FEATURE ARTICLES

Western Skink in Southeastern British Columbia

Jakob Dulisse

410 Second Street, Nelson, BC. V1L 2L3

Abstract

An inventory and habitat assessment for the "Blue-listed" Western Skink *(Eumeces skiltonianus)* was conducted in the West and East Kootenay regions of British Columbia during 2004 and 2005. Western Skinks were located at 41 out of 91 sites surveyed. Data collected from other sources confirmed skinks at another 86 locations in the West Kootenay, making a total of 127 known occupied sites. The easternmost records were from the Creston valley, and skinks were confirmed at several locations northward along Kootenay Lake as far north as Pilot Bay and Ainsworth. Vallican remains the northernmost confirmed Western Skink location in the Slocan valley, but the species may occur at New Denver and Rosebery. Western Skinks are relatively common from Syringa Park, south along the Columbia River valley to the United States border and throughout the Pend d'Oreille River valley. At occupied sites, Western Skinks were the most commonly encountered reptile and they often co-occurred with Northern Alligator Lizards (*Elgaria coerulea*) and Northern Rubber Boas (*Charina bottae*). Skinks were located primarily in low elevation dry forest and mixed grassland habitat. Important habitat components included sites with low crown closure, warm aspects, loose soil substrates, and an abundance of cover objects, such as rocks with nearby grasses, shrubs or woody debris. The conservation of skink habitat is especially important considering the patchiness of suitable sites in many areas and the species' apparent lack of ability to move between habitats. Loss of habitat through development activities and forest ingrowth are probably the primary threats to the Western Skink in the study area.

Introduction

Currently, the Western Skink (Figure 1) is listed as a species of Special Concern by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC 2003) and is Blue-listed (vulnerable or sensitive) by the British Columbia Conservation Data Centre (Conservation Data Centre 2004) because it is thought to have characteristics that make it particularly sensitive to human activities or natural events (Ovaska and Engelstoft 2002).

In British Columbia, the Western Skink occurs in valley bottoms and dry lower slopes of south-central and east-central parts of the province (Gregory and Campbell 1984), including the Kootenay River valley (Creston and west), the Lower Arrow Lake and Columbia River valley south of Castlegar, and Okanagan-Boundary north to Salmon Arm. In 2004, an inventory was initiated to determine the distribution and habitat associations of the Western Skink in southeastern British Columbia.

Figure 1. Like many secretive reptiles in British Columbia, the Western Skink poses challenging issues for biologists studying its life history. Wallack Creek, BC. 15 June 2006 (Jakob Dulisse). BC Photo 3455.

Study Area

Surveys were limited to lower elevation (below 1,100 m), drier, open forest types because these sites were thought to have the greatest potential. Drier sites within the following Biogeoclimatic Ecosystem Classification (BEC) subzones (Braumandl and Curran 1992) were sampled: Dry Warm Interior

Cedar-Hemlock (ICHdw), Very Dry Warm Interior Cedar-Hemlock (ICHxw), Moist Warm Interior Cedar-Hemlock (ICHmw2), Wet Cool Interior Cedar-Hemlock (ICHwk), Dry Mild Interior Douglas-fir (IDFdm2), Undifferentiated Interior Douglas-fir (IDFun), and Dry Hot Ponderosa Pine Variant (PPdh2). (Refer to Braumandl and Curran (1992) and Dulisse (2004a) for detailed descriptions of these forest types.) See Table 1 for a list of survey sites by BEC subzones.

Methods

In summers of 2004 and 2005 a total of 91 potential sites were surveyed for the presence of Western Skinks (Figure 2). In addition to these surveyed locations, data were collected from other herpetological surveys (*e.g.,* Merilees 1981, Rutherford and Gregory 2001, Schaeffer et al. 2002) and public sightings were solicited through word of mouth, and by placing "wanted" posters throughout the region. In 2005, extra survey effort was targetted near the edge of the known range for the species in the Riondel, Grey Creek, Ainsworth, Balfour, Winlaw, Slocan, and New Denver areas.

Surveys were conducted at each site by foot and cover objects (*e.g.,* rocks and woody debris) were turned over and potential escape shrubs investigated for lizard presence. At each site, habitat data were collected. Over the duration of the project, a total of 7,751 person minutes were spent searching and 29,426 cover objects were investigated.

Results

Distribution

A total of 218 Western Skink observations were made at 41 sites. Individual skinks observed included five eggs (all found in one active nest; Figure 3), 12 young of the year, 12 juveniles, 28 subadults, 44 adults (Figure 4) including two carcasses, and 116 exuvia (shed skins).

Data used to map Western Skink distribution came from three sources:

1) 2004 and 2005 surveys;
2) other herpetological surveys in the area; and
3) reported sightings from members of the public, colleagues, and friends (Table 1).

Reported sightings were accepted if they were received from a reliable source (*e.g.,* professional biologist or naturalist), or were particularly convincing (*e.g.,* observer saw bright blue tail of skink) and within the known range of the Western Skink. Unconfirmed but convincing records outside the suspected range of the skink are included in Figure 2.

Western Skinks were located at 19 of 40 (47.5%) sites visited in 2004 and 22 of 59 (37.3%) sites visited in 2005. Overall, skinks were located at 41 of 97 (42.3%) sites visited over the two seasons. An additional 18 sites were gathered from a historic publication (Merilees 1981) and recent public

Table 1. Summary of Western Skink records by source and Biogeoclimatic Ecosystem Classification subzone.

	ICHdw	ICHxw	IDFun	ICHmw2	ICHwk	IDFdm2	PPdh2	**Total**
Number of sites sampled (2004-2005)	74	9	1	6	2	4	1	**97**
Number of sites with skinks								
This survey (2004-2005)	31	9	1					**41**
Other herpetological surveys[1]	9	32	3					**44**
Reported sightings[2]	24	16		1		1		**42**
Total	**64**	**57**	**4**	**1**	**0**	**1**	**0**	**127**

[1] Dulisse 2004b; Rutherford and Gregory 2001; Schaeffer et al. 2002; Merilees 1981.
[2] See Acknowledgements for a list of people who contributed to this survey.

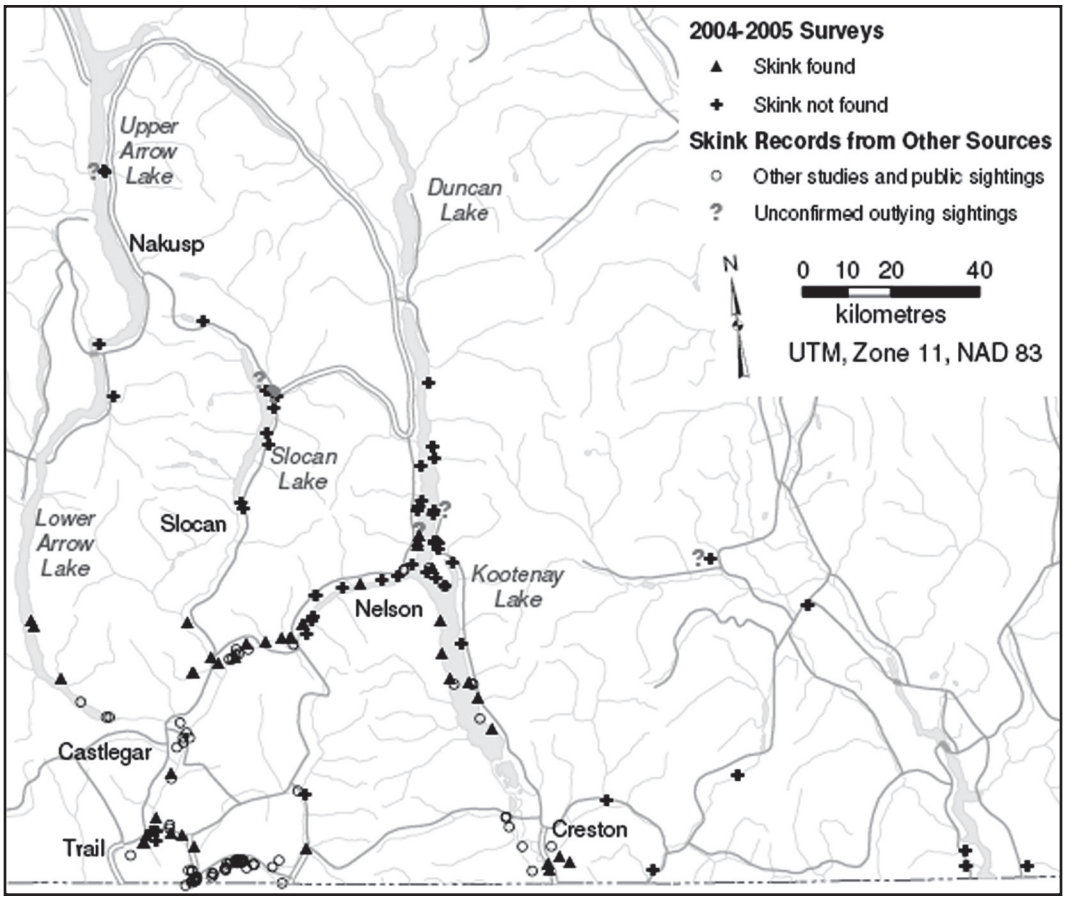

Figure 2. Location of all sites surveyed for Western Skinks in 2004 and 2005, and records from other sources, in the West and East Kootenay regions of British Columbia.

Figure 3. Western Skink at nest with five eggs discovered in South Slocan, BC. on 29 June 2005 (Jakob Dulisse). BC Photo 3456.

sightings make a total of 127 known Western Skink locations in the Kootenay region study area.

The easternmost skink records were in east Creston (see back cover) and the species was confirmed north along the east shore of Kootenay Lake from Creston to Pilot Bay Park (Figure 2). Along the west shore of Kootenay Lake, skinks were recorded at three locations along a 14 km stretch from Drewry Point Park to a site just north of Heather Creek. Skinks were found at only two locations along the West Arm of Kootenay Lake and at an additional three sites in the Coffee Creek/Ainsworth area. Skinks were confirmed at two areas near Coffee Creek and above the highway approximately 750 m south of Ainsworth, the northernmost confirmed occupied site on the west side of Kootenay Lake. Merilees (1981) reports a 1944 skink sighting from the "n*orth shore, Nelson B.C.*" and a 1945 sighting at Queen's Bay, but the precise locality data have been

Figure 4. The crisp longitudinal light body stripes and the bright blue tail help identify adult and young Western Skinks. Beaver Creek Park, BC. 25 August 1999 (Jakob Dulisse). BC Photo 3457.

lost. I received a convincing anecdotal report of a Western Skink sighting from the 1950s at Queen's Bay, so the species likely occurred in these areas but it is not known if these populations persist. Extensive residential development along the West Arm of Kootenay Lake may have reduced occupied skink habitat into isolated patches.

In the Slocan valley, skinks were found as far north as Vallican, near the confluence of the Slocan and Little Slocan Rivers. Despite the investigation of convincing sighting reports from the Slocan City, New Denver (Merilees 1981), and Rosebery areas (Merilees 1981), I was unable to confirm the presence of the species at these locations. Forest ingrowth is probably a problem for the species here, and one of the recent New Denver sightings involved domestic cat predation so this may be an additional threat.

Skinks were reported in the Castlegar area on the north and south sides of the Columbia River, down the river valley on the north side of the river to Trail (Figure 5). South of Trail, there were skink records on either side of the Columbia to the United States border and they were common throughout the Pend d'Oreille Valley (Dulisse 2004b). These areas represent the "core" habitat of the species in the Kootenay region.

In 2004, five East Kootenay sites were surveyed without success (Figure 2) and one site (Kimberley Nature Park) was visited in 2005. The Northern Alligator Lizard was found to occur at this site, which represents an extension of the known range

Figure 5. A young Western Skink, with its brightly-coloured blue tail, helps with locating this small lizard. Trail, BC. 31 August 2005 (Jakob Dulisse). BC Photo 3458.

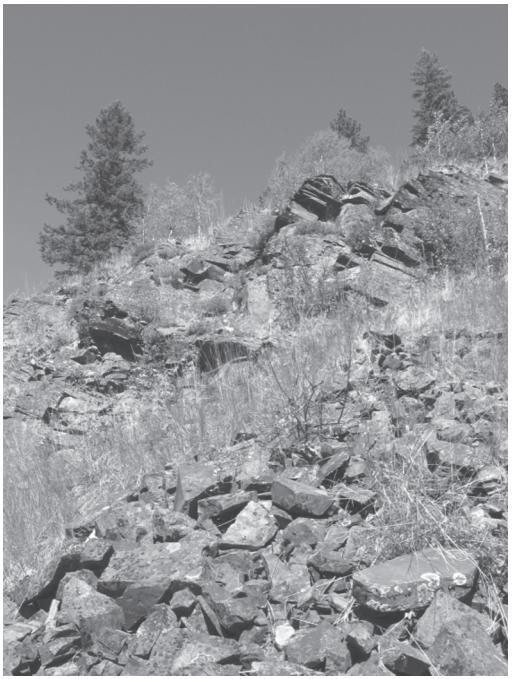

Figure 6. In British Columbia, the Western Skink frequents lightly wooded and shrubby habitats with escape cover often consisting of rocks and fallen logs. Fort Shepherd, BC. 26 August 2005 (Jakob Dulisse). BC Photo 3459.

for this species.

I have collected seven unconfirmed, extralimital records at the following locations: south end of Slocan Lake, New Denver, Rosebery, Halfway River, Ainsworth, and Riondel.

Habitat Characteristics

All confirmed skink sites to date are located within the ICHdw, IDFun and ICHxw BEC subzones (Table 1). These subzones represent the hottest and driest forest types in our area and skinks are probably largely limited to these habitats.

Western Skinks arguably have very narrow habitat requirements compared to other reptile species in the study area. Skinks were found to be patchily distributed in warm, dry, open, sparsely treed habitat with high levels of solar insolation, loose soil, and abundant escape cover (Figure 6). Usually, rocks are loosely embedded in the substrate.

Solar Exposure

Incident solar radiation (termed solar insolation) at a given site is correlated with and increases with southerly aspects (D'Eon and Serrouya 2005) and increasing slope (Mowat et al. 2002). Although solar insolation was not measured directly, site aspect and slope were measured. In order to benefit skinks, solar radiation must reach the ground and be reflected, so crown closure will influence reflected solar insolation (*i.e.,* reduced crown closure will increase direct and reflected solar insolation). In general, sample sites tended to be on warm aspects, steep terrain and locations with low crown closure (Table 2).

All occupied sites were located on warm aspects,

ranging from 120 to 285 degrees azimuth with a mean of 190.7 degrees while the orientation of unoccupied sites had a greater range from 65 to 280 and similar mean aspect 218.0 degrees (Table 2). Occupied sites and unoccupied sites were similarly steep (62.1 vs 65.7%; Table 2). Most occupied sites were located on steep terrain. The mean percent slope of occupied sites was 62.1 compared to 65.7 at sites with no skinks so the preference for steep slopes may be a sampling bias (Table 2).

Typically, crown closure on occupied sites was low, with a mean of 7%, and did not differ significantly from crown closure at sites with no skinks, which had a mean value of 9% (Table 2).

Cover Objects

Almost all (213 out of 218) Western Skink observations (including exuvia) were made under cover objects, usually rocks (n=212). This is typical of this very secretive species (Tanner 1957) and is probably in response to predation pressures.

Loose rocks were present at 98% of occupied sites (see Figure 6) and coarse woody debris was present at 46% of occupied sites (Table 2). The most common cover objects were rocks, especially exposed medium to large sized, flat colluvial debris lying on loose soil and frequently associated with upslope bedrock formations. Skink burrows were frequently observed directly under the rocks and in the surrounding soil. Deeply embedded rocks were not used, probably because of reduced access and excavation opportunities underneath. Also, rocks with thick layers of moss and/or lichen were not used, perhaps because this affects the ability of the rock to absorb and reflect solar radiation. Many ant colonies were observed during this survey and skinks were never found under the same rock as ants. Skinks were always found singly under a cover object; they do not appear to frequently share the use of a cover rock with other skinks or other species.

Table 2. Summary statistics for sites with Western Skinks and sites where no skinks were found (2004-2005).

Variable of Interest	Sites with Skinks	No Skinks Found
Total number of sites sampled	41	56
Number of cover objects investigated	13,033	16,393
Number of minutes searched	3,809	3,942
Elevation range (m)	450-1050	420-1250
Mean percent slope (s.d.)	62.1 (24.1)	65.7 (21.5)
Mean aspect[1] (s.d.)	190.7 (45.4)	218.0 (49.6)
Mean percent crown closure (s.d.)	7.0 (4.5)	9.0 (5.3)
Number of sites with bedrock present	38	50
Number of sites with loose rock present	40	53
Number of sites with coarse woody debris present	19	32
Number of sites with invasive plants present	31	41
Number of Western Skinks detected	218	0
Northern Alligator Lizards detected (no. of sites)	73 (27)	178 (36)
Garter snakes (*Thamnophis* spp.) detected[2] (no. of sites)	28 (12)	58 (21)
Rubber Boas detected (no. of sites)	27 (17)	4 (3)
Racers detected (no. of sites)	8 (3)	0

[1] Using Oriana software to analyse circular data.

[2] It was not possible to identify garter snake exuvia to the species level.

Invasive Plants

Thirty-one out of 41 (76%) sites occupied by Western Skinks had significant amounts of non-native plants present (Table 2), especially spotted knapweed (*Centaurea maculosa*). Other invasive plant species noted at survey sites included St. John's wort (*Hypericum perforatum*), Scotch broom (*Cytisus scoparius*), clover (*Melilotus* spp.), cheatgrass (*Bromus tectorum*), diffuse knapweed (*Centaurea diffusa*), Dalmatian toadflax (*Linaria dalmatica*), great mullein (*Verbascum thapsus*), sulphur cinquefoil (*Potentilla recta*), and hound's-tongue (*Cynoglossum officinale)*.

Co-occurrence with Other Reptiles

At the 41 sites where Western Skink was found, the species co-occurred with Northern Alligator Lizard at 27 (66%) sites, Rubber Boa at 17 (42%) sites, garter snake (*Thamnophis* spp.) at 12 (29%), and Western Racer (*Coluber constrictor*) at three (7%) (Table 2). Overall, the rate of Western Skink/ Northern Alligator Lizard co-occurrence from this study was comparable to what Rutherford and Gregory (2001) found in Creston, where the two species co-occurred at 70% (n=10) of sites they studied.

At the 41 sites were they were found, Western Skink was the most commonly encountered reptile at 32 (78%) sites. Overall, the Western Skink was the most commonly encountered reptile during this survey. A total of 218 Western Skinks were observed compared to 73 Northern Alligator Lizards, 28 garter snakes, 27 Rubber Boas, and eight Western Racers (note: these observations include exuvia). This differs markedly with the results of Rutherford and Gregory (2001), who captured Western Skinks more frequently than Northern Alligator Lizards at only one out of 10 sites (The two lizard species seem to be similarly detectable and a single survey methodology is effective in detecting both species).

The Western Racer (provincially Blue-listed and listed as Special Concern by COSEWIC) often co-occurs with the Western Skink in the Trail, Waneta and Pend d'Oreille Valley areas. The Rubber Boa has been down-listed from the provincial Conservation Data Centre Blue-list but remains federally listed as Special Concern by COSEWIC. The high rate of co-occurrence of Western Skink with Western Racers (only in the areas mentioned) and Rubber Boa in the same areas throughout the study area presents an opportunity to simultaneously study and address the habitat conservation needs of three reptile species at risk.

Discussion

Direct Habitat Loss

Although the Western Skink is relatively tolerant of human presence, the main threat to the species province-wide is thought to be loss of habitat due to urban and agricultural development (Dupuis and Ramsay 2003), especially in the Okanagan valley. The range of the skink in British Columbia overlaps with much of the densest human population in the province. Much of this habitat is privately owned and therefore subject to development pressures (Ovaska and Engelstoft 2002). Residential and industrial development within skink habitat will likely become more of a problem within the Kootenays, where increasing development will have direct impacts on habitat availability. For example, the Brilliant dam expansion project has impacted occupation sites. Skink habitat along the West Arm of Kootenay Lake from Nelson to Queen's Bay has almost certainly been impacted by extensive residential development along this corridor and it is likely that the species has been extirpated from many historically occupied sites. Removal of rock and gravel for construction may also have an impact at some sites (Ovaska and Engelstoft 2002).

Habitat Islands

Occupied skink habitats appear to be fragmented, both naturally and due to human activities (Figure 7). This habitat patchiness and fragmentation probably limits lizard movements between suitable sites and may decrease or prevent the establishment of populations in new areas or the recolonisation of previously occupied sites. These metapopulation factors may be important, especially considering the species' apparent poor dispersal ability. Global warming may also affect future metapopulation processes; the northern limit of habitat suitability may shift north with climate change (but forest ingrowth may counteract this effect; see following discussion).

Figure 7. Road and highway construction may contribute to patchiness and fragmentation of Western Skink habitat in British Columbia. Near Ainsworth, BC. 12 September 2005 (Jakob Dulisse). BC Photo 3460.

Invasive Plants

Where food is plentiful, retreat site availability may limit a lizard's local abundance (Bustard 1970 *in* Gregory and Rutherford 2001). Because vegetation cover is very important for foraging skinks to avoid predation, invasive plants have likely reduced the habitat quality for skinks in many areas. This occurs when dense native vegetation such as pinegrass (*Calamagrostis rubescens*) is displaced by non-native, less densely growing species such as spotted knapweed and Dalmatian toadflax. The resulting ground cover is significantly decreased, which may affect skink movement and habitat.

Cover Disturbance

Because the availability of retreat sites may affect local lizard abundance, the removal of cover objects such as rocks at occupied sites probably impacts skinks at some locations near hiking trails (*e.g.,* Pulpit Rock), and other recreation sites such as beaches or cliffs above water where loose surface rocks are often moved or removed. Also, in some areas, talus deposits are mined for highway construction and other development - if this occurs in skink habitat, it would likely affect the species negatively.

Power line right-of-ways that are periodically brushed for vegetation control, which likely results in some ground disturbance but also prevents forest and shrub encroachment, so there may be an overall benefit for the skinks.

Direct Mortality

Several observers in rural/residential settings commented that pets (cats and dogs) frequently attack skinks. It is unknown to what extent this predation affects local skink populations but it may have an impact in isolated habitat patches, especially given the relatively low reproductive capacity of the species and the localised nature of its occurrence.

Unlike many other reptile species, the Western Skink does not appear to be susceptible to road mortality. The extremely secretive nature and relatively short distance movements of the species ensure that it rarely ventures on to road surfaces (pers. obs.). Also, because it occurs in very open habitat (as long as cover objects are available), with ample basking opportunities, it may not be attracted to road surfaces as a heat source.

Forest Ingrowth

Fire suppression in dry forest types is probably negatively impacting the Western Skink as open areas with high reflected solar insolation decline in area and number. Although fire probably causes some direct mortality to some skinks, it may enhance skink habitat in some areas.

ICHdw is classified as a Natural Disturbance Type 3 (NDT3) forest and ICHxw and IDFun are classified as Natural Disturbance Type 4 (NDT4) (Parminter 1995). Historically, NDT4 and dry NTD3 forests would have experienced frequent stand-initiating and stand-maintaining wildfires, which would have maintained the relatively open stand structures typical of these ecosystems. Fire suppression over the last century has greatly reduced the frequency of these events, resulting in changes in forest structure (*e.g.,* increased density of shrubs and increased crown closure) and species composition. These changes have decreased the value of these forests to wildlife adapted to live in these habitats.

For example, near the northernmost range limit of Western Skinks along the east shore of Kootenay Lake, fire suppression has impacted wildlife habitat on Pilot Peninsula. The air photos in Figure 8 illustrate the dramatic increase in crown closure at the southern tip of Pilot Peninsula from 1945 through

to 2004. This forest ingrowth has almost certainly decreased the habitat quality and availability for the Western Skink in this area. It is not known if the forest openings present in 1945 are natural or anthropogenic, but the area of suitable skink habitat was likely much greater than it is today.

It is important to note that these changes are occurring throughout the drier forests of the study area and are negatively impacting the habitat quality for Western Skinks and many other species associated with fire-maintained ecosystems. These changes in habitat may be especially important for species near their geographic range limits.

Acknowledgements

The Fish and Wildlife Compensation Program (www.fwcp.ca) funded this research. John Krebs and Juliet Craig administered the project and reviewed drafts of this report. This project would not have been possible without contributions from following individuals: Trevor Allegretto, Ted Antifeau, Marc-André Beaucher, Nico Becker, Sandra Bernier, Charmaine Campbell, Jason Carter, Anne Champagne, Ross Clarke, Stewart Clow, Tola Coopper, Gail Coopper, Juliet Craig, Lance Delport, Katherine Enns, Kent Goodwin, Alan Grant, Steve Gritchen, John Gwilliam, Brenda Herbison, Thomas Hill, Shaun Hills, Steve Hilts, Rachel Holt, Colleen Hughes, Karen Huxley, John Krebs, Susan Kurtz, Gabrielle Liddle, Rene and Marcel Linot, Heath Lockhurst, Marlene Machmer, Erica Mallam, Derek Marcoux, Liz Mayer, Loree McArthur, Maryanne McDonough, Bill Merilees, Don Miller, Steve Ogle, Penny Ohanjanian, Elaine Overton, Peter Paulson, Debbie, Brian and Jake Phelan, Adam Prisciak, Aaron Reid, Ted Ryan, Margo Saunders, Rob Serrouya, Kevin Smith, Patrick Stent, Gina Stewart, Paul Temple, Erika Tigichallr, Erik Treijs, Rebecca Whidden, and Andy Wight. GIS support was provided by Amy Waterhouse and Mark Schnider of the Fish and Wildlife Compensation Program.

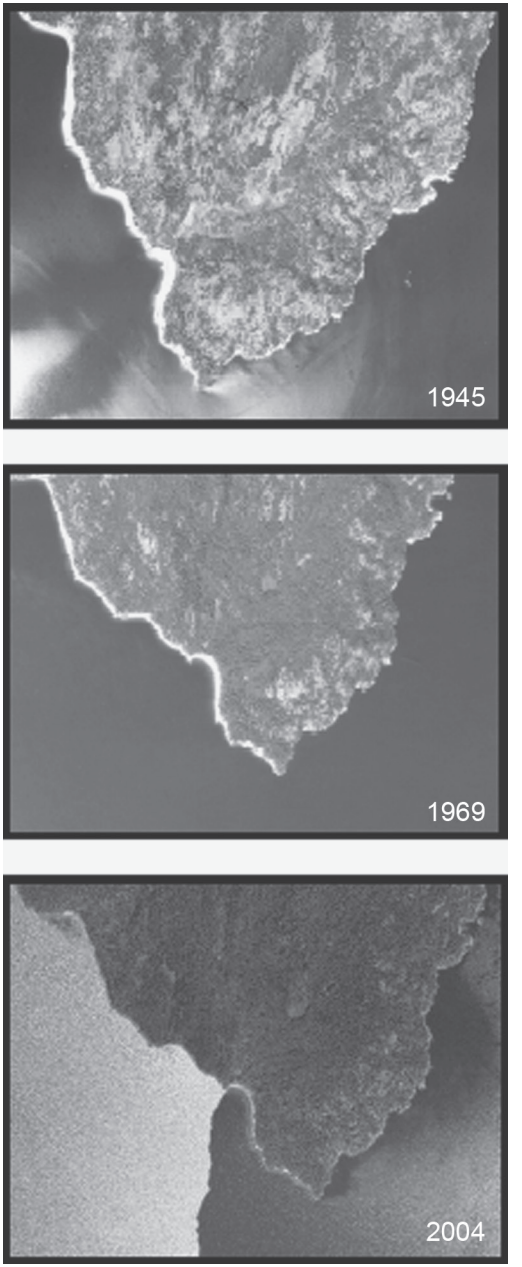

Figure 8. Forest ingrowth at Pilot Peninsula, BC. 1945-2004.

Literature Cited

Braumandl, T.F., and M.P. Curran. 1992. A field guide for site identification and interpretation for the Nelson Forest region., British Columbia Ministry of Forests Research Branch Report, Victoria, BC.

British Columbia Conservation Data Centre [CDC]. 2004. (http://srmwww.gov.bc.ca/cdc/).

Bustard, H.R. 1970. The population ecology of the Australian Gekkonid Lizard *Heteronotia binoei* in an exploited forest. Journal of Zoology 162:31-42.

Committee on the Status of Endangered Wildlife in Canada [COSEWIC]. 2003. List of Canadian Species at Risk. Ottawa, ON.

D'Eon, R.G., and R. Serrouya. 2005. Mule Deer seasonal movements and multi-scale resource selection using GPS radiotelemetry. Journal of Mammalogy 86:736-744.

Dulisse, J. 2004a. Columbia Basin Western Skink (*Eumeces skiltonianus skiltonianus*) survey and assessment: 2004 results. Columbia Basin Fish and Wildlife Compensation Program Report, Nelson, BC.

Dulisse, J. 2004b. Racer (*Coluber constrictor mormon*) survey of the Pend d'Oreille Valley. Columbia Basin Fish and Wildlife Compensation Program Report, Nelson, BC.

Dupuis, L., and L. Ramsay. 2003. British Columbia Conservation Data Centre: 2003 Conservation status report: Western Skink, *Eumeces skiltonianus*. Victoria, BC.

Gregory, P.T., and R.W. Campbell. 1984. The reptiles of British Columbia. British Columbia Provincial Museum Handbook 44, Victoria, BC. 103 pp.

Merilees, W.J. 1981. Notes on the distribution of the Western Skink in the west Kootenay region of British Columbia. Discovery (Vancouver Natural History Society) 10:50-52.

Mowat, K.G., Poole, R. D'Eon, and J. Wierzchowwski. 2002. West Kootenay ungulate winter range – pilot mapping exercise. Arrow Innovative Forest Practices Agreement Unpublished Report, Nelson, BC.

Ovaska, K.E., and C. Engelstoft. 2002. Committee on the Status of Endangered Wildlife in Canada status report on the Western Skink *Eumeces skiltonianus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa, ON.

Parminter, J. 1995. Biodiversity guidebook - Forest Practices Code of British Columbia. British Columbia. Ministry of Forests and British Columbia Ministry of Environment, Victoria, BC.

Rutherford, P.L., and P.T. Gregory. 2001. Habitat use and movement patterns of Northern Alligator Lizards (*Elgaria coerulea principis*) and Western Skinks (*Eumeces skiltonianus skiltonianus*) in southeastern British Columbia. Columbia Basin Fish and Wildlife Compensation Program Report, Nelson, BC.

Schaeffer, L., L. Datchkoff, S. Bennett and M. Sarell. 2002. Biodiversity inventory within the ICHxw at Fort Shepherd. Columbia Basin Fish and Wildlife Compensation Program Report, Nelson, BC.

Tanner, W.W. 1957. A taxonomic and ecological study of the Western Skink. Great Basin Naturalist 17:59-94.

About the Author

Jakob (Figure 9) is a wildlife biologist and nature photographer with a special interest in rare and lesser known fauna including spiders, reptiles and owls. A childhood spent catching snakes and frogs in the Nelson area led to a biology degree at the University of Victoria and an internship with the United States National Biological Service in Hawaii, studying endangered honeycreepers on the island of Maui. In 1996, Jakob returned to the Kootenays to start a career in wildlife research and began to seriously pursue his interest in photography.

Currently, Jakob operates his own biological consulting business and his photographic client base has grown to include Canadian Geographic, BBC [British Broadcasting Corporation] Wildlife Magazine, and British Columbia Magazine. His web page can be visited at www.JakobDulisse.com

Figure 9. Biologist Jakob Dulisse holding three adult Rubber Boas found during field work in the Pend d'Oreille valley, BC. 24 May 2006 (Patrick Stent). BC Photo 3461.