterfly species during its flight period. This should also make the calculation of search effort more streamlined.
- Consider the use of hand held electronic data devices such as a Personal Digital Assistants (PDA) for such a project to limit amount of time spent with data management both in and out of the field.
- Ensure that the data management and reporting time requirements are considered during project planning.
- Establish and field test an efficient way to track search effort and/or amount of suitable habitat present for each individual target species if this information is wanted.

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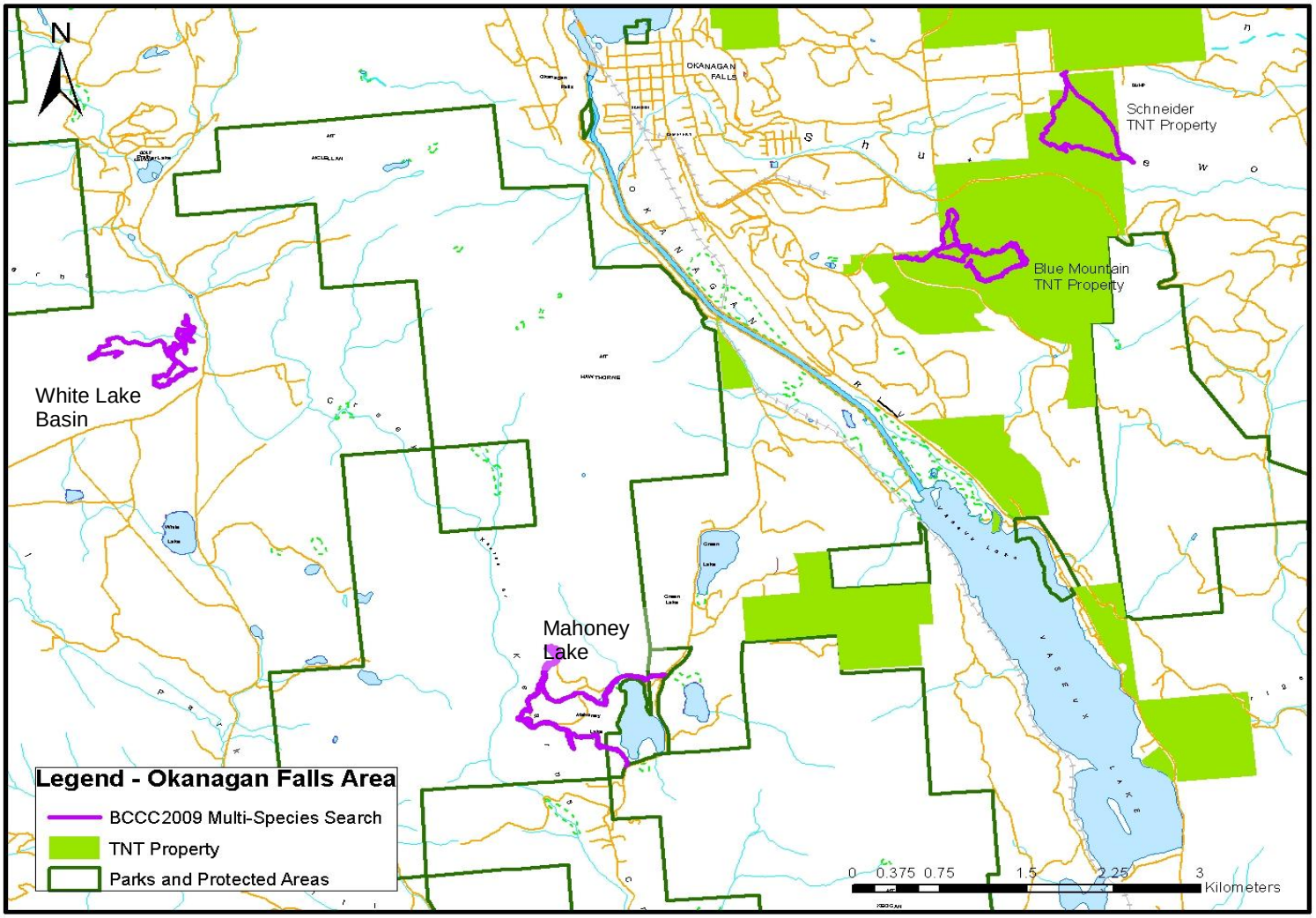
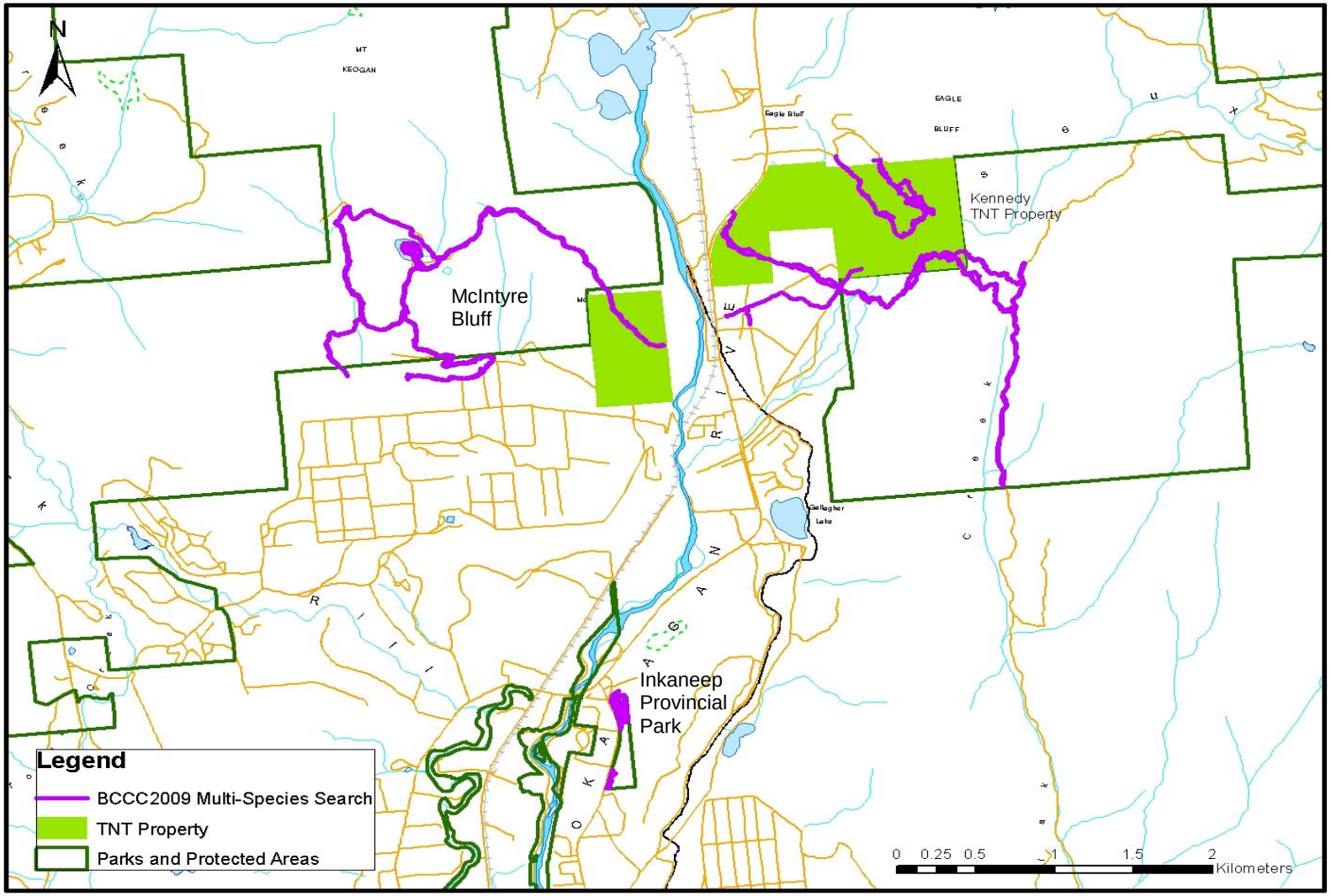
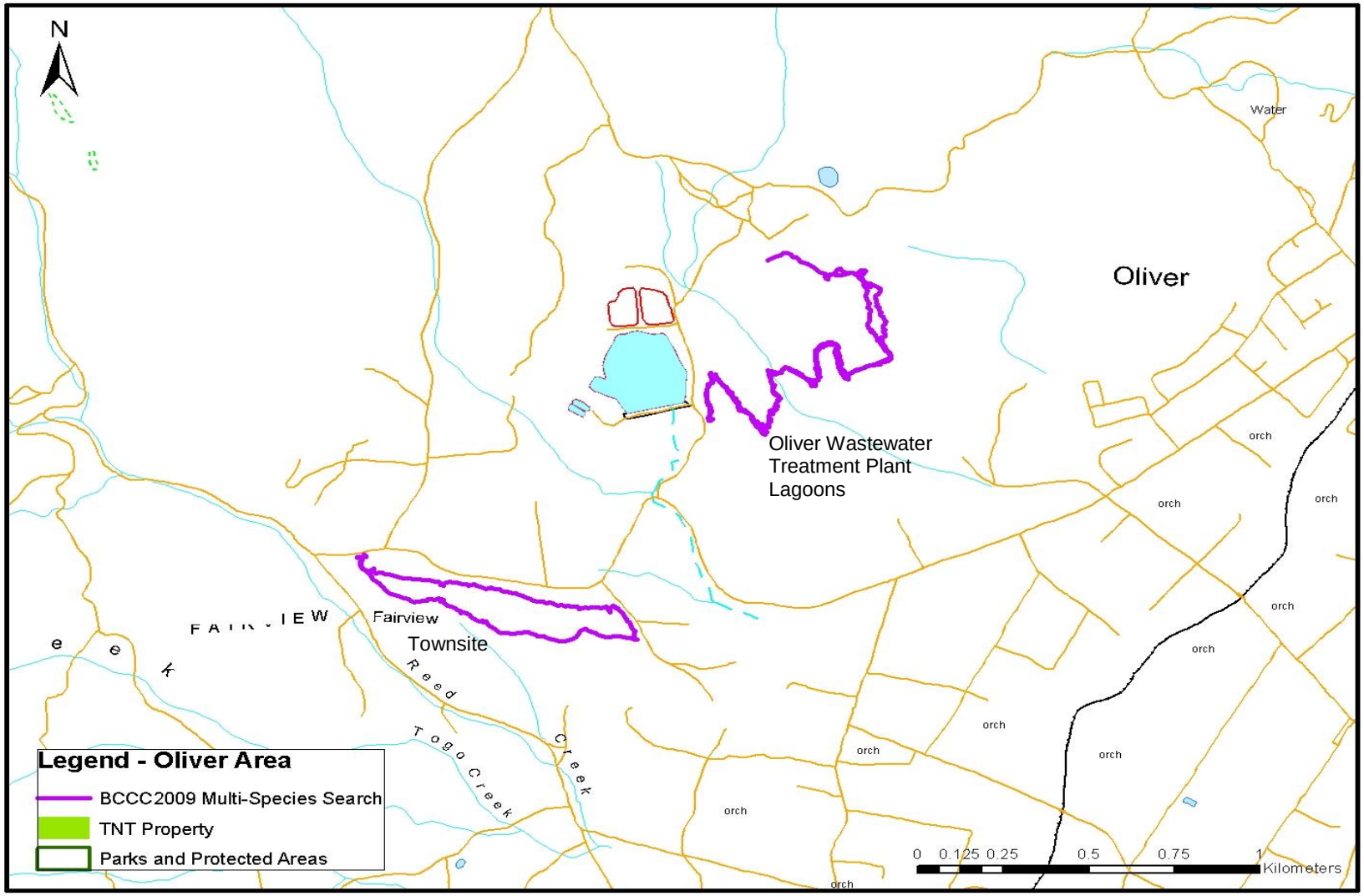
Appendix 1. Maps of Areas Searched During 2009 BCCC Multi-Species Inventory



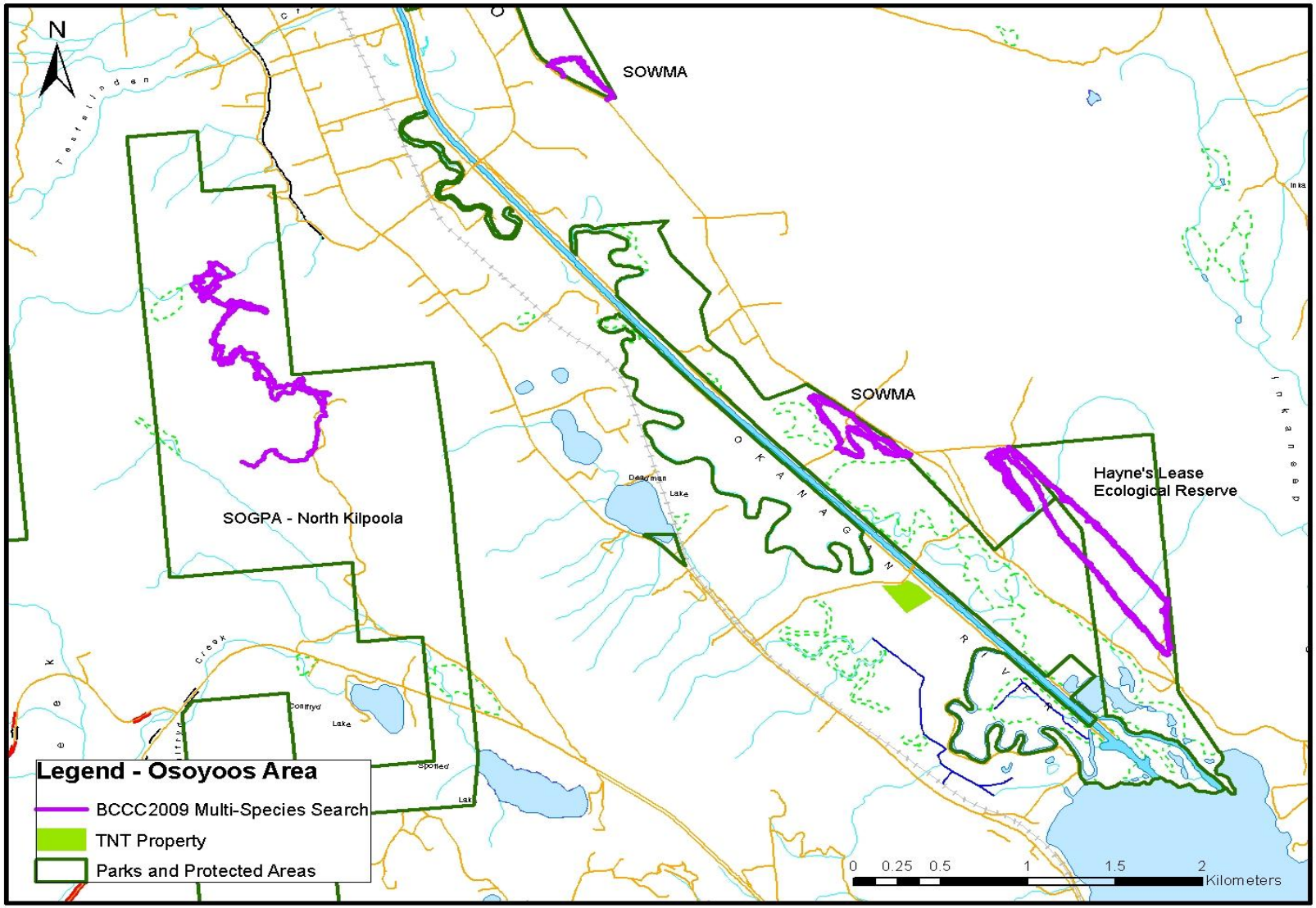
Survey locations in the Okanagan Falls area during the 2009 BCCC multi-species inventory.



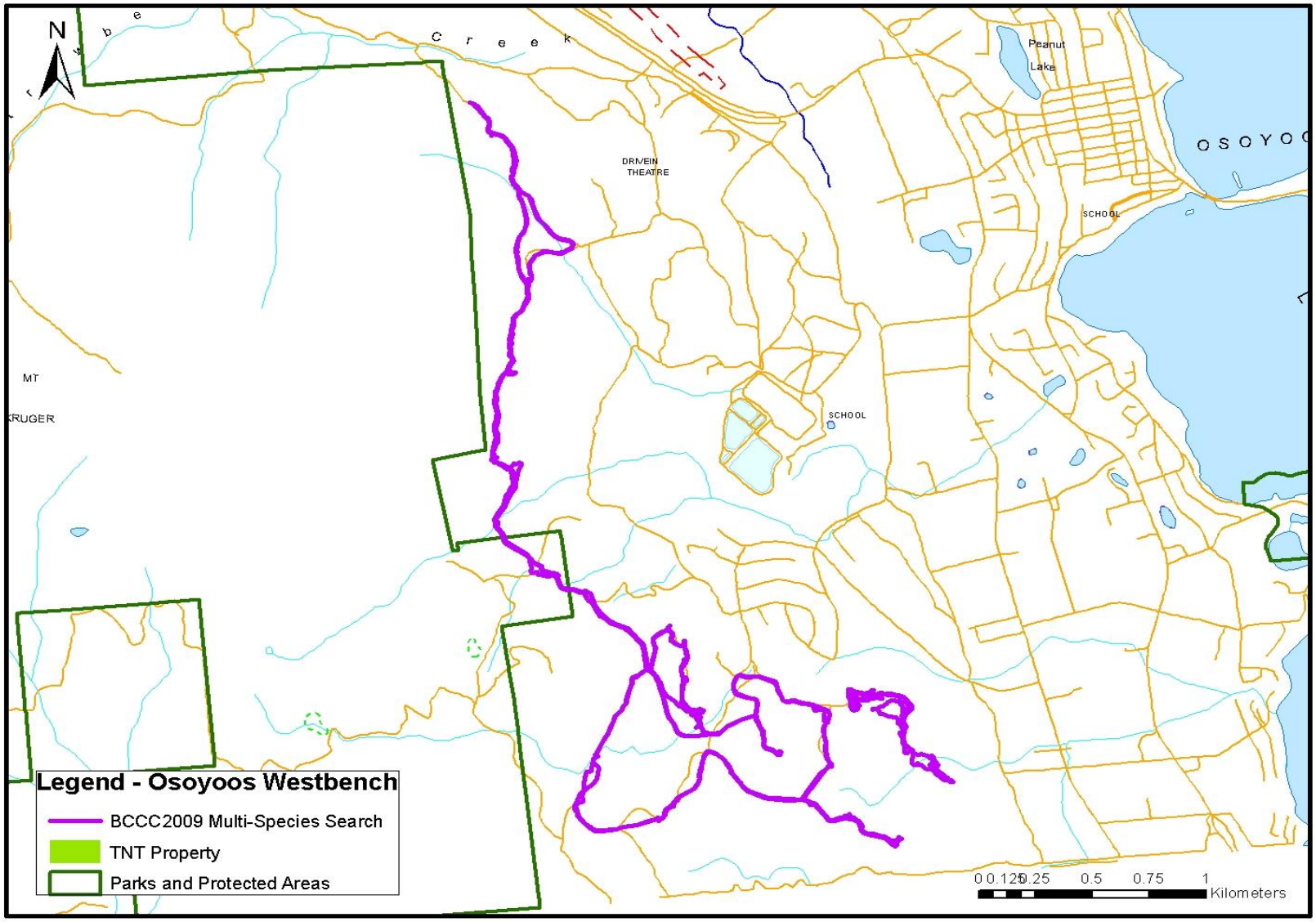
Survey locations North of Oliver in parks and protected areas and on The Nature Trust (TNT) properties for the 2009 BCCC multi-species inventory.



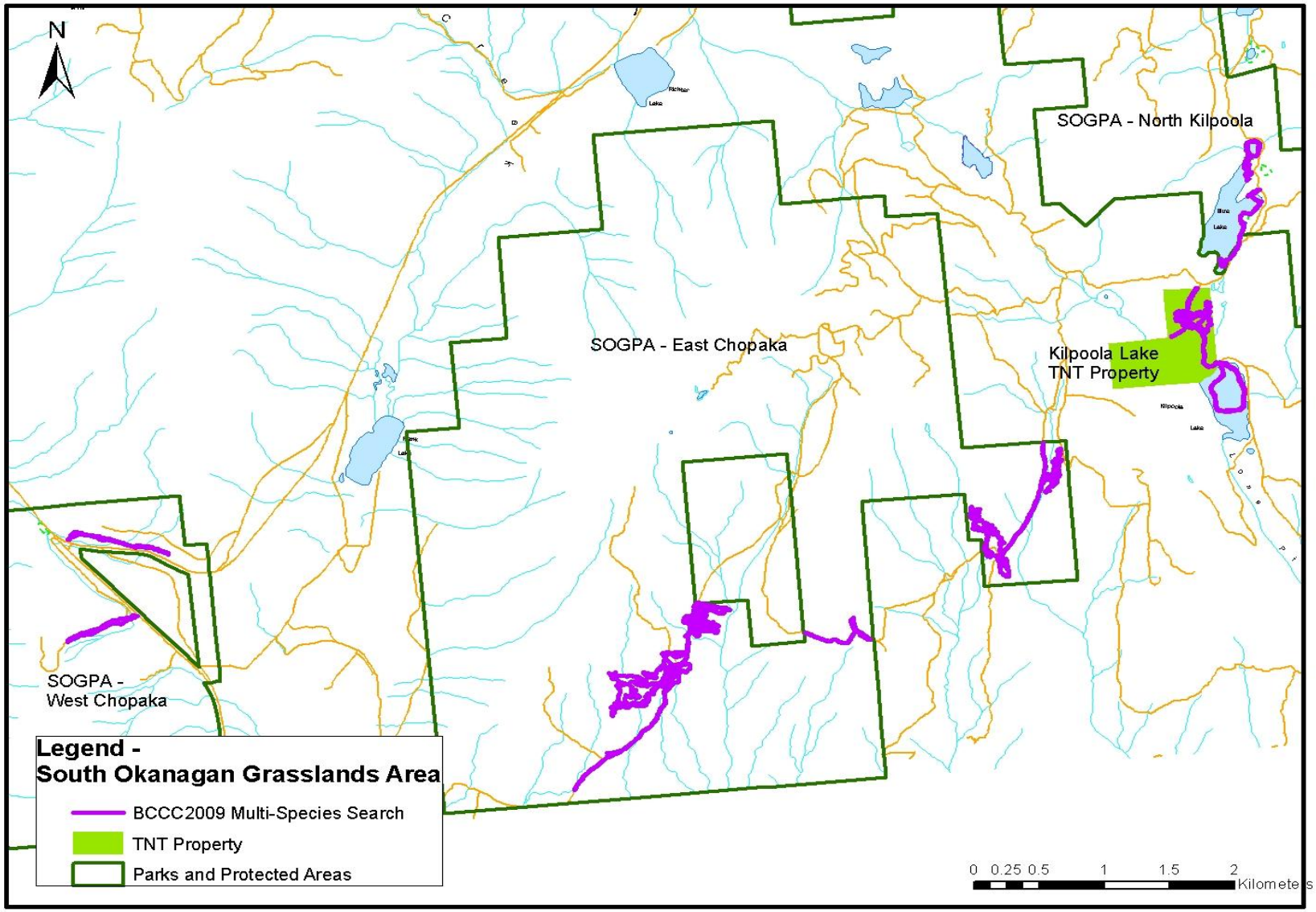
Survey locations in the Oliver area for the 2009 BCCC multi-species inventory.



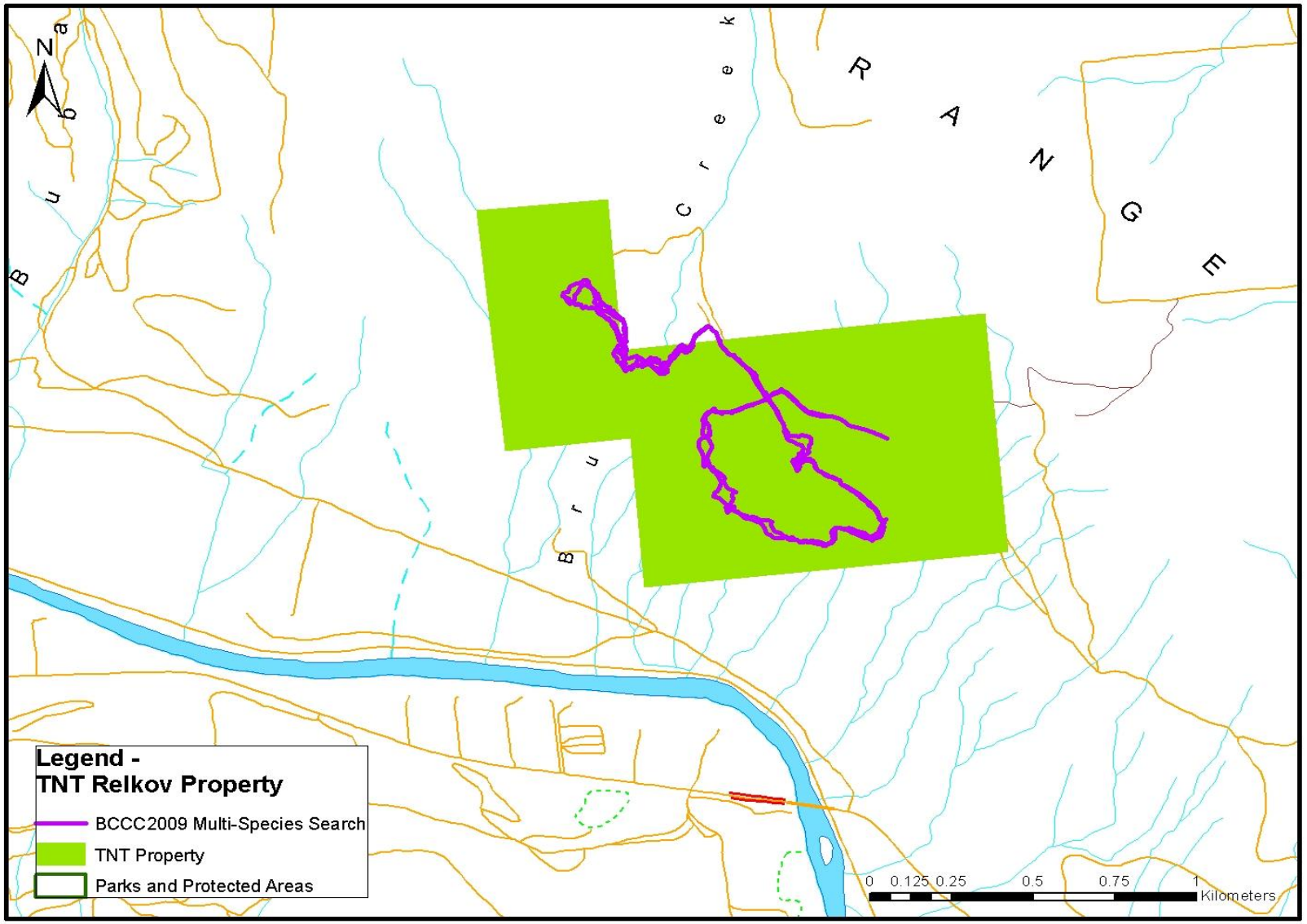
Survey locations in the Osoyoos area in the South Okanagan Wildlife Management Area (SOWMA) and South Okanagan Grassland Protected Areas (SOGPA) for the 2009 BCCC multi-species inventory.



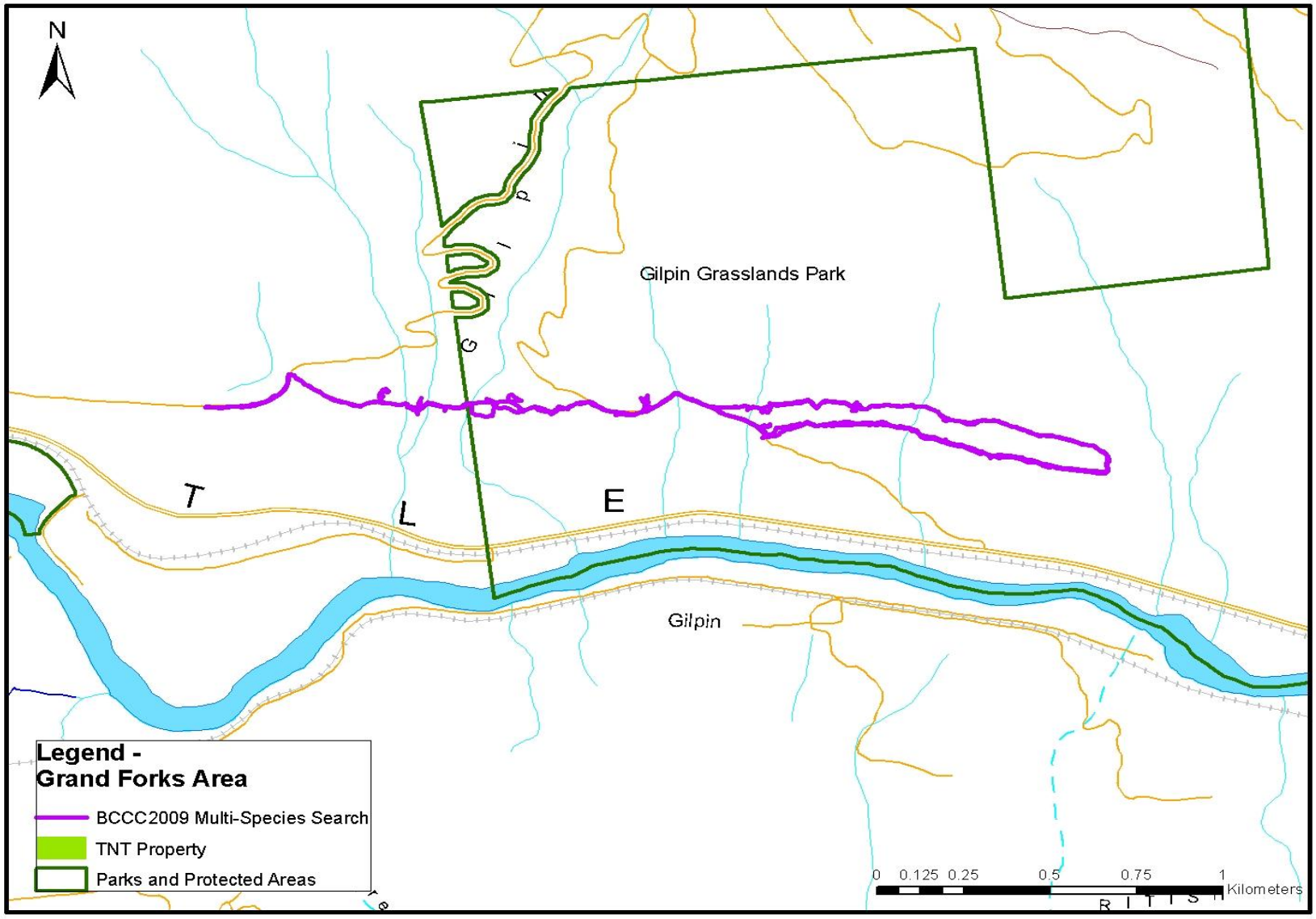
Survey locations on the Osoyoos Westbench for the 2009 BCCC multi-species inventory.



Survey locations in the South Okanagan Grassland Protected Areas (SOGPA) land parcels for the 2009 BCCC multi-species inventory.



Survey locations on the Nature Trust's Relkov – Rock Creek property for the 2009 BCCC multi-species inventory.



Survey locations in the Grand Forks area for the 2009 BCCC multi-species inventory.