

**Identification of Western Toad (*Anaxyrus boreas*)  
Breeding Sites and  
Road Mortality Mitigation Assessment  
on Vancouver Island**

***Prepared by:***

Elke Wind  
E. Wind Consulting  
Suite A – 114 Fifth Street,  
Nanaimo, BC V9R 1N2

*and*

Shari Willmott  
Island GIS Services  
3971 Gibbins Road,  
Duncan, BC V9L 6G4

***For:***

Trudy Chatwin  
Ministry of Forests, Lands and Natural Resource Operations  
Nanaimo, BC

December 2012

## **ACKNOWLEDGEMENTS**

We'd like to thank all of the private land owners that generously provided us with toad observations in their area and who allowed us to survey their property.

As well, there were many people who volunteered resources and their time to help with the toadlet rescue at Wake Lake in July. In particular, we'd like to thank:

Pamela Williams, Hitomi Kimura, Parker Jefferson, Gloria Edmundson, Gerald and Caroline Thom, Paul Rickard, Dixie Muller, Ted Leischner, Warrick and Jan Whitehead, and Trystan Willmott for construction of the directive fencing and pitfall traps;

Rose Rogan, Alison Rimmer and family, Hitomi Kimura, Karen Fowler, Lorna Cutt and family, Parker Jefferson, Gwenth Evans, James Strumpfer, Warrick and Jan Whitehead, Mary Nelson, Cathy Brown, Jane McAllister, Buster Rowan, Barb Wong and family, Belle and Emerald White, Jenny Broere, Tegan Padgett, Harvy and Virginia Radons, and Trystan Willmott for monitoring pitfall traps;

Eric and Dorothy Marshall for photographing the migration and road mitigation as well as passing all the updates on to the Cowichan Valley Naturalists;

And the Sahtlam Fire Hall for use of the hall for our end of season volunteer potluck.

## TABLE OF CONTENTS

Acknowledgements.....	2
1. Introduction .....	4
2. Methods.....	5
2.1 Identify and Map Western Toad Breeding Populations on Vancouver Island.....	5
2.2 Identify and Summarize Information about Known Road Mortality Sites.....	5
2.3 Mitigate Road Impacts on Dispersing Toad Metamorphs at Wake Lake.....	5
3. Results .....	6
3.1 Identify and Map Western Toad Breeding Populations on Vancouver Island.....	6
3.2 Identify and Summarize Information about Known Road Mortality Sites.....	8
3.3 Mitigate Road Impacts on Dispersing Toad Metamorphs at Wake Lake.....	9
4. Discussion and Recommendations .....	10
5. References .....	11
6. Appendix .....	12

## List of Tables and Figures

Figure 1. Directive fencing, pitfall traps, and educational signage installed along Barnjum and Riverbottom Roads near Wake Lake in Duncan to safely move dispersing toadlets across the road.....	6
Figure 2. Western Toad sightings for Vancouver Island, including confirmed breeding sites, general observation locations, and mass metamorph dispersal sites (e.g., road and trail crossings). .....	7
Figure 3. Western Toad sightings for the Cowichan Valley, including six confirmed breeding sites, general observation locations, and mass metamorph dispersal sites (e.g., road and trail crossings). .....	8
Table 1. Known Western Toad Road Crossing Areas on Vancouver Island and the Mainland of BC. ....	9

## 1. INTRODUCTION

The Western Toad (*Anaxyrus boreas*) is a species of *Special Concern* in Canada and included on Schedule 1 of the Species at Risk Act (SARA) due to population declines in south-coastal areas of British Columbia (BC). The BC Conservation Framework ranks the Western Toad as priority 2 under goal 2 (Prevent species and ecosystems from becoming at risk) and as priority 3 under goal 1 (Contribute to global efforts for species and ecosystem conservation). As such, the BC Western Toad Provincial Working Group has prepared a Draft Provincial Management Plan for this species (Provincial Western Toad Working Group 2012). The Plan underwent Manager's Review in 2010. The Working Group concluded that populations of Western Toads have declined in the Georgia Depression and that few breeding sites are known. They also determined that medium and high threats for the species include urban development and transportation corridors respectively. For example, the large aggregations of Western Toad metamorphs that form when they emerge and disperse away from breeding sites are particularly vulnerable to road mortality. As well, Western Toad breeding sites are subject to drainage, pollution, and sedimentation throughout their range. The primary goal of the Western Toad Management Plan is to maintain self-sustaining populations of Western Toads across BC. The first management objective the Plan outlines in order to meet that goal is to identify regionally important metapopulations, with the aim of protecting a minimum of 10 additional sustainable populations on Vancouver Island and the Lower Mainland by 2015.

The Western Toad has become a flagship species for the issue of road impacts on amphibian populations in BC, receiving extensive media coverage in recent years. Groups in various areas are attempting to address this issue. For example, E. Wind Consulting has been working with the BC Ministry of Transportation and Infrastructure (MoTI) since 2007 to mitigate road issues for amphibians on Vancouver Island. The first project they worked on together was an emergency response to a Western Toad metamorph dispersal taking place across Highway 19 north of Courtenay, BC. The dispersal event lasted approximately 81 days and at least 100,000 toadlets were captured in pitfall traps on the east side of the highway and released on the west side during that time (Fyfe and Wind 2008). Most recently, a partnership with Island GIS Services was formed to address issues associated with road mortality of Western Toads at Wake Lake in Duncan, BC. In 2011, in addition to a survey of spring and fall road movements of adult toads, over 250,000 dispersing toadlets were manually trapped and moved across the road over a 16-day period (Willmott and Willmott 2011). E. Wind Consulting has also worked with the Ministry of Environment (MOE) and Vancouver Island University (VIU) on a long-term monitoring project of Western Toads breeding at a lake in Morrell Nature Sanctuary in Nanaimo, BC. This latter project has been focusing on population demographics and survivorship. Numerous projects are underway to understand and protect toad populations on the south coast. However, opportunities and resources available for mitigation have been somewhat limited up to this point, and there is a lack of knowledge and understanding of what should be done where. For example, many Western Toad road crossing sites are dependent on volunteers to reduce impacts on the local population. Support for inventories, research, and monitoring are needed.

Two knowledge gaps identified in the Draft Provincial Management Plan for Western Toads, that were addressed in this study include:

- The location of breeding sites and a threat assessment is required for conservation prioritization and to facilitate application of best management practices.
- Movement distances and dispersal patterns, especially in fragmented landscapes, are required for conservation prioritization and to improve best management practices.

## *Objectives*

There were three main objectives of this project:

1. Identify and map known Western Toad breeding populations on Vancouver Island to identify those that could be considered for protection as per the Management Plan by 2015.
2. Identify and summarize what is known about Western Toad breeding populations threatened by road mortality on the south Coast, especially on Vancouver Island.
3. Mitigate the effects of road mortality on dispersing toad metamorphs at Wake Lake in 2012.

## **2. METHODS**

### *2.1 Identify and Map Western Toad Breeding Populations on Vancouver Island*

All Western Toad locality information for Vancouver Island was compiled into a database in Excel and mapped using GIS. Where possible, the data were broken down by life stage to distinguish confirmed breeding sites (egg or tadpole observations) from observations of subadults or adults. Sources of information for the database included the BC Conservation Data Centre, the provincial Frogwatch database, records compiled for the original COSEWIC status report for the species, and more recent observations provided by biologists, consultants, and the general public.

### *2.2 Identify and Summarize Information about Known Road Mortality Sites*

Data and information were gathered about known road crossing locations for Western Toads. In addition to a list of sites in the Lower Mainland and Vancouver Island area, more detailed information was gathered about road sites in the Wake Lake area in Duncan. A public presentation was held in Duncan on June 10, 2012 about the work being done in and around Wake Lake on amphibians, to garner local support and to gather information about possible toad breeding sites and road crossing locations. The public presentation was advertised in the local newspaper. People who attended the presentation, and who helped with or stopped by the toad fencing at Wake Lake (see below) provided us with observations of toads from their properties (e.g., toads observed in gardens, ponds, and dugouts) and along roadways. We contacted these people and visited as many of these sites as possible to attempt to confirm breeding sites and understand the movement patterns of toads in the area relative to known breeding locations.

### *2.3 Mitigate Road Impacts on Dispersing Toad Metamorphs at Wake Lake*

As in 2011, numerous volunteers were enlisted to manually move newly emerged toadlets across roads adjacent to Wake Lake in Duncan in 2012. Temporary directive fencing and pitfall traps were installed on July 20th, 2012 with the help of numerous volunteers, and the Cowichan Valley Regional District donated educational signs to caution drivers about the dispersal event (Fig. 1). A 75-m long section of directive fencing was installed along Barnjum Road directing toadlets to an existing culvert. A section of 25-m long fencing was also installed along Riverbottom Road. The fencing was constructed of plastic vapour barrier erected with wooden stakes and sand was placed along the bottom to deter toadlets from crawling underneath. Pitfall traps were installed every 10-15 m along the fences (total = 14). The traps were made from plastic buckets buried flush with the ground. Wetted, unbleached paper towel was placed in the bottom of each trap for moisture. The traps were opened in the morning and evening and checked continuously for captured toadlets. The toadlets were removed from the traps by hand and temporarily placed into a plastic tote for transfer to the release point. The approximate number of

toadlets caught in each trap during each trap check was recorded. The traps were closed at night and mid day. The toadlets were released on the opposite side of the road in or adjacent to a drainage channel.



Figure 1. Directive fencing, pitfall traps, and educational signage installed along Barnjum and Riverbottom Roads near Wake Lake in Duncan to safely move dispersing toadlets across the road.

### 3. RESULTS

#### 3.1 Identify and Map Western Toad Breeding Populations on Vancouver Island

Approximately 155 locality records could be ascertained for Western Toads for Vancouver Island from field work conducted in 2012 and from other sources (e.g., Frogwatch database). Unfortunately, the majority of records received from the provincial Frogwatch database do not indicate life stage so breeding could not be confirmed. In total, breeding was confirmed for 21 locations on Vancouver Island (Fig. 2).

From the field work conducted in the Cowichan Valley in 2012, numerous toad locations were found, including five new breeding sites. From the public presentation in Duncan in the spring eight people provided us with toad sightings and knew of or suspected possible breeding sites in the area. This database of local information continued to grow as more people read or heard about the project—12 more names/sites were obtained. We were able to survey 4 private properties, as well as opportunistically explore some additional sites. Through this, we were able to confirm the location of 6 toad breeding sites in the Cowichan Valley, Wake Lake plus five new sites (Fig. 3). Numerous metamorph dispersal sites were also identified, but the exact breeding site (source) could not be confirmed and needs further research.

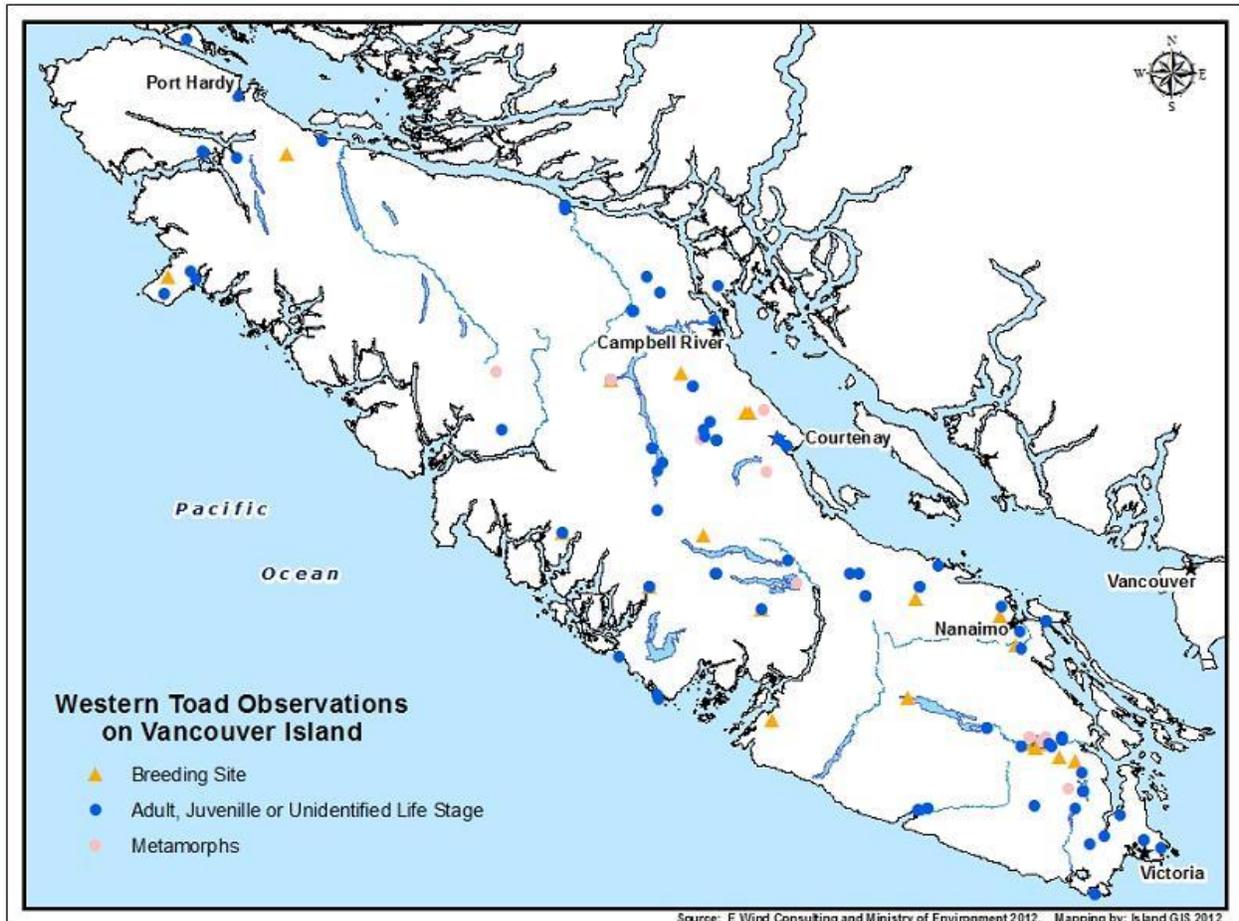


Figure 2. Western Toad sightings for Vancouver Island, including confirmed breeding sites, general observation locations, and mass metamorph dispersal sites (e.g., road and trail crossings).

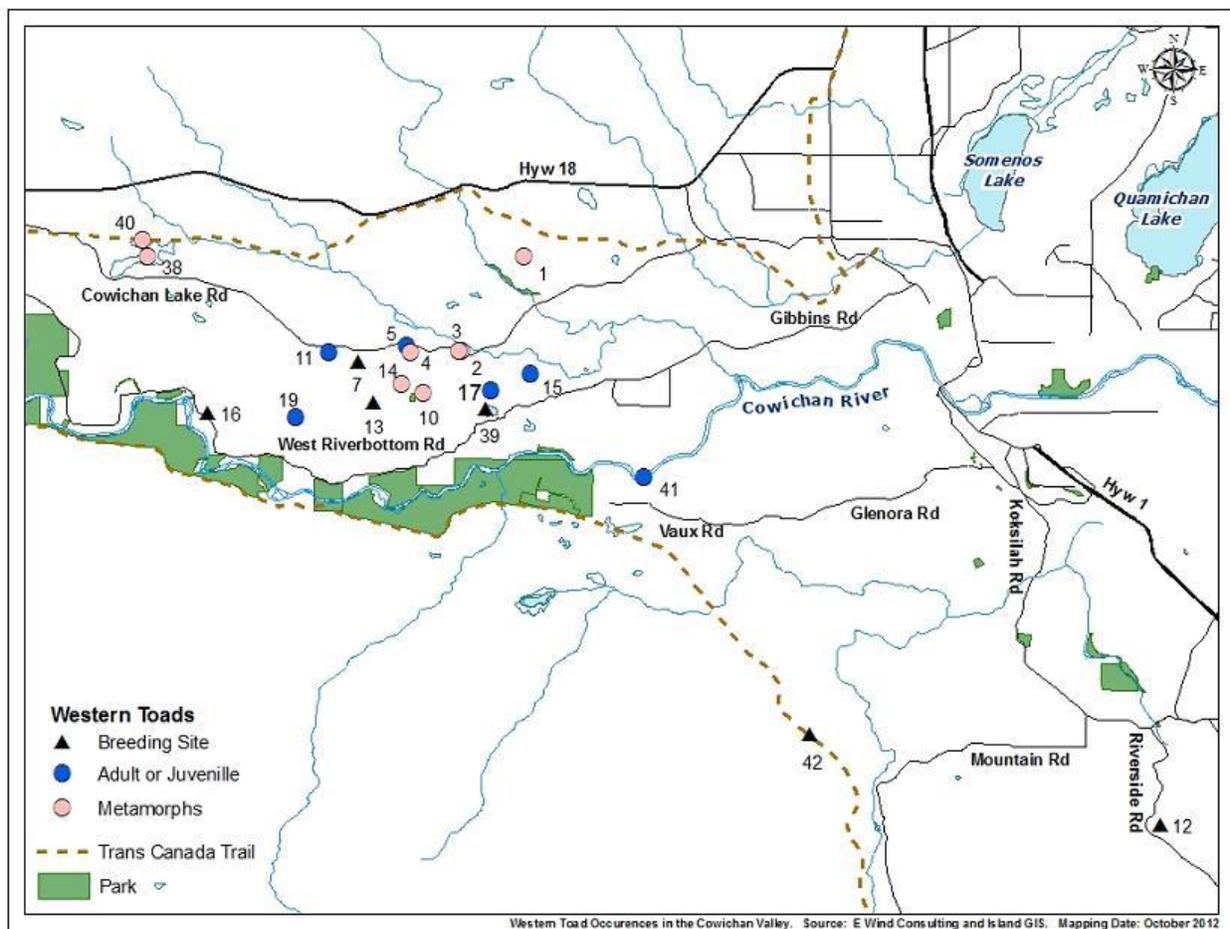


Figure 3. Western Toad sightings for the Cowichan Valley, including six confirmed breeding sites, general observation locations, and mass metamorph dispersal sites (e.g., road and trail crossings).

### 3.2 Identify and Summarize Information about Known Road Mortality Sites

In addition to information about breeding sites, numerous people told us about adult or juvenile toads or congregations of dispersing toadlets they had seen on their property or on roads and trails in the Duncan area. These locations were scattered throughout the area (Fig. 3) suggesting that toadlets may move (disperse) hundreds of metres from breeding sites and/or that more toad breeding sites occur in the area.

There are a number of known breeding sites on Vancouver Island and on the mainland that have active road crossing mitigation measures in place. Based on provincial records at the CDC, the COSEWIC status report and recent observations submitted to the authors, known Western Toad road crossing sites in BC are presented in Table 1.

Table 1. Known Western Toad Road Crossing Areas on Vancouver Island and the Mainland of BC.

Geographic Location	Closest Community	Site / Roads	Current Mitigation
Vancouver Island	Sooke	Sooke Mainline and MacDonald Mainline at Deception Reservoir (southwest end of Sooke Lake)	Road closure on Sooke Mainline
	Duncan	Riverbottom Road and Barnjum Road at Wake Lake	Volunteer manual capture and movement; public education
		3988 Riverside Road (dugout on private property)	Volunteer manual capture and movement
	Nanaimo	1092 Spruston Road (metamorphs move through Mountaineer Campground)	None
	Port Alberni	5000 Katherine Drive (metamorphs come from various directions)	None
	Courtenay	Highway 19 south of Hamm Road (Keddy Swamp)	Directive fencing and culverts / wildlife underpasses
		Highway 19 north of Pup Creek	Directive fencing and culverts / wildlife underpasses
	Merville	Railway Avenue west of Merville wetland	None
	Gold River	Logging road MU-55 west of Muchalat Lake	None
Lower Mainland	Chilliwack	Ryder Lake Road, Ryder Lake (Fraser Valley Conservancy)	Selective road closures on Elk View and Ryder Lake Road
	Langley	East of Allard Crescent, Derby Reach Regional Park (Vancouver Metro Regional Parks)	Volunteer manual capture and movement; public education
Mainland	Whistler	Lost Lake park – toadlets killed on trails and in parking lot	Temporary, mobile directive fencing across trails; public education
	Prince George	Forests for the World park – toadlets killed on trails	None
	Nakusp	Highway 6 at Summit Lake	Directive fencing and underpasses; manual capture and movement across highway; public education

### 3.3 Mitigate Road Impacts on Dispersing Toad Metamorphs at Wake Lake

On the day that the fencing was installed, a local television station ran a story on the evening news about the toadlet dispersal and rescue efforts<sup>1</sup>.

Trapping and manual movements of toadlets occurred for approximately two weeks and then the traps were closed for the season. Approximately 300,000 toadlets were moved across Barnjum and Riverbottom Road at Wake Lake in 2012. Approximately 50,000 were moved across Riverside Road in

<sup>1</sup> Media coverage: [http://www.youtube.com/watch?v=\\_RMog3FI764](http://www.youtube.com/watch?v=_RMog3FI764)

Duncan as well between Aug. 2 and 12<sup>th</sup> (by Kent Ball and his volunteer network<sup>2</sup>). The effort at Wake Lake included: approximately \$3000 in equipment and supervisor costs (some of which were reused from 2011 and were donated), over 40 volunteers, and over 300 person-hours devoted to trap installation and trap checking.

#### 4. DISCUSSION AND RECOMMENDATIONS

Surveys of aquatic habitats on Vancouver Island suggest that Western Toad breeding sites are relatively rare compared to other native amphibian species, and that lakes are often used as breeding sites. Unlike mainland populations, toads on the island appear to rarely exploit smaller water bodies and ephemeral aquatic sites (Wind, E. pers. obs.). As in other areas, Western Toads appear to be patchily distributed on the island, being uncommon over large areas but relatively abundant in areas where they do occur and breed (Wind and Dupuis 2002). The areas around Wake Lake in Duncan and north of Courtenay (Merville) may be hot spots for toads on the island as numerous breeding sites appear to occur in those areas. Interestingly, both of these locations have similar landscapes in that they have gently rolling topography, they contain a matrix of terrestrial habitats (agricultural fields, pasture, and forest cover), and numerous artificial water bodies (e.g., dugouts, mined peat bogs). The presence of these water bodies may artificially inflate the number / density of toad breeding sites in those areas.

We were able to identify numerous new toad breeding sites and road crossing locations in the Duncan area by working with a local community, soliciting volunteers, obtaining media coverage about our project(s) and issues toad populations face, and through a public presentation. This approach has resulted in high public and local government support and a cost-effective means of obtaining toad locality information. In an area such as Duncan, where the non-native and invasive American Bullfrog (*Lithobates catesbeianus*) is common, it is critical that information be passed along to the public about Western Toads to reduce the likelihood that the latter might be confused with the former and indiscriminately killed. This multi-pronged approach would be an effective conservation approach for other toad hot spot locations on the island.

The following recommendations would provide valuable information towards the management and conservation of Western Toads on Vancouver Island and elsewhere in BC:

- Confirm breeding sites
  - Anecdotal and historic toad locality records need repeat surveys to confirm (continued) breeding.
  - Consider prioritizing areas for surveys and conservation that may be toad hot spots such as the Cowichan Valley and Courtenay / Merville area, which may have a greater potential for long-term persistence.
- Determine land ownership
  - The land ownership of confirmed toad breeding sites needs to be identified to determine where potential WHA may be placed and what management actions can be taken (e.g., creation of preserves or covenants placed on land).
- Investigate road mortality sites

---

<sup>2</sup> Media coverage:

<http://www.timescolonist.com/When+tiny+toads+roads+rescuers+make+crossing+safer/6986311/story.html>

- Known road mortality sites need to move beyond volunteer projects that manually move toadlets across roads to understand impacts to adults and to the overall long-term persistence of the population.
- Determine whether mitigation is possible where crossings occur (e.g., via the installation of wildlife underpasses). Some road surface locations are not conducive to underpasses or directive fencing (e.g., insufficient road depth).

## 5. REFERENCES

- Fyfe, L. and E. Wind. 2008. Emergency Response and Mitigation Measures for Two Western Toad Migrations along Highway 19 near Courtenay, British Columbia. Report prepared for the BC Ministry of Transportation. Victoria, BC.
- Provincial Western Toad Working Group. 2012. Management Plan for the Western Toad (*Anaxyrus boreas*; formerly *Bufo boreas*) in British Columbia. Prepared for the B.C. Ministry of Environment, Victoria, BC. XX pp.
- Willmott, T. and S. Willmott. 2011. Western Toad Migration Road Mitigation Project – Wake Lake, Duncan, BC. Report prepared for the BC Ministry of Transportation and Infrastructure. Victoria, BC.
- Wind, E., and L.A. Dupuis. 2002. Status Report on the Western Toad, *Bufo boreas*, in Canada. Report written for the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), Canadian Wildlife Service, Environment Canada. Ottawa, ON.

## **6. APPENDIX**

*See Excel file for database associated with locality records.*