

COSEWIC
Status Appraisal Summary

on the

Northern Leopard Frog
Lithobates pipiens

Rocky Mountain population

in Canada

ENDANGERED
2021

COSEWIC
Committee on the Status
of Endangered Wildlife
in Canada



COSEPAC
Comité sur la situation
des espèces en péril
au Canada

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Production note:

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COSEWIC Assessment Summary

Assessment Summary – November 2021

Common name

Northern Leopard Frog - Rocky Mountain population

Scientific name

Lithobates pipiens

Status

Endangered

Reason for designation

The Canadian distribution of this frog is restricted to a small area of south-central British Columbia, where a single natural population exists within the Creston Valley Wildlife Management Area. Since the previous assessment, increased search efforts have extended the frog's known range by approximately 1.5–2.5 km. Habitat restoration and seasonal road closures have been undertaken to mitigate threats. Reintroductions have continued at two sites (Upper Kootenay Floodplain and Columbia Marshes) but are not yet self-sustaining. Restricted range and small population size (estimated at fewer than 50 mature individuals), together with declining habitat quality and ongoing cumulative high impact threats from disease, introduced American Bullfrogs, and road mortality, contributed to the retention of Endangered status.

Occurrence

British Columbia

Status history

Designated Endangered in April 1998. Status re-examined and confirmed in May 2000, in April 2009, and in December 2021.



COSEWIC Status Appraisal Summary

Northern Leopard Frog, Rocky Mountain population

Grenouille léopard du Nord, Population des Rocheuses

Lithobates pipiens

Range of occurrence in Canada (province/territory/ocean): British Columbia

SAS 6

Wildlife species:

Change in eligibility, taxonomy or designatable units:	yes <input type="checkbox"/> no <input checked="" type="checkbox"/>
<p>Explanation:</p> <p>No changes. The Rocky Mountain population is geographically disjunct and separated from other leopard frogs in Canada by barriers posed by the Rocky Mountains. The occurrence of the population in a different ecological setting and different Amphibian and Reptile Faunal Zone from those east of the Rocky Mountains provides strong inference of evolutionary significance. Available genetic information (mitochondrial haplotype frequency and genetic diversity based on microsatellite analysis) also supports the validity of this DU (see COSEWIC 2009 for summary). Genetic monitoring is currently underway by researchers at Laurentian University and the Calgary Zoo. The results are unavailable at the time of this assessment.</p>	

Range:

SAS 7	Change in Extent of Occurrence (EOO):	yes <input checked="" type="checkbox"/> no <input type="checkbox"/> unk <input type="checkbox"/>
SAS 8	Change in Index of Area of Occupancy (IAO):	yes <input checked="" type="checkbox"/> no <input type="checkbox"/> unk <input type="checkbox"/>
SAS 9	Change in number of known or inferred current locations ¹ :	yes <input type="checkbox"/> no <input checked="" type="checkbox"/> unk <input type="checkbox"/>
SAS 10	Significant new survey information:	yes <input checked="" type="checkbox"/> no <input type="checkbox"/>

Explanation:

Change in EOO and IAO

A single remnant population of Northern Leopard Frogs is located in the Creston Valley Wildlife Management Area (CVWMA; Figure 1). A reintroduction occurred in the CVWMA in the Corn Creek Marsh area in 2001–2005 but was unsuccessful (Adama and Beaucher 2006; ECCC 2017). Not including the latter, there are two reintroduction sites in British Columbia: in the Upper Kootenay Floodplain (Bummer's Flats in the 2009 status report) and in the Columbia Marshes near Brisco (Randall *et al.* 2016); see Figure 1 in ECCC (2017) for a map of these two sites and Figure 2 in Boucher (2019) for detailed maps of the CVWMA. The first phase of reintroductions in the Upper Kootenay Floodplain occurred in 2003–2005 and the second phase in 2011–2015, with over 35,000 juveniles released during these years (Ohanjanian 2018b). The Upper Kootenay Floodplain subpopulation was believed to be extirpated at the time of the 2009 status assessment report. Further reintroductions have occurred since the previous report but there have been no observations of adults since 2018, and no successful breeding since 2017, possibly because the pumps supplying water to the breeding site failed in 2017 (Ohanjanian 2018b).

Reintroductions have also occurred in the Columbia Marshes since the last assessment, with over 36,000 juveniles released from 2009 to 2020 (L. Randall unpubl. data). The reintroduced subpopulation in the Columbia Marshes does not appear to be self-sustaining as of May 2021. Neither of the above two

¹ See Definitions and Abbreviations on [COSEWIC website](#) and [IUCN](#) for more information on this term.

reintroductions are eligible for inclusion in the status assessment according to COSEWIC's manipulated populations guidelines because they are not self-sustaining.

In the previous status assessment (COSEWIC 2009), the EOO was reported as 322 km² and the IAO as 268 km², currently both are 56 km². However, the Upper Kootenay Floodplain and Corn Creek Marsh subpopulations, believed to be extirpated or not self-sustaining at that time, should not have been included in the original calculation (COSEWIC 2020). The current and recalculated historical EOO and IAO calculations presented here are based only on the CVWMA population. Because EOO cannot be smaller than the IAO, the EOO value was adjusted to match the IAO. The corrected EOO and IAO were 32 km² in 2009 and 56 km² in 2020. The known EOO and IAO have increased because the species is now known to be more widespread in the CVWMA than was previously thought. Some individuals have recently been observed in Six Mile Slough, approximately 1.5–2.5 km from the main breeding area in the CVWMA (McGlynn pers. comm. 2020). This area was previously not well surveyed due to lack of access and was not included in the 2009 assessment. Given the proximity of Six Mile Slough to the main breeding area, this is likely part of the same subpopulation. Individuals from both areas probably overwinter in the Kootenay River, which divides the two areas (McGlynn pers. comm. 2020). The increases in EOO and IAO reflect expanded search effort and not an actual increase in distribution.

Significant new survey information

Standard amphibian census techniques (i.e., nocturnal calling surveys, egg mass surveys, visual surveys, and mark-recapture surveys) occur annually in the CVWMA, primarily in the Duck Lake Nesting Area and Leach Lake. Additional surveys were conducted in 2019 and 2020 in the Six Mile Slough area of the CVWMA. These survey efforts are led by Fish and Wildlife Compensation Program (FWCP) biologists (Manley pers. comm. 2020).

Spring breeding call surveys and visual encounter surveys (VES) have occurred in the Upper Kootenay Floodplain and Columbia Marshes in all years of releases and continued for two years after releases in the Upper Kootenay Floodplain (Ohanjanian pers. comm. 2020). Since 2018, survey efforts in the Upper Kootenay Floodplain have been limited to the use of automated recording units (2019, n=11; 2020, n=6) and to habitat assessments, but no Northern Leopard Frogs have been detected (Ohanjanian pers. comm. 2020; Lea Randall unpubl. data). In 2020, additional habitat surveys were conducted near the Upper Kootenay Floodplain (n=5) and Columbia Marshes reintroduction sites (n=10), and 14 nocturnal calling surveys were conducted within 1.5 km of the release site in the Columbia Marshes. No Northern Leopard Frogs were observed on the habitat surveys, and no calling was detected; reintroduced young of year were observed only at the Columbia Marshes release site (McGlynn pers. comm. 2020). Since reintroductions began, a single breeding call was detected in 2017 and two overwintered frogs were detected in the Columbia Marshes in 2019, but there is no evidence of successful breeding; breeding calls were detected in the spring of 2021 but it is not known if that has resulted in successful breeding (Ohanjanian 2018a; Stanton and Randall 2019; L. Randall, unpubl. data). The Upper Kootenay Floodplain subpopulation is presumed to be extirpated, and breeding has not been detected in the Columbia Marshes. However, it is possible that undetected occurrences exist in these areas.

In the Kootenay region, systematic surveys for amphibians were conducted in 2005; at that time, there were no observations of Northern Leopard Frogs at any of the 11 historical or 46 other surveyed sites (Ohanjanian *et al.* 2006). Additional amphibian surveys (VES, complete wetland surveys at smaller, well-defined wetlands, larval (dipnet) surveys, and capture surveys) were conducted at 38 randomly selected and two non-randomly selected sites in 2008 and at 43 randomly selected sites in the West Kootenay region of the Fish and Wildlife Compensation Program (FWCP) project area in 2009 and 43 randomly selected wetlands in the Headwaters Forest District (Dulisse and Hausleitner 2009; Dulisse and Hausleitner 2010, 2011). Annual amphibian and reptile surveys (egg mass surveys, visual encounter surveys, auditory surveys, radiotelemetry) have occurred in the Kinbasket and Arrow Lakes Reservoirs in 2008 and 2009 and from 2011 to 2017 (Hawkes and Tuttle 2009, 2010, 2012, 2013, 2015; Hawkes and Wood 2014; Hawkes *et al.* 2015, 2017, 2018). Amphibian surveys (VES and larval dipnet surveys) were conducted in the Duncan-Lardeau region in 2014 (Dulisse 2014). In 2016, amphibian surveys (VES and larval (dipnet) survey) were conducted at 36 wetlands in the Upper Kootenay Ecosystem Enhancement

Plan area (Dulisse and Boulanger 2016). Extensive surveys (automated recording surveys, active acoustic surveys, eyeshine VES, and visual surveillance) for American Bullfrog (*Lithobates catesbeianus*) have been conducted from 2018 to 2020 in nearly all identified wetlands, ponds, lakes, irrigation ditches, and borrow pits from Corn Creek Marsh to Dale Marsh on the west side of the valley, and from Sutcliffe Farm to Rykerts Lake on the east side of the valley (Fraser *et al.* 2020; Morrison pers. comm. 2021). Additionally, the entire stretch of the Kootenay River has been surveyed for bullfrogs from the Summit Creek outflow to the border with USA. There have been no confirmed observations of Northern Leopard Frogs outside the CVWMA or reintroduction sites since the last assessment.

Population Information:

SAS 11	Change in number of mature individuals:	yes <input type="checkbox"/> no <input checked="" type="checkbox"/> unk <input type="checkbox"/>
SAS 12	Change in population trend:	yes <input type="checkbox"/> no <input checked="" type="checkbox"/> unk <input type="checkbox"/>
SAS 13	Change in severity of population fragmentation:	yes <input checked="" type="checkbox"/> no <input type="checkbox"/> unk <input type="checkbox"/>
SAS 14	Change in trend in area and/or quality of habitat:	yes <input checked="" type="checkbox"/> no <input type="checkbox"/> unk <input type="checkbox"/>
SAS 15	Significant new survey information:	yes <input checked="" type="checkbox"/> no <input type="checkbox"/>

Explanation:

Change in number of mature individuals and population trend

In 2009, the population of mature individuals was estimated at approximately 50 in CVWMA and <10 in the Upper Kootenay Floodplain (COSEWIC 2009). The previous report indicated that the Upper Kootenay Floodplain subpopulation was thought to be extirpated so it is not clear how the estimate was derived. Between 2011 and 2015, it was estimated that there were 17–39 breeding females at CVWMA with a very small subpopulation in the Upper Kootenay Floodplain (ECCC 2017). Since the last assessment, the number of egg masses (and thus the number of mature females) detected annually in the CVWMA has ranged from a low of seven to a high of 39, suggesting that since the last assessment, the population has fluctuated but with no apparent population trend (Figure 2). Assuming a 1:1 sex ratio and annual breeding by all females, the number of mature individuals would have ranged from 14 to 84 over the past 10-year period. Although breeding was detected in some years, no mature adults have been detected in the Upper Kootenay Floodplain since 2018.

Severity of population fragmentation

Previously, the population was considered to be severely fragmented (COSEWIC 2009). Because there remains only one subpopulation, the concept of severe fragmentation does not apply.

Change in trend in area and/or quality of habitat

Habitat has not improved in the CVWMA since 2009 (Boucher and Manley pers. comm. 2021), as predicted in the last assessment. Succession is occurring within the CVWMA with an overall increase of emergent vegetation such as cattails (*Typhus spp.*), which has reduced the availability of breeding and foraging habitat and has led to challenges in managing water levels in the breeding area (Boucher pers. comm. 2021). Habitat restoration activities were implemented in the East (mowed, plowed and disced) and West Duck Lake Nesting Areas (mowed and disced) in 2019–2021 to remove encroaching emergent vegetation and restore hydrological connectivity (Proctor and Mahr 2021). Water levels were particularly low in 2018 and 2019, which has led to an increase in cattail abundance and a reduction of high-quality breeding habitat since the restoration (Boucher pers. comm. 2021). A study at Six Mile Slough showed that abundance of cattail was negatively related to macroinvertebrate abundance in the area, which could lead to reduced foraging opportunities (Quamme *et al.* 2020). There has been a significant increase of Watershield (*Brasenia schreberi*) in the breeding area since 2005, but it is unclear if this has had a negative impact on the breeding habitat. Low water levels in the Six Mile Slough area recently necessitated the translocation of two egg masses to prevent tadpoles from being stranded in 2021 (McGlynn pers. comm. 2021). Plans are underway to install two new water control structures in the Six Mile Slough unit to help mitigate the effects of increasing droughts predicted with climate change by providing better control of water levels in the future. Wetlands were created in 2016 between the Duck Lake Nesting Area for birds and the Old Goat overwintering channel with the intention of increasing the

availability of breeding habitat and providing “bullfrog-proof” water bodies and to reduce the risk of road mortality during migration periods (Biebighauser 2019). Although the wetlands do not have sufficient hydroperiod to act as breeding ponds every year, young of year frogs have been observed foraging in them in late summer and fall (McGlynn pers. comm. 2021). It is unknown whether restoration activities are sufficient to offset projected declines in habitat quality resulting from natural succession and climate change.

Significant new survey information

Standard amphibian census techniques (i.e., nocturnal calling surveys, egg mass surveys, visual surveys, and mark-recapture surveys) occur annually in the CVWMA, primarily in the Duck Lake bird Nesting Area and Leach Lake. Additional surveys were conducted in 2019 and 2020 in the Six-mile Slough area of the CVWMA. A genetics study aims to examine effective population size, but results were not available at the time of this report. See corresponding section under **Range** for details of monitoring surveys at the reintroduction sites.

SAS 16

Threats:

Change in nature and/or severity of threats:	yes <input checked="" type="checkbox"/> no <input type="checkbox"/> unk <input type="checkbox"/>
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Explanation:

A threats calculator was completed by the B.C. Northern Leopard Frog recovery team in 2012 (BCNLFRT 2012). The following threats were identified and described in the previous assessment (COSEWIC 2009) and the recovery strategy (ECCC 2017) and continue to be important: disease, American Bullfrogs and introduced fish, non-native plants, agriculture and cattle grazing, and road mortality.

The overall threat impact was “very high”. The threat category of invasive and other problematic species was rated as “very high”, agriculture and aquaculture and pollution as “medium”, and natural system modification as “medium-low”. Residential and commercial development and transportation and service corridors were both rated as “low”. Energy production and mining, human intrusion and disturbance, and climate change and severe weather were rated as “unknown”. These assessments included the reintroduction sites.

Batrachochytrium dendrobatidis (*Bd*), a fungal disease responsible for chytridiomycosis, has caused mortality among adult and juvenile Northern Leopard Frogs in the CVWMA (Adama and Beaucher 2006; Voordouw *et al.* 2010). *Bd* has been detected in the extant and reintroduced populations of Northern Leopard Frogs in British Columbia and was previously identified as the single-most significant threat to the Rocky Mountain population (BCNLFRT 2012). Regular monitoring of *Bd* has not been conducted, and although chytridiomycosis does not appear to be a significant source of mortality in the CVWMA (Voordouw *et al.* 2010; McGlynn pers. comm. 2021), it remains as a potential threat.

American Bullfrogs and introduced fish prey on Northern Leopard Frog tadpoles and adult frogs (COSEWIC 2009). Introduced and predatory fish are widespread in the breeding and overwintering habitat of the CVWMA (Gebhart and Roberge 2001). Since the previous evaluation, American Bullfrogs were confirmed in the Nelway region on the border of Idaho and British Columbia in 2015 (Fraser *et al.* 2020). Since then, bullfrogs have been confirmed at various localities throughout the Creston Valley. Bullfrogs are yet to be detected within the designated critical habitat of Northern Leopard Frogs in the CVWMA but are continuing to expand in that direction (14 km away in 2018 and 11 km away in 2019) despite extensive eradication efforts led by the Central Kootenay Invasive Species Society (CKISS). Eradication efforts have employed a variety of means, resulting in the capture and euthanasia of 1,952 individuals as of 2020. Long term efforts are required to prevent the encroachment of bullfrogs into the critical habitat of Northern Leopard Frogs (Fraser *et al.* 2020; Morrison pers. comm. 2021).

Agriculture, including crops and cattle grazing, is widespread in the CVWMA and is likely to be an issue at future reintroduction sites. Cattle grazing can lead to deterioration of habitat through soil compaction and erosion, changes to hydrology, water quality, and cause direct mortality through trampling. The loss of

protective vegetation cover can lead to increased predation, increased risk of desiccation, and exposure to ultraviolet radiation (Cragg 2007). The impacts of cattle grazing have worsened since the last assessment along the Kootenay River East Channel, which is an important overwintering area for the frogs (McGlynn pers. comm. 2021). Although the overall number of dairy farms has decreased since the last assessment, the number of large dairy farms has increased upstream of the CVWMA population from one in 2005 to four in 2021, and the overall number of dairy cattle has increased, likely leading to a decrease in water quality in the Old Goat Channel overwintering habitat (Beaucher pers. comm. 2021).

Pollution can cause direct and indirect mortality of Northern Leopard Frogs; the effects are summarized in Dodd (2013). Of particular concern within the CVWMA and reintroduction sites are the effects of agricultural chemicals, such as herbicides or pesticides (BCNLFRT 2012). The railway also represents another possible source of pollution at potential reintroduction sites. Pollution can result from toxic spills or leaching from the railway bed itself as waste from the lead/zinc Sullivan Mine at Kimberley, British Columbia, was used in ballast bed construction (BCNLFRT 2012).

Roads can lead to direct mortality and interfere with seasonal movements (Lannoo 2005; Dodd 2013). A seasonal road closure that prohibits motorized vehicle use has been implemented in parts of the CVWMA to mitigate road mortality during the spring and fall migration periods (March 15th–April 30th and August 15th– October 15th). When mitigation strategies are not in effect, the threat of road mortality remains (Anderson pers. com. 2020).

Drought was not considered a threat to the CVWMA population in the 2009 status assessment (COSEWIC 2009) but was included in the 2012 threats calculator. Northern Leopard Frogs often breed in small and/or shallow wetlands that are prone to drying due to climate change effects such as reduced snowpack and warmer summers (Bunnell *et al.* 2010). A provincial assessment ranked Northern Leopard Frogs as medium to high risk with respect to climate change susceptibility, with moderate to poor adaptive capacity (Price and Daust 2016).

Natural systems modification, specifically dams and water management, may lead to habitat degradation, direct mortality, and habitat loss (BCNLFRT 2012). In the CVWMA, and many potential reintroduction sites, water levels must be actively managed in order to maintain suitable seasonal habitat. Poor water management could result in a lack of water at breeding sites, making them unsuitable for egg-laying or stranding egg masses or tadpoles. Inundation of breeding ponds with cool water during development could reduce growth of tadpoles. Improper water management can also result in a loss of habitat if dense vegetation encroaches on shallow breeding ponds (Boucher pers. comm. 2021).

SAS 17

Protection:

Change in effective protection:	yes <input type="checkbox"/> no <input checked="" type="checkbox"/> unk <input type="checkbox"/>
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Explanation:
 Critical Habitat under SARA has been identified within the CVWMA and areas of the Columbia Marshes and Upper Kootenay Floodplain (ECCC 2017), but the effectiveness of protection has not changed. The only extant site is within CVWMA and has existing protection under the *Creston Valley Wildlife Act* (Province of British Columbia 1968) and the *BC Wildlife Act* (Province of British Columbia 1982) where habitats are protected from industrial and commercial activities and habitat management is ongoing.

SAS 18

Rescue Effect:

Change in evidence of rescue effect:	yes <input type="checkbox"/> no <input checked="" type="checkbox"/>
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Explanation:
 No change, rescue from USA remains unlikely.

SAS 19

Quantitative Analysis:

Change in estimated probability of extirpation:	yes <input type="checkbox"/> no <input checked="" type="checkbox"/> unk <input type="checkbox"/>
Details: No quantitative analyses have been performed.	

Summary and Additional Considerations [e.g., recovery efforts; summarize exactly what has changed since the previous assessment]

The CVWMA population is slightly more widespread than previously thought, as some individuals have recently been observed in Six Mile Slough, approximately 1.5 – 2.5 km from the main breeding area. Continued reintroductions have occurred at two sites (Upper Kootenay Floodplain and Columbia Marshes) but neither has resulted in a self-sustaining subpopulation, and the Upper Kootenay Floodplain subpopulation may be extirpated. Recent habitat restoration has occurred at the CVWMA with mixed success.

A habitat suitability model (HSI) and reintroduction site assessment guidelines are under development to help guide selection of new reintroduction sites. Captive breeding and assurance colonies of Northern Leopard Frogs have been started at Vancouver Aquarium (2009), Calgary Zoo (2017), and Edmonton Valley Zoo (2019) to help bolster reintroduction efforts and to establish populations in captivity as an insurance against catastrophic population loss in the wild (ECCC 2017).

A threats calculator was completed by the B.C. Northern Leopard Frog Recovery Team in 2012 (BCNLFRT 2012). *Batrachochytrium dendrobatidis* was identified as the single-most significant threat to the Rocky Mountain population (BCNLFRT 2012). Since the previous evaluation, American Bullfrogs have become well-established in the Creston Valley, but have yet to be observed in the breeding area, likely due to ongoing eradication efforts (Morrison pers. comm. 2020). A seasonal road closure that prohibits motorized vehicle use has been implemented in parts of the CVWMA to mitigate road mortality during the spring and fall migration periods.

A federal recovery strategy was published in 2017 and included designated critical habitat in Creston Valley, Kootenay River floodplain, and Columbia Marshes (ECCC 2017). The goal of the strategy is to prevent extirpation by expanding the current population at the CVWMA and establish two additional subpopulations within the species' historical range. Another recovery objective is to address the knowledge gaps that currently constrain effective implementation of recovery efforts. Priority research areas that were identified include: impacts of chytridiomycosis and mitigation strategies, genetic constraints on population recovery, population dynamics, quantification of population level impacts of threats, including pollution and invasive species, and effectiveness of population augmentation, reintroduction, and habitat restoration strategies (ECCC 2017). Some of these knowledge gaps are being addressed, but others are not. For example, population dynamics are being studied at the CVWMA through a capture-mark-recapture study, researchers from Laurentian University and the Calgary Zoo are currently examining the impacts of genetics on recovery, and additional research is planned to begin in 2021 to examine ways to improve fertilization rates in captive breeding facilities.

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INFORMATION SOURCES

Adama, D.B., and M.A. Beaucher. 2006. Population monitoring and recovery of the Northern Leopard Frog (*Rana pipiens*) in southeast British Columbia. Report prepared for Columbia Basin Fish and Wildlife Compensation Program, Nelson, British Columbia. 28 pp. Website: http://www.sgrc.selkirk.ca/bioatlas/pdf/NLF_2000_2005.pdf [accessed June 2021].

Anderson, L., pers. comm. 2020. *Email correspondence to L. Randall*. November 2020. Rare & Endangered Species Biologist, Terrestrial Habitat and Wildlife Section, Nelson, British Columbia.

- BCNLFRT (British Columbia Northern Leopard Frog Recovery Team). 2012. Threat Assessment Worksheet for the Rocky Mountain Population of Northern Leopard Frogs. British Columbia. Available from B.C. Conservation Data Centre.
- Boucher, M.A. 2019. Creston Valley Wildlife Management Area Management Plan 2019-2026. 71 pp. Website: <https://crestonwildlife.ca/publications/> [accessed June 2021].
- Beaucher, M-A., pers. comm. 2020. *Email correspondence to L. Randall*. November 2020. Head of Conservation Programs, Creston Valley Wildlife Management Area, Creston, British Columbia.
- Beaucher, M-A., pers. comm. 2021. *On-line meeting with L. Randall*. June 2021. Head of Conservation Programs, Creston Valley Wildlife Management Area, Creston, British Columbia.
- Biebighauser, T.R. 2019. Frog Bear Restoration Project Plan Update. Unpubl. Report prepared for Nature Conservancy Canada. 7 pp.
- Churchill, T.A., and K.B. Storey. 1995. Metabolic effects of dehydration on an aquatic frog, *Rana pipiens*. *Journal of Experimental Zoology* 198:147-154.
- COSEWIC. 2009. COSEWIC assessment and update status report on the Northern Leopard Frog *Lithobates pipiens*, Rocky Mountain population, Western Boreal/Prairie populations in Canada. Committee on the Status of Endangered Wildlife in Canada, Ottawa, Ontario. 69 pp.
- COSEWIC. 2020. Operations and Procedures Manual – March 2020. Appendix E7. Guidelines on Manipulated Wildlife Species. 12 pp.
- Cragg, J. 2007. The effects of livestock grazing on the amphibians of British Columbia. Workterm report in partial fulfilment of the requirements of the Biology Co-op Program Winter 2004. B.C. Ministry of Environment, Wildlife Working Report No. WR-111. Victoria, British Columbia. 43 pp.
- Dodd, C.K. 2013. *Lithobates pipiens*. Pp 578-608 in *Frogs of the United States and Canada*, 2-vol. set. JHU Press, Baltimore, Maryland.
- Dole, J.W. 1967. The role of substrate moisture and dew in the water economy of leopard frogs, *Rana pipiens*. *Copeia* 1967:141-149.
- Dulisse, J., and D. Hausleitner. 2009. 2008 West Kootenay Amphibian Survey. Prepared for Fish & Wildlife Compensation Program Nelson, British Columbia. Website (through BC Ministry of Environment Species Inventory Web Explorer): <http://a100.gov.bc.ca/pub/siwe/details.do?projectId=4676&pagerOffset=10> [accessed June 2021].
- Dulisse, J., and D. Hausleitner. 2010. 2009 Amphibian Survey Columbia Forest District. Prepared for Fish & Wildlife Compensation Program Nelson, BC. Website (through BC Ministry of Environment Species Inventory Web Explorer): <http://a100.gov.bc.ca/pub/siwe/details.do?projectId=4676&pagerOffset=10> [accessed June 2021].

- Dulisse, J., and D. Hausleitner. 2011. 2010 Amphibian Survey Headwaters Forest District. Prepared for Fish & Wildlife Compensation Program Nelson, BC. Website (through BC Ministry of Environment Species Inventory Web Explorer) : <http://a100.gov.bc.ca/pub/siwe/details.do?projectId=4676&pagerOffset=10> [accessed June 2021].
- Dulisse, J. 2014. Duncan-Lardeau Conservation Property Baseline Amphibian and Bird Surveys. Report prepared for Ministry of Forests, Lands and Natural Resource Operations Fish & Wildlife Compensation Program-Section 401-333 Victoria St Nelson, BC. 10 pp. Website (through BC Ministry of Environment Species Inventory Web Explorer): <http://a100.gov.bc.ca/pub/siwe/details.do?projectId=5210&pagerOffset=20> [accessed June 2021].
- Dulisse, J., and J. Boulanger. 2016. Upper Kootenay Amphibian Monitoring Project. Prepared for Fish & Wildlife Compensation Program, Castlegar, BC. 33 pp. Website (through BC Ministry of Environment Species Inventory Web Explorer): <http://a100.gov.bc.ca/pub/siwe/details.do?projectId=5445&pagerOffset=20> [accessed June 2021].
- ECCC (Environment and Climate Change Canada). 2017. Recovery strategy for the Northern Leopard Frog (*Lithobates pipiens*), Rocky Mountain population in Canada. Ottawa. 24 + 47 pp.
- Fraser, K., Morrison, M., and E. Bates. 2020. Northern Leopard Frog Preservation - American Bullfrog Control. Prepared for Fish and Wildlife Compensation Program. 22 pp. Website (through BC Ministry of Environment Species Inventory Web Explorer): <http://a100.gov.bc.ca/pub/siwe/details.do?projectId=5807&pagerOffset=30> [accessed June 2021].
- Gebhart, D., and M. Roberge. 2001. Northern Leopard Frog Recovery Project: CVWMA Fish Inventory. Unpubl. report completed by Aquatic Resources Limited for the Columbia Basin Fish and Wildlife Compensation Program. 12 pp. Website: http://www.sgrc.selkirk.ca/bioatlas/pdf/NLF_Fish_Inventory.pdf [accessed June 2021].
- Hawkes, V.C., and K. Tuttle. 2009. Kinbasket and Arrow Lakes Reservoirs: Amphibian and Reptile Life History and Habitat Use Assessment. Annual Report – 2008. LGL Report EA3075. Unpublished report by LGL Limited environmental research associates, Sidney, BC, for BC Hydro Generations, Water License Requirements, Burnaby, BC. 107 pp + Appendices. Website (through BC Ministry of Environment Species Inventory Web Explorer): <http://a100.gov.bc.ca/pub/siwe/details.do?projectId=4823&pagerOffset=10> [accessed June 2021].

- Hawkes, V.C., and K.N. Tuttle. 2010. Kinbasket and Arrow Lakes Reservoirs: Amphibian and Reptile Life History and Habitat Use Assessment. Annual Report – 2009. LGL Report EA3075. Unpublished report by LGL Limited environmental research associates, Sidney, BC, for BC Hydro Generations, Water License Requirements, Burnaby, BC. 70 pp + Appendices. Website (through BC Ministry of Environment Species Inventory Web Explorer): <http://a100.gov.bc.ca/pub/siwe/details.do?projectId=4823&pagerOffset=10> [accessed June 2021].
- Hawkes, V.C., and K.N. Tuttle. 2012. CLBMON-58. Kinbasket Reservoir: Monitoring of Impacts on Amphibians and Reptiles from Mica Units 5 and 6 in Kinbasket Reservoir. Year 1 Annual Report – 2012. LGL Report EA3303. Unpublished report by LGL Limited environmental research associates, Sidney, B.C., for BC Hydro Generations, Water License Requirements, Burnaby, B.C. 75 pp + Appendices. Website (through BC Ministry of Environment Species Inventory Web Explorer): <http://a100.gov.bc.ca/pub/siwe/details.do?projectId=4823&pagerOffset=10> [accessed June 2021].
- Hawkes, V.C., and K.N. Tuttle. 2013. CLBMON-37. Kinbasket and Arrow Lakes Reservoirs: Amphibian and Reptile Life History and Habitat Use Assessment. Year 5 Annual Report – 2012. LGL Report EA3303. Unpublished report by LGL Limited environmental research associates, Sidney, BC, for BC Hydro Generations, Water License Requirements, Burnaby, BC. 67 pp + Appendices. Website (through BC Ministry of Environment Species Inventory Web Explorer): <http://a100.gov.bc.ca/pub/siwe/details.do?projectId=4823&pagerOffset=10> [accessed June 2021].
- Hawkes, V.C., and C. Wood. 2014. CLBMON-58. Kinbasket Reservoir: Monitoring of Impacts on Amphibians and Reptiles from Mica Units 5 and 6 in Kinbasket Reservoir. Year 2 Annual Report – 2013. LGL Report EA3452. Unpublished report by Okanagan Nation Alliance and LGL Limited environmental research associates, Sidney, B.C., for BC Hydro Generations, Water License Requirements, Burnaby, B.C. 68 pp + Appendices. Website (through BC Ministry of Environment Species Inventory Web Explorer): <http://a100.gov.bc.ca/pub/siwe/details.do?projectId=4823&pagerOffset=10> [accessed June 2021].
- Hawkes, V.C., K.N. Tuttle, and C.M. Wood. 2015. CLBMON-37. Kinbasket and Arrow Lakes Reservoirs: Amphibian and Reptile Life History and Habitat Use Assessment. Year 7 Annual Report – 2014. LGL Report EA3533. Unpublished report by LGL Limited environmental research associates, Sidney, BC, for BC Hydro Generations, Water License Requirements, Burnaby, BC. 79 pp + Appendices. Website (through BC Ministry of Environment Species Inventory Web Explorer): <http://a100.gov.bc.ca/pub/siwe/details.do?projectId=4823&pagerOffset=10> [accessed June 2021].

- Hawkes, V.C., and K.N. Tuttle. 2016. CLBMON-58. Kinbasket Reservoir: Monitoring of Impacts on Amphibians and Reptiles from Mica Units 5 and 6 in Kinbasket Reservoir. Year 3 Annual Report – 2015. LGL Report EA3533. Unpublished report by Okanagan Nation Alliance and LGL Limited environmental research associates, Sidney, B.C., for BC Hydro Generations, Water License Requirements, Burnaby, B.C. 59 pp + Appendices. Website (through BC Ministry of Environment Species Inventory Web Explorer):
<http://a100.gov.bc.ca/pub/siwe/details.do?projectId=4823&pagerOffset=10>
[accessed June 2021].
- Hawkes, V.C., B. McKinnon, and C. Wood. 2017. CLBMON-37. Kinbasket and Arrow Lakes Reservoirs: Amphibian and Reptile Life History and Habitat Use Assessment. Year 6 Annual Report – 2016. LGL Report EA3533D. Unpublished report by LGL Limited environmental research associates, Sidney, BC and Okanagan Nation Alliance, Westbank, BC for BC Hydro Generations, Water License Requirements, Burnaby, B.C. 79 pp + Appendices. Website (through BC Ministry of Environment Species Inventory Web Explorer):
<http://a100.gov.bc.ca/pub/siwe/details.do?projectId=4823&pagerOffset=10>
[accessed June 2021].
- Hawkes, V.C., K.N. Tuttle, K.J. Meyers. 2018. CLBMON-58. Kinbasket Reservoir: Monitoring of Impacts on Amphibians and Reptiles from Mica Units 5 and 6 in Kinbasket Reservoir. Year 4 Annual Report – 2017. LGL Report EA3533. Unpublished report by LGL Limited environmental research associates, Sidney, B.C. and Okanagan Nation Alliance, Westbank, BC for BC Hydro Generations, Water License Requirements, Burnaby, B.C. 51 pp + Appendices. Website (through BC Ministry of Environment Species Inventory Web Explorer):
<http://a100.gov.bc.ca/pub/siwe/details.do?projectId=4823&pagerOffset=10>
[accessed June 2021].
- Lannoo, M.J. 2005. *Rana Pipiens* Schreber. Pages 570-577 in Amphibian declines: the conservation status of United States species. Univ of California Press, Berkeley, California.
- Manley, I., pers. comm. 2020. *Email correspondence to L. Randall*. November 2020. Wildlife Biologist, Fish and Wildlife Compensation Program. Ministry of Forests, Lands and Natural Resource Operations, Nelson, British Columbia.
- Manley, I., pers. comm. 2021. *On-line meeting with L. Randall*. June 2021. Wildlife Biologist, Fish and Wildlife Compensation Program. Ministry of Forests, Lands and Natural Resource Operations, Nelson, British Columbia.
- McGlynn, K., pers. comm. 2020, 2021. *Email correspondence to L. Randall*. July, September, November 2020 and June 2021. Wildlife Technician, Fish and Wildlife Compensation Program. Ministry of Forests, Lands and Natural Resource Operations, Nelson, British Columbia.
- Manion, J.J., and B.L. Cory. 1952. Winter kill of *Rana pipiens* in shallow ponds. *Herpetologica* 8:32.

- Merrell, D.J. 1977. Life history of the Leopard Frog, *Rana pipiens*, in Minnesota. Occasional Papers. Bell Museum of Natural History, Minneapolis, Minnesota. 22 pp.
- Morrison, M., pers. comm. 2021. *Email correspondence to L. Randall*. June 2021. Ecosystems Biologist, American Bullfrog Program Coordinator. Ministry of Forests, Lands, Natural Resource Operations & Rural Development. Nelson, British Columbia.
- Ohanjanian, P., pers. comm. 2020. *Email correspondence to L. Randall*. November 2020. Wildlife Biologist, Isabel Ohanjanian Consulting Biologists, Kimberley, British Columbia.
- Ohanjanian, P. 2018a. Monitoring a reintroduced population of northern leopard frogs in the Columbia Marshes—Year 5. Unpubl. report prepared for Columbia Wetlands Stewardship Partners, Kootenay Conservation Program and Northern Leopard Frog Recovery Team. 14 pp.
- Ohanjanian, P. 2018b. Monitoring of a reintroduced population of Northern Leopard Frogs (*Lithobates pipiens*) on the Upper Kootenay Floodplain in 2017. Unpubl. report prepared for Ktunaxa Nation Council, Northern Leopard Frog Recovery Team, and Columbia Basin Trust. 15 pp.
- Ohanjanian, P., D. Adama, and A. Davidson. 2006. An amphibian inventory of the East Kootenays with an emphasis on *Bufo boreas*, 2005. Unpubl. report prepared for the Columbia Basin Fish and Wildlife Compensation Program. 31 pp. Website: http://www.sgrc.selkirk.ca/bioatlas/pdf/An_Amphibian_Inventory_of_the_East_Kootenays.pdf [accessed June 2021].
- Pope, S.E., L. Fahrig, and H.G. Merriam. 2000. Landscape complementation and metapopulation effects on Leopard Frog populations. *Ecology* 81:2498–2508.
- Price, K., and D. Daust. 2016. Climate change vulnerability of BC’s fish and wildlife: First approximation. Prepared for B.C. Ministry of Forests, Lands, and Natural Resource Operations - Competitiveness and Innovation Branch. 41 pp.
- Proctor, M. F., and M H. Mahr. 2021. Kootenay Connect: Riparian Wildlife Corridors for Climate Change, Year 2 Annual Report. Kootenay Connect, Kaslo, BC. 160 pp. Website: <https://kootenayconservation.ca/wp-content/uploads/2021/06/Kootenay-Connect-Y2-Final-Report-09June2021.pdf> [accessed June 2021].
- Province of British Columbia. 1968. Wildlife Act [RSBC 1996] c. 84. Queen’s Printer, Victoria, British Columbia. Website: https://www.bclaws.gov.bc.ca/civix/document/id/complete/statreg/96084_01 [accessed November 2021].
- Province of British Columbia. 1982. Wildlife Act [RSBC 1996] c. 488. Queen’s Printer, Victoria, British Columbia. Website: https://www.bclaws.gov.bc.ca/civix/document/id/complete/statreg/96488_01 [accessed November 2021].

- Quamme D., R. MacKenzie, and R. Durand. 2020. Pre-restoration biomonitoring of Six Mile Slough. Report Prepared for BC Forest, Lands and Natural Resource Operations and Rural Development and Creston Valley Wildlife Management Area. 65 pp. Website:
<https://integratedecologicalresearch.files.wordpress.com/2020/07/six-mile-slough-pre-restoration-monitoring-final-report-july-10-2020.pdf> [accessed June 2021].
- Randall, L., K. Kendell, P. Govindarajulu, B. Houston, P. Ohanjanian, and A. Moehrensclager. 2016. Re-introduction of the Northern Leopard Frog (*Lithobates pipiens*) in British Columbia and Alberta, Canada. Pages 45-50 in P. S. Soorae, editor. Global Re-introduction Perspectives: 2016. Further case studies from around the globe. IUCN/SSC Re-introduction Specialist Group and Abu Dhabi, UAE: Environment Agency-Abu Dhabi, Gland, Switzerland.
- Ruibal, R. 1959. The ecology of a brackish water population of *Rana pipiens*. *Copeia* 1959:315-322.
- Schmid, W.D. 1982. Survival of frogs in low temperature. *Science* 215:697-698.
- Stanton, R., and L.A. Randall. 2019. Reintroduction and monitoring of northern leopard frogs (*Lithobates pipiens*) in the Columbia marshes, 2019. Unpub. report prepared for the Columbia Basin Trust, Kootenay Conservation Program, Northern Leopard Frog Recovery Team, and Ministry of Forests, Lands, and Natural Resource Operations. 16 pp.
- Vatnick, I., M. Brodtkin, M. Simon, B. Grant, C. Conte, M. Gleave, R. Myers, and M. Sadoff. 1999. The effects of exposure to mild acidic conditions on adult frogs (*Rana pipiens* and *Rana clamitans*): Mortality rates and pH preferences. *Journal of Herpetology* 33:370-374.
- Voordouw, M., D. Adama, B. Houston, P. Govindarajulu, and J. Robinson. 2010. Prevalence of the pathogenic chytrid fungus, *Batrachochytrium dendrobatidis*, in an endangered population of Northern Leopard Frogs, *Rana pipiens*. *BMC Ecology* 10:1-10.

WRITER OF SAS

Lea A. Randall

TECHNICAL SUMMARY

Lithobates pipiens

Northern Leopard Frog - Rocky Mountain population

Grenouille léopard du Nord, Population des Rocheuses

Range of occurrence in Canada (province/territory/ocean): British Columbia

Demographic Information

Generation time (usually average age of parents in the population; indicate if another method of estimating generation time indicated in the IUCN guidelines (2011) is being used)	2-3 yrs
Is there an [observed, inferred, or projected] continuing decline in number of mature individuals?	Projected continuing decline based on threats
Estimated percent of continuing decline in total number of mature individuals within [5 years or 2 generations, whichever is longer up to a maximum of 100 years]	Unknown
[Observed, estimated, inferred, or suspected] percent [reduction or increase] in total number of mature individuals over the last [10 years, or 3 generations, whichever is longer up to a maximum of 100 years].	No change, based on egg mass counts
[Projected or suspected] percent [reduction or increase] in total number of mature individuals over the next [10 years, or 3 generations, whichever is longer up to a maximum of 100 years].	Unknown but could be as high as 50-100% decline based on “very high” overall impact from threats calculator (BCNLFRT 2012). Threat mitigation, including control of invasive American Bullfrogs, is expected to continue and ameliorate the impacts.
[Observed, estimated, inferred, or suspected] percent [reduction or increase] in total number of mature individuals over any period [10 years, or 3 generations, whichever is longer up to a maximum of 100 years], including both the past and the future.	Unknown
Are the causes of the decline a. clearly reversible and b. understood and c. ceased?	a. No b. Partially understood c. No
Are there extreme fluctuations in number of mature individuals?	No, fluctuations occur but are less than an order of magnitude

Extent and Occupancy Information

Estimated extent of occurrence (EOO)	56 km ²
Index of area of occupancy (IAO) (Always report 2x2 grid value).	56 km ²

Is the population “severely fragmented” i.e., is >50% of its total area of occupancy in habitat patches that are (a) smaller than would be required to support a viable population, and (b) separated from other habitat patches by a distance larger than the species can be expected to disperse?	a. no b. no
Number of “locations”* (use plausible range to reflect uncertainty if appropriate)	1 location based on threat from introduced American Bullfrogs and disease
Is there an [observed, inferred, or projected] decline in extent of occurrence?	No
Is there an [observed, inferred, or projected] decline in index of area of occupancy?	No
Is there an [observed, inferred, or projected] decline in number of subpopulations?	No
Is there an [observed, inferred, or projected] decline in number of “locations”**?	No
Is there an [observed, inferred, or projected] decline in [area, extent and/or quality] of habitat?	Yes, inferred and projected decline in area, extent, and quality of habitat based on threat assessment (BCNLFRT 2012). Habitat quality has not improved since the last assessment. Restoration activities are ongoing.
Are there extreme fluctuations in number of subpopulations?	No
Are there extreme fluctuations in number of “locations”*?	No
Are there extreme fluctuations in extent of occurrence?	No
Are there extreme fluctuations in index of area of occupancy?	No

Number of Mature Individuals (in each subpopulation)

Subpopulations (give plausible ranges)	N Mature Individuals
Creston Valley Wildlife Management Area	<50
Total	<50

Quantitative Analysis

Is the probability of extinction in the wild at least [20% within 20 years or 5 generations whichever is longer up to a maximum of 100 years, or 10% within 100 years]?	Not conducted
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* See Definitions and Abbreviations on [COSEWIC website](#) and [IUCN](#) for more information on this term.

Threats (direct, from highest impact to least, as per IUCN Threats Calculator)

Was a threats calculator completed for this species?

- i. Yes, by the B.C. Northern Leopard Frog Recovery Team (BCNLFRT 2012)
- ii. List the main threat categories here with impact in parentheses
 - Invasive and other problematic species and genes (Very High).
 - Agriculture and aquaculture (Medium)
 - Pollution (Medium)
 - Natural system modification (Medium-low).
 - Residential and commercial development (Low)
 - Transportation and service corridors (Low)
 - Energy production and mining (Unknown)
 - Human intrusion and disturbance (Unknown)
 - Climate change and severe weather (Unknown)
 - Biological resource use and geological events were not assessed

What additional limiting factors are relevant?

- Requirement of three seasonal habitats: spring breeding, summer foraging, and overwintering habitat (Dodd 2013). The loss of any of them or connectivity between them may render the landscape unsuitable, which makes Northern Leopard Frogs particularly vulnerable to habitat loss and fragmentation (Pope *et al.* 2000).
- Requirement for suitable aquatic hibernation habitats that contain well-oxygenated water and that do not freeze to the bottom (Schmid 1982). While overwintering, Northern Leopard Frogs are vulnerable to predation and may die if dissolved oxygen drops below acceptable parameters (Manion and Cory 1952; Merrell 1977).
- Physiological constraints, including intolerance of high salinity (Ruibal 1959), acidic conditions (Vatnik *et al.* 1999), and water loss (Dole 1967; Churchill and Storey 1995).

Rescue Effect (immigration from outside Canada)

Status of outside population(s) most likely to provide immigrants to Canada.	USA: S1 (Washington), S2 (Idaho)
Is immigration known or possible?	No
Would immigrants be adapted to survive in Canada?	Yes
Is there sufficient habitat for immigrants in Canada?	No
Are conditions deteriorating in Canada?+	Yes
Are conditions for the source (i.e., outside) population deteriorating?+	Yes
Is the Canadian population considered to be a sink?+	No
Is rescue from outside populations likely?	No

+ See [Table 3](#) (Guidelines for modifying status assessment based on rescue effect).

Data Sensitive Species

Is this a data sensitive species?	No
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Status History

COSEWIC Status History:

Designated Endangered in April 1998. Status re-examined and confirmed in May 2000, in April 2009, and in December 2021.

Status and Reasons for Designation:

Status: Endangered	Criteria: B1ab(iii,v)+2ab(iii,v); C2a(i,ii); D1
Reasons for designation: The Canadian distribution of this frog is restricted to a small area of south-central British Columbia, where a single natural population exists within the Creston Valley Wildlife Management Area. Since the previous assessment, increased search efforts have extended the frog's known range by approximately 1.5–2.5 km. Habitat restoration and seasonal road closures have been undertaken to mitigate threats. Reintroductions have continued at two sites (Upper Kootenay Floodplain and Columbia Marshes) but are not yet self-sustaining. Restricted range and small population size (estimated at fewer than 50 mature individuals), together with declining habitat quality and ongoing cumulative high impact threats from disease, introduced American Bullfrogs, and road mortality, contributed to the retention of Endangered status.	

Applicability of Criteria

Criterion A (Decline in Total Number of Mature Individuals): Not applicable. Insufficient data to reliably infer, project, or suspect percentage of decline, but is near meeting A3 based on very high projected threats.
Criterion B (Small Distribution Range and Decline or Fluctuation): Meets Endangered, B1ab(iii,v)+2ab(iii,v). Both EOO and IAO at 56 km ² are below thresholds for Endangered, and the population is (a) known to exist at one location and is (b) experiencing a continuing inferred and projected decline (iii) in area, extent and quality of habitat, and a projected decline (v) in number of mature individuals.
Criterion C (Small and Declining Number of Mature Individuals): Meets Endangered C2a(i,ii). Number of mature individuals is <50, all in one subpopulation, and there is a projected continuing decline in number of mature individuals, all of which belong to one subpopulation.
Criterion D (Very Small or Restricted Population): Meets Endangered D1. Number of mature individuals estimated to be <50.
Criterion E (Quantitative Analysis): Not applicable. Analysis not conducted.

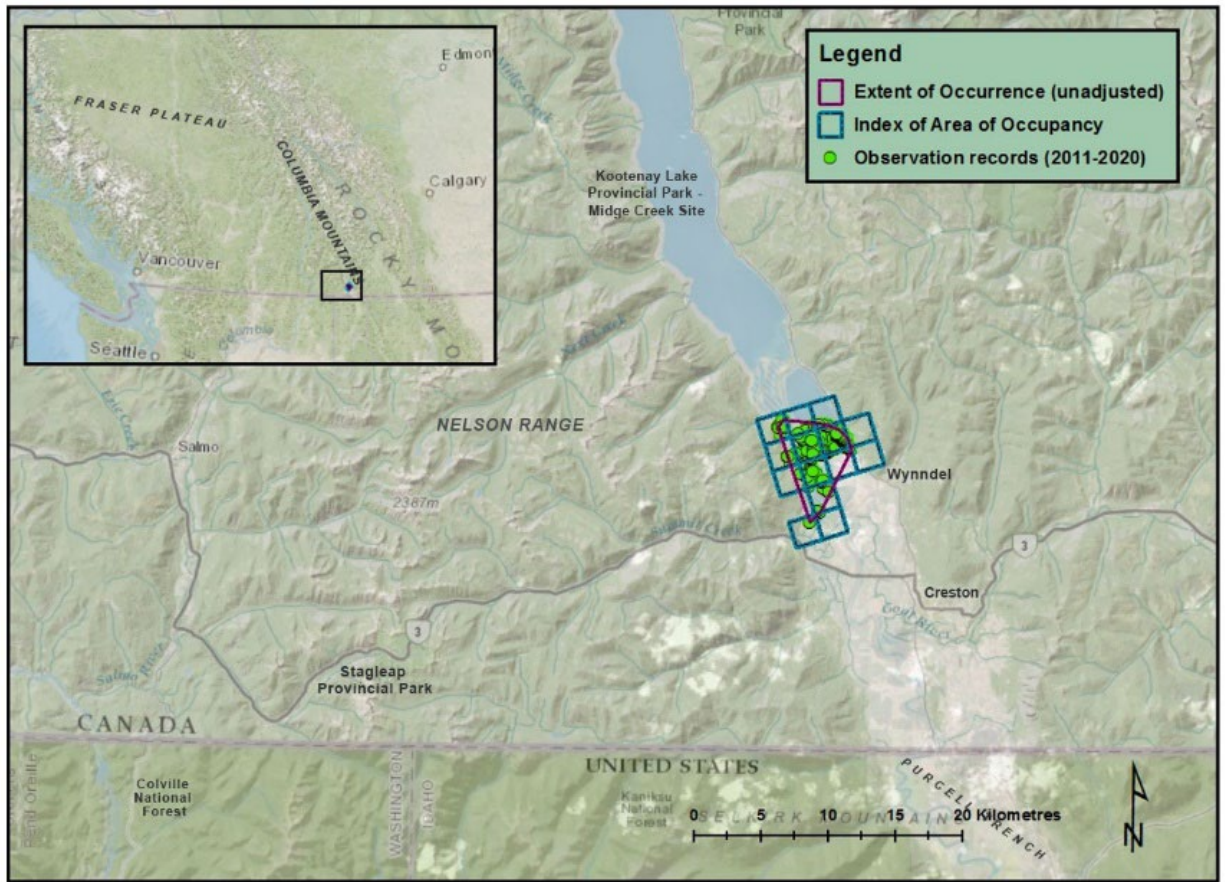


Figure 1. Distribution map for the Northern Leopard Frog Rocky Mountain Population in the Creston Valley Wildlife Management Area. Map prepared by Alain Filion (COSEWIC Secretariat).

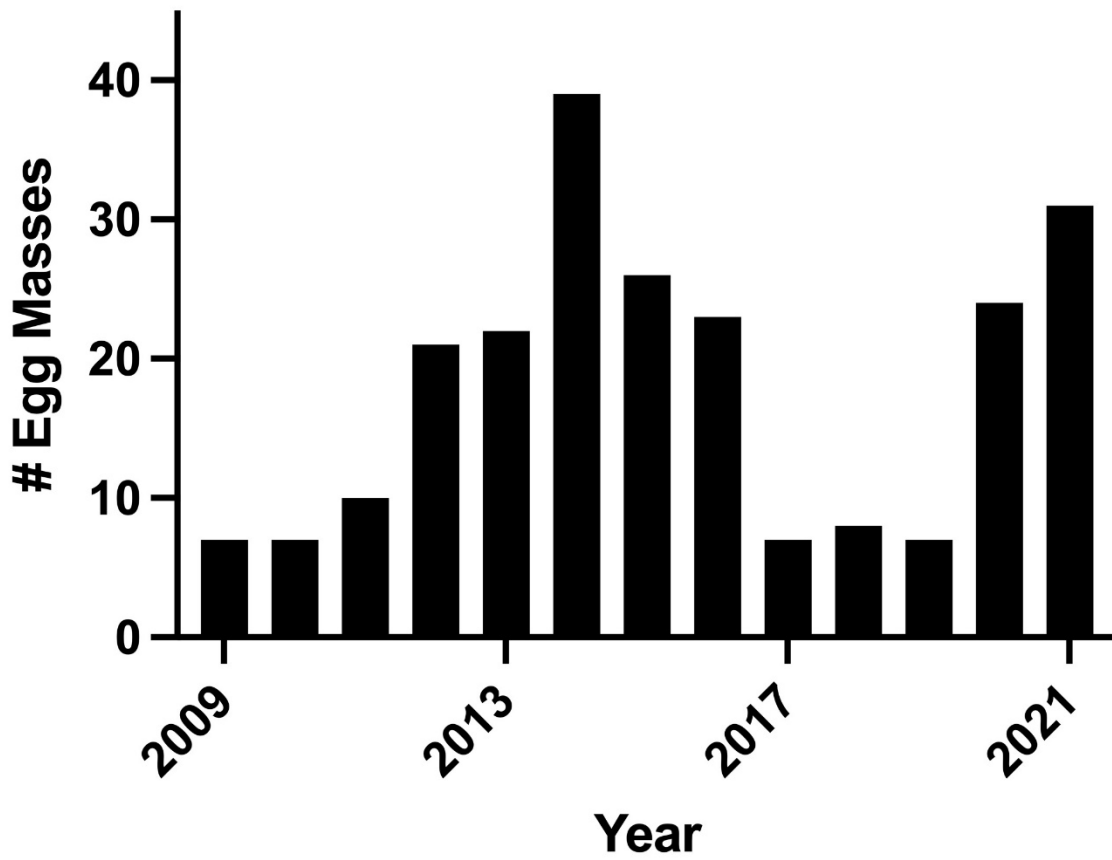


Figure 2. Number of Northern Leopard Frog egg masses detected in the Creston Valley Wildlife Management Area from 2009 to 2021.



COSEWIC HISTORY

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) was created in 1977 as a result of a recommendation at the Federal-Provincial Wildlife Conference held in 1976. It arose from the need for a single, official, scientifically sound, national listing of wildlife species at risk. In 1978, COSEWIC designated its first species and produced its first list of Canadian species at risk. Species designated at meetings of the full committee are added to the list. On June 5, 2003, the *Species at Risk Act* (SARA) was proclaimed. SARA establishes COSEWIC as an advisory body ensuring that species will continue to be assessed under a rigorous and independent scientific process.

COSEWIC MANDATE

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assesses the national status of wild species, subspecies, varieties, or other designatable units that are considered to be at risk in Canada. Designations are made on native species for the following taxonomic groups: mammals, birds, reptiles, amphibians, fishes, arthropods, molluscs, vascular plants, mosses, and lichens.

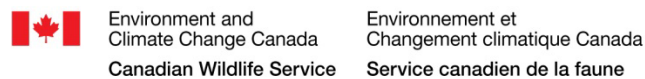
COSEWIC MEMBERSHIP

COSEWIC comprises members from each provincial and territorial government wildlife agency, four federal entities (Canadian Wildlife Service, Parks Canada Agency, Department of Fisheries and Oceans, and the Federal Biodiversity Information Partnership, chaired by the Canadian Museum of Nature), three non-government science members and the co-chairs of the species specialist subcommittees and the Aboriginal Traditional Knowledge subcommittee. The Committee meets to consider status reports on candidate species.

DEFINITIONS (2021)

Wildlife Species	A species, subspecies, variety, or geographically or genetically distinct population of animal, plant or other organism, other than a bacterium or virus, that is wild by nature and is either native to Canada or has extended its range into Canada without human intervention and has been present in Canada for at least 50 years.
Extinct (X)	A wildlife species that no longer exists.
Extirpated (XT)	A wildlife species no longer existing in the wild in Canada, but occurring elsewhere.
Endangered (E)	A wildlife species facing imminent extirpation or extinction.
Threatened (T)	A wildlife species likely to become endangered if limiting factors are not reversed.
Special Concern (SC)*	A wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.
Not at Risk (NAR)**	A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances.
Data Deficient (DD)***	A category that applies when the available information is insufficient (a) to resolve a species' eligibility for assessment or (b) to permit an assessment of the species' risk of extinction.

* Formerly described as "Vulnerable" from 1990 to 1999, or "Rare" prior to 1990.
 ** Formerly described as "Not In Any Category", or "No Designation Required."
 *** Formerly described as "Indeterminate" from 1994 to 1999 or "ISIBD" (insufficient scientific information on which to base a designation) prior to 1994. Definition of the (DD) category revised in 2006.



The Canadian Wildlife Service, Environment and Climate Change Canada, provides full administrative and financial support to the COSEWIC Secretariat.