



## Best Management Practices for Northern Red-legged Frogs and Western Toads in BCTS Strait of Georgia Operating Areas

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Adapted from E. Wind, R.P.Bio. Nov. 30, 2010

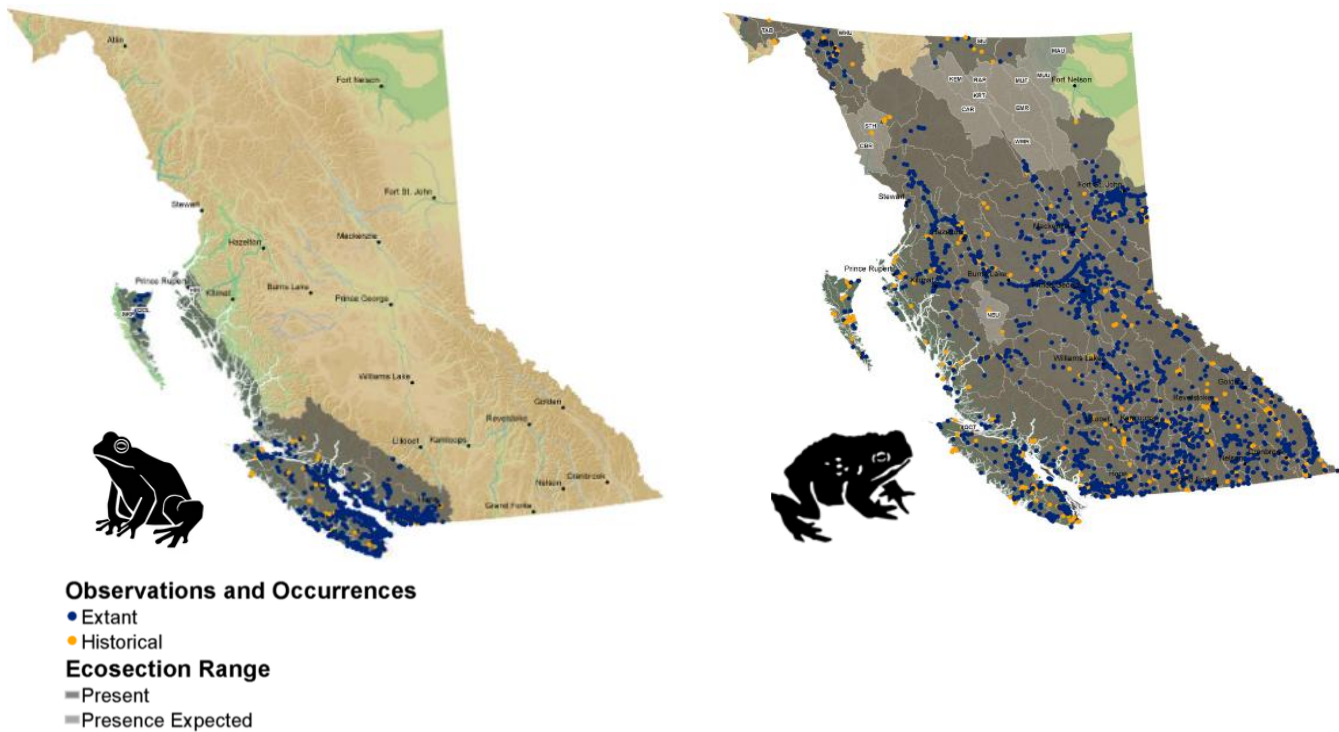
### Overview

BC Timber Sales (BCTS) is bound by legal, non-legal, and certification requirements<sup>1</sup> to protect Species at Risk (SAR). Northern Red-legged Frogs (*Rana aurora*; hereafter 'Red-legged Frogs') and Western Toads (*Anaxyrus boreas*) are listed under Schedule 1 of the federal *Species at Risk Act* (SARA) and designated as 'Special Concern' by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). Both species are protected provincially under the *Wildlife Act* and the Red-legged Frog is listed as an Identified Wildlife Species which affords protection measures under the *Forest and Range Practices Act* (FRPA).

Red-legged Frogs and Western Toads are forest-dwelling amphibians that require both aquatic (wetland/pond) and terrestrial habitats to complete their lifecycle. Terrestrial habitat is required for feeding and growing, whereas wetlands/ponds are used for breeding. There are two subpopulations of Western Toads in Canada: 'calling' and 'non-calling'. Western Toads found in British Columbia belong to the non-calling subpopulation (COSEWIC 2012). In the Coast Region of BC, their range extends along the entire Pacific Coast, including Haida Gwaii and Vancouver Island (**Figure 1**). Red-legged Frogs occur on Vancouver Island, and along the South Coast (**Figure 1**), however, Red-legged frogs on Haida Gwaii are a result of historical introductions (i.e. they are non-native to the island).

Declines in the non-calling population of Western Toads and Red-legged Frogs have been recorded in the southern portion of both of their ranges (Environment Canada 2016 and Environment and Climate Change Canada 2016). Breeding habitat degradation, road mortality, introduced species, and emerging diseases such as chytridiomycosis represent the major threats to both species (Environment Canada 2016). Because the ecology these species are similar (e.g., overlapping ranges, similar breeding site requirements), management strategies can apply to both species.

<sup>1</sup> 'Legal, non-legal, and certification requirements' refer to a) legally-binding Acts and Regulations set by provincial and federal governing bodies, b) non-legally binding stewardship plans and promises, and c) requirements set by organizations awarding certifications (e.g., Sustainable Forestry Initiative Certification).



**Figure 1. Range maps of Northern Red-legged Frog (left) and Western Toad (right) in British Columbia. Red-legged frog detections on Haida Gwaii are a result of historical introductions. [Range maps](#) were produced by the BC Conservation Data Center in 2022.**

The following protocol outlines the Best Management Practices (BMP) for Northern Red-legged Frogs and Western Toads when adults, juveniles, and/or tadpoles are encountered in the Strait of Georgia (TSG) operating areas. Additionally, this BMP outlines the process for proactively identifying amphibian breeding habitat during the planning stage. As new information becomes available or as new policy is implemented, BCTS will review this protocol to meet new requirements, otherwise it will be updated every five years.

Identification keys for amphibian eggs and adults (**Appendix A**), riparian classification of lakes and wetlands (**Appendix B**), and habitat quality as defined by the *Small Wetland and Amphibian Field Card* (**Appendix C**) are provided as appendices to this document. **Appendix D** outlines various measures to consider when planning riparian buffers and management zones, as well as road layout and design. Definitions for key terms are provided in **Appendix E**.

## Objectives

This BMP will achieve the following objectives:

1. Facilitate identification of Northern Red-legged Frogs, Western Toads, and their breeding sites (ponds/wetlands);
2. Provide a framework for proactive habitat identification and for reporting frogs, toads, and their breeding areas encountered in TSG operating areas;
3. Provide management strategies to protect individuals and/or breeding areas.

## Identification & Ecology

### Northern Red-legged Frogs

See **Appendix A** for identification keys for amphibian eggs and adults.

#### Adults and Juveniles

- Adults can reach up to 10 cm (diameter of a pop can).
- Tan to brown on back (some dark spots); dark eye mask and cream-coloured lip line; underside of legs is translucent red.
- Two dorsolateral folds run down the back starting behind the eyes; long back legs for jumping.
- Pacific Chorus Frogs (*Pseudacris regilla*) are generally smaller (2.5 – 4 cm), have smoother skin, and do not have cream coloured lip lines.

#### Eggs

- Masses are relatively large (10 – 20 cm diameter) and spherical, laid near the surface among vegetation.
- Composed of loose jelly; individual eggs visible; surface uneven and irregular.
- Mass may become fragmented, flat, floating or with a green hue as it ages.
- Typically present from February through April.

#### Tadpoles

- Can reach up to 3.5 cm in length.
- Brown with gold flecks along side and bottom; inset eyes when viewed from above; high arching tail fin.
- Typically present from May through August.

#### Lifecycle

- Breeding window varies geographically (by latitude and elevation); in lowland coastal areas, typically occurs February through August, with courtship and spawning beginning in early February (**Figure 3**).
- Eggs hatch in 5 to 7 weeks.
- Tadpoles metamorphose in 11 – 14 weeks, but sometimes overwinter.
- Individuals reach sexual maturity at 3 years of age.
- Overwintering occurs between mid-October and mid-February.



**Figure 2. Red-legged Frog adult (top), egg masses (middle), and tadpole (bottom). See Appendix A for identification keys.**



**Figure 3. Red-legged Frog phenology (South Coast Conservation Program, 2024a).**

*Breeding Habitat*

- Shallow edges of lakes, ponds, wetlands, bogs and fens in close proximity to forests generally below 1,000 meters in elevation (COSEWIC 2015; **Figure 4**).
- Natural waterbodies that:
  - contain >50 cm of standing water in early spring (February through April); retain standing water until at least August (tadpoles require approximately 4 to 5 months to metamorphose); a soft-bottom pond (i.e., build-up of humus/organic debris) may suggest longer hydroperiods,
  - have low current velocities (less than 2 cm/sec.),
  - contain a mosaic of open water habitat (e.g., approximately 50%) and emergent vegetation, especially herbaceous plants and thin-stemmed graminoids (e.g., sedges, rushes, and grasses), and
  - have relatively open canopy-cover conditions (e.g., less than 25% cover of trees and tall shrubs over the pond).
- Human-made waterbodies, including potholes and ditches (COSEWIC 2015). Human-made breeding habitats that act as population sinks may have negative effects on population trends (COSEWIC 2012). Refer to **Appendix E** for the complete definitions of natural and human-made waterbodies.



**Figure 4. Examples of Red-legged Frog breeding habitats: bog (top left), wetland (top right), and shallow lake edge (bottom). Note proximity of lake edge to forest. Western Toads may be breeding here too.**

## Western Toads

See **Appendix A** for identification keys for amphibian eggs and adults.

### Adults and Juveniles

- Adults can reach up to 14.5 cm (length of smartphone)
- Juveniles (toadlets) are typically 2 – 5 cm (coin to ping pong ball size)
- Many colour variations but usually have a light stripe down centre of back
- Warty/bumpy skin
- Short back legs for crawling versus jumping

### Eggs

- Laid in strings among emergent vegetation, along shallow shoreline areas or near the water surface on top of vegetation in deeper areas
- Eggs typically laid in April.

### Tadpoles

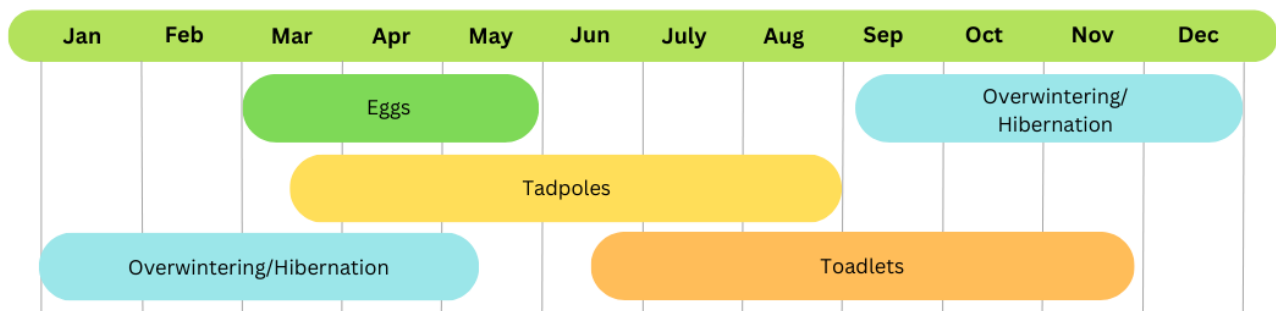
- Relatively large and chunky (can reach up to 5 cm body length)
- Black overall (difficult to see eyes); narrow tail fin.
- Typically present from May to July at lower elevations.

### Lifecycle

- Breeding window varies geographically (by latitude and elevation); in lowland areas of the coast, typically between March and August with courtship and spawning beginning in early March (**Figure 6**).
- Exhibit high site fidelity to natal breeding ponds.
- Eggs hatch in 3 – 12 days (dependent on temperature).
- Tadpoles metamorphose in 12 weeks into toadlets.
- Toadlets move away from aquatic breeding sites en mass, forming large post-metamorphic aggregations (often considered a ‘mass dispersal event’ or a ‘toadlet migration event’).
- Individuals reach sexual maturity at 2 – 6 years of age.
- Overwintering of adults and juveniles occurs between October and mid-February.



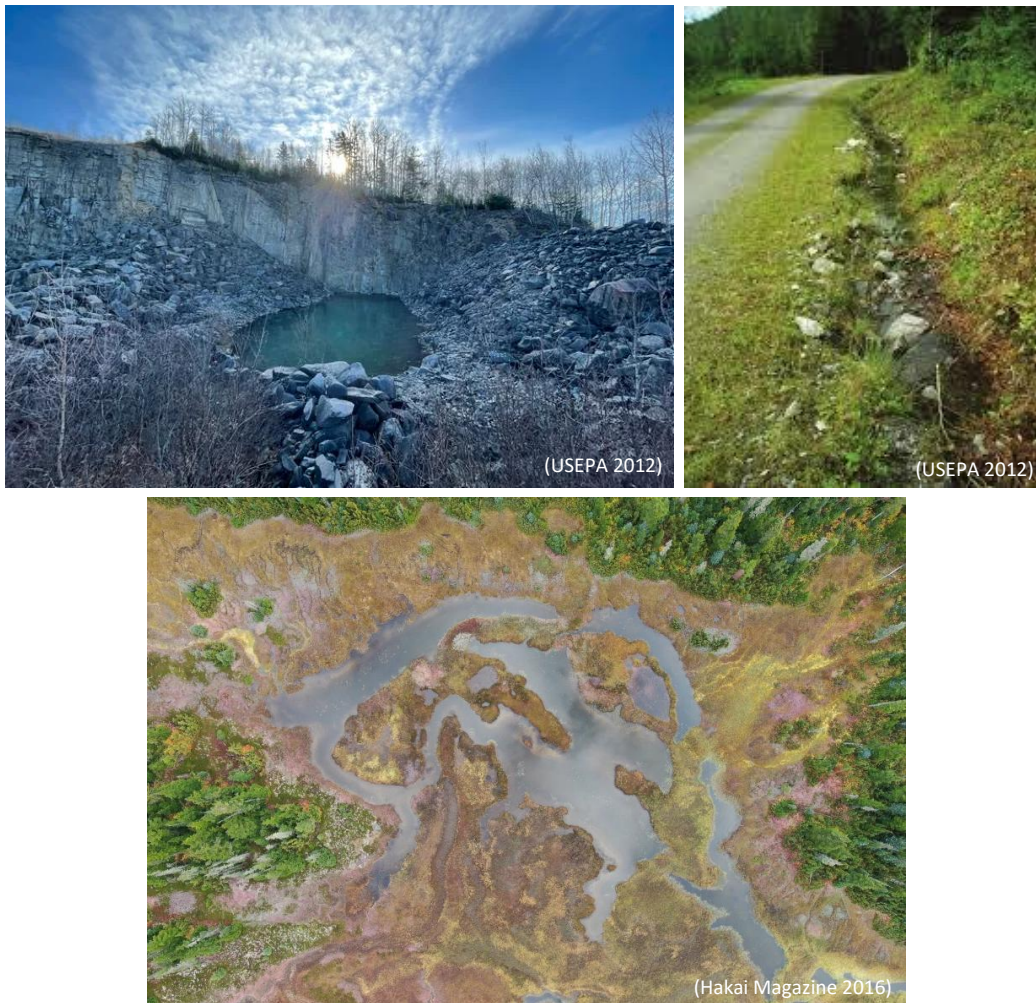
**Figure 5. Western Toad adult (top), egg strings (middle) and tadpole (bottom). See Appendix A for identification keys.**



**Figure 6. Western Toad phenology (adapted from South Coast Conservation Program, 2024b).** Phenology highly dependant on elevation and water temperature.

*Breeding Habitat*

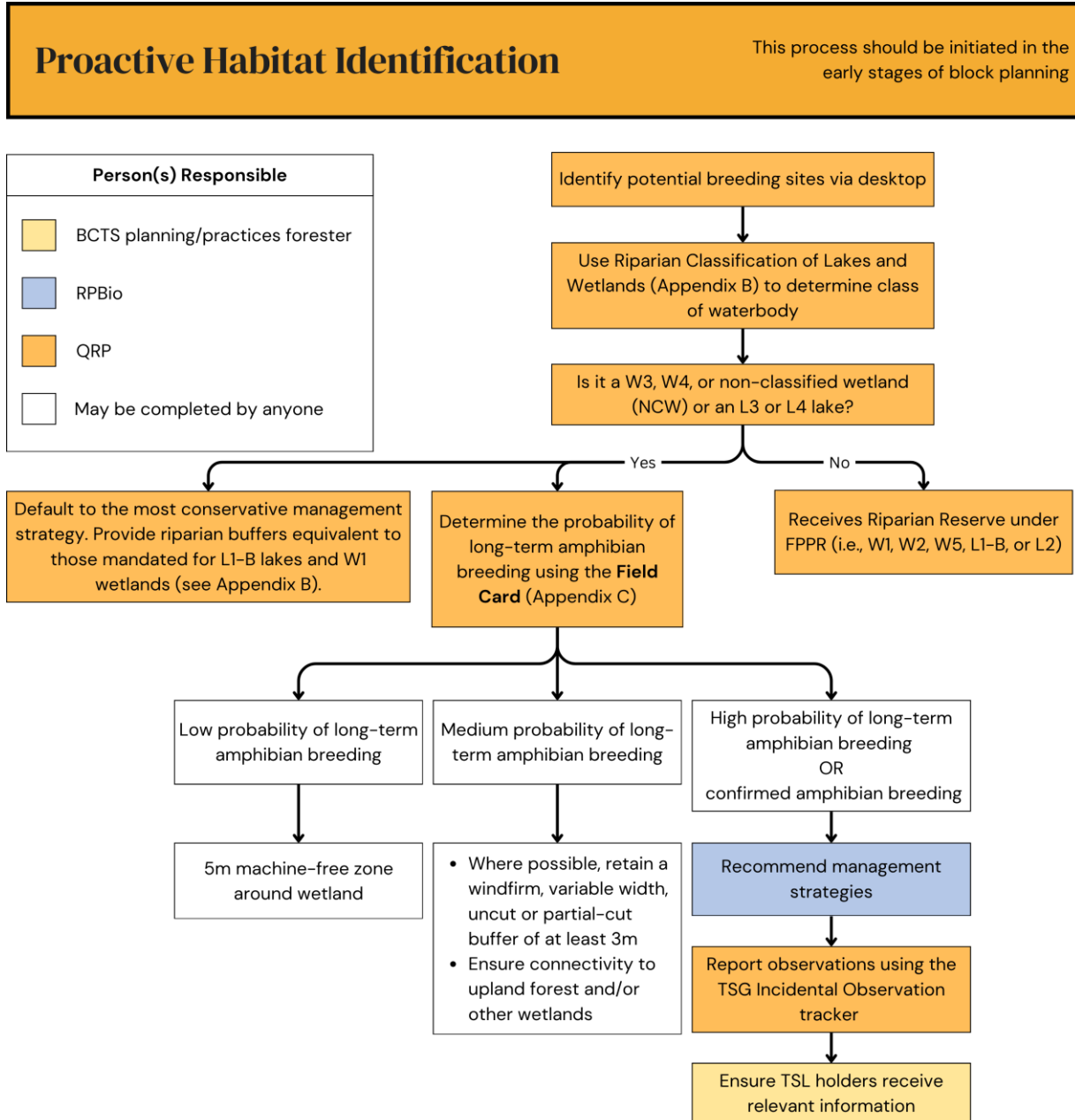
- Shallow edges of lakes, ponds, bogs, streams, and river estuaries generally below 2,250 meters in elevation (COSEWIC 2012; Ministry of Environment 2012; **Figure 7**).
- Natural waterbodies that:
  - contain >50 cm of standing water in early spring (February through April); retain standing water until at least August (tadpoles require approximately 3 months to metamorphose); a soft-bottom pond (i.e., build-up of humus/organic debris) may suggest longer hydroperiods.
  - provide a mosaic of open water habitat (e.g., approximately 50%) and emergent vegetation, especially herbaceous plants and thin-stemmed graminoids (e.g., sedges, rushes, and grasses),
  - have low current velocities (less than 2 cm/sec.), and
  - have relatively open canopy-cover conditions (e.g., less than 25% cover of trees and tall shrubs).
- Human-made waterbodies, including ponds in clearcuts, ditches and wheel ruts, which are ephemeral (Gyug 1996; Waldick et al. 1999), and water-filled quarries. Human-made breeding habitats that act as population sinks may have a negative effect on population persistence (COSEWIC 2012).



**Figure 7: Examples of Western Toad breeding habitats: abandoned rock quarry (top left); road-side ditch (top right); bog complex (bottom).** Red-legged Frogs may also use these areas for breeding.

## Framework for Proactive Amphibian Breeding Habitat Identification

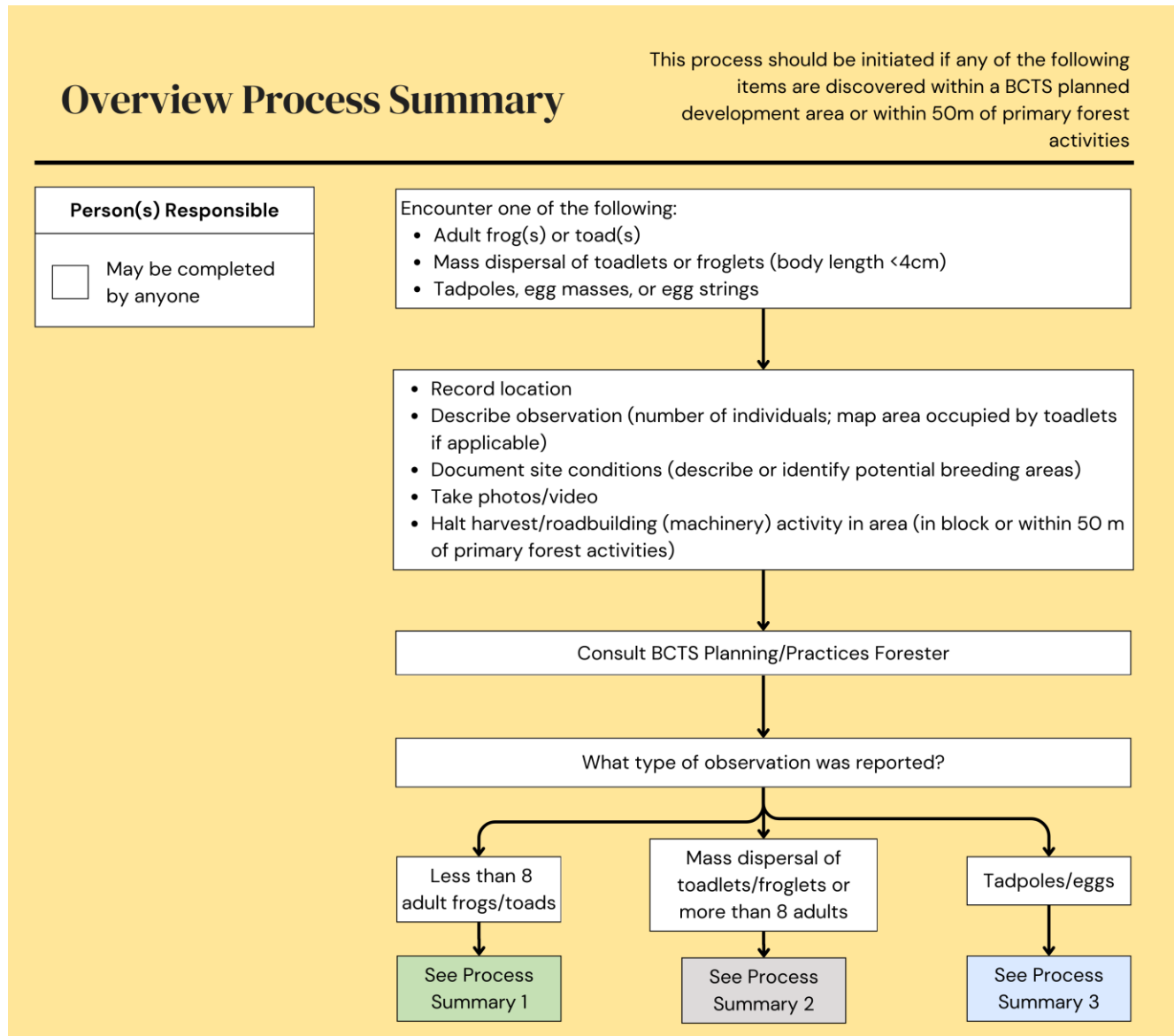
The following schematic demonstrates how to implement this BMP to proactively identify amphibian breeding habitat. Since small wetlands (< 0.5 ha), lakes, and unclassified wetlands do not receive protective buffers (i.e. reserve zones) under the Forest Planning and Practices Regulations (FPPR), it will be important to assess the amphibian breeding potential of these areas as a proactive measure to protect high-quality breeding habitat.



**Process summary for proactive identification of breeding habitat.** This process should occur early in the planning stage in order to identify potential breeding habitat for amphibians. FPPR is the Forest Planning and Practices Regulation. The Field Card (**Appendix C**) is a flow chart that assesses the quality of the waterbody to support long-term breeding. The results of the Field Card should be used by the R.P.Bio. to inform management strategies. For the definition of a QRP, refer to **Appendix E**.

## Framework for Encountering Amphibians in the Field

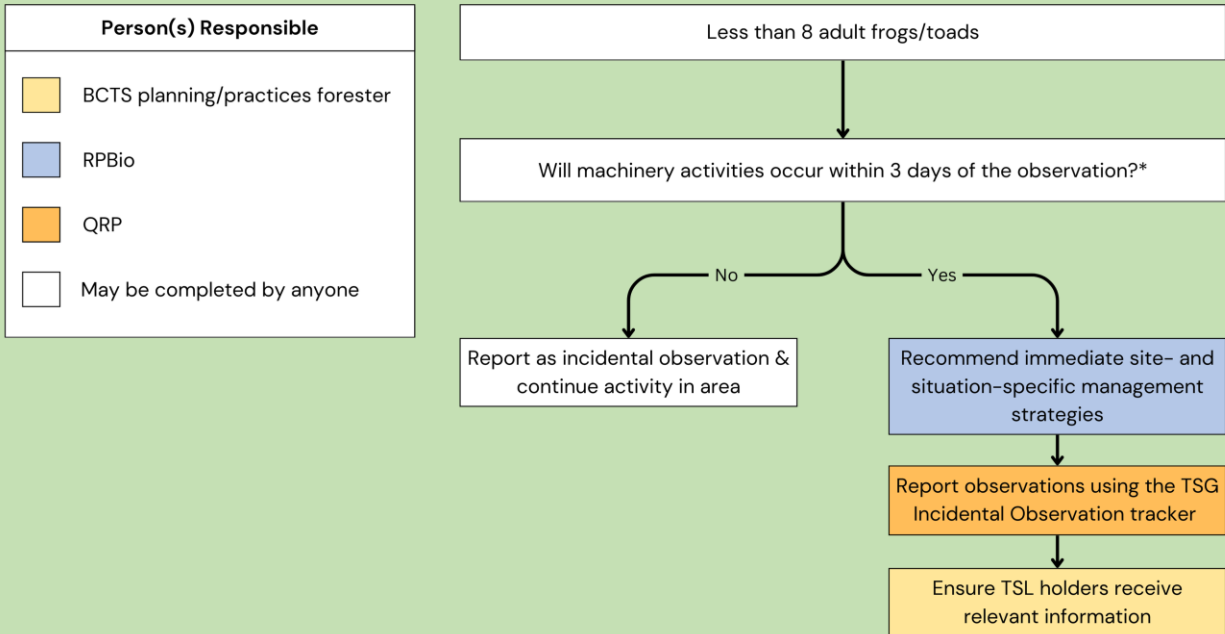
The following schematics demonstrate how to implement this BMP when encountering amphibians in the field.



**Overview process summary for the initial discovery of adult frogs/toads, mass dispersal events, or evidence of breeding.** This process summary may be completed by anyone working in BCTS-TSG operating areas (including contractors).

## Process Summary 1

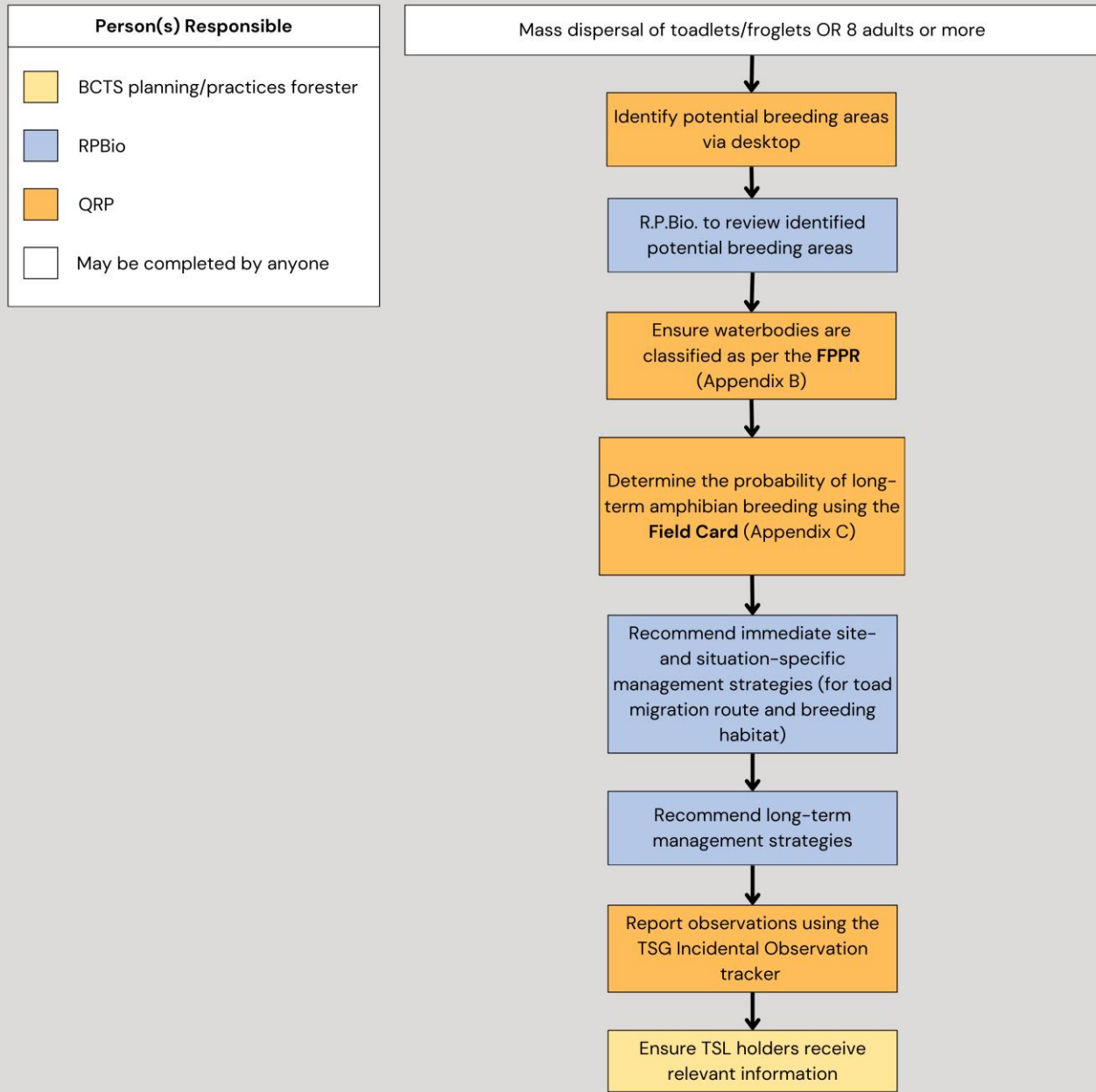
This process should be initiated if any of the following items are discovered within a BCTS planned development area or within 50m of primary forest activities



**Process summary 1 for the discovery of less than eight adult frogs or toads.** \*All adult frogs and toads are protected by the Wildlife Act; three machine-free days provides the adults an opportunity to disperse from the area and avoid harm.

## Process Summary 2

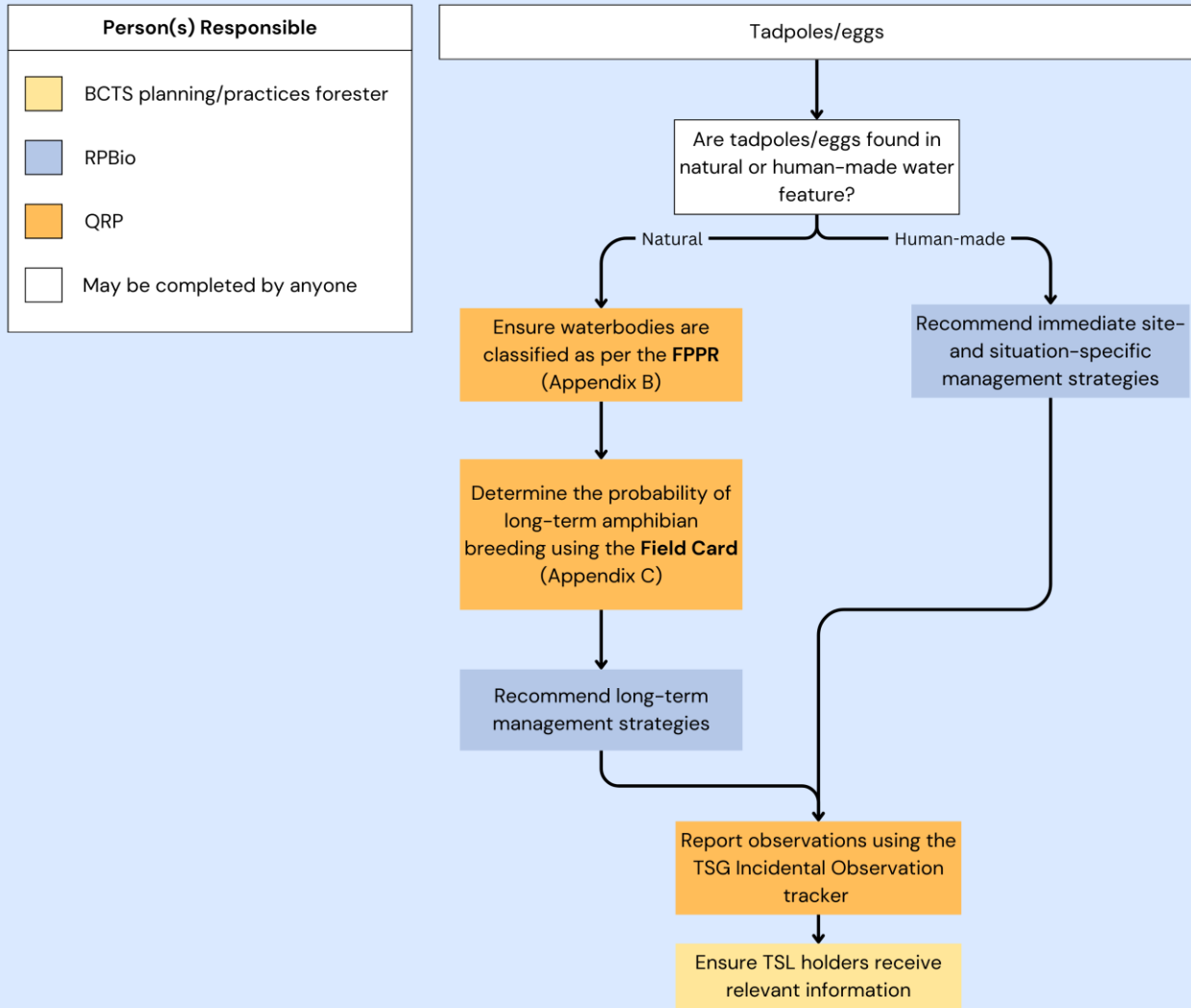
This process should be initiated if any of the following items are discovered within a BCTS planned development area or within 50m of primary forest activities



**Process summary 2 for the mass dispersal of toadlets/frogllets or eight or more adult frogs or toads (assuming that subsequent sightings are not the same individual).** The objective of this assessment is to confirm amphibian breeding. FPPR is the Forest Planning and Practices Regulation. The Field Card (**Appendix C**) is a flow chart that assesses the quality of the waterbody to support long-term breeding. The results of the Field Card should be used by the R.P.Bio. to inform management strategies.

## Process Summary 3

This process should be initiated if any of the following items are discovered within a BCTS planned development area or within 50m of primary forest activities



**Process summary 3 for the discovery of tadpoles or eggs.** FPPR is the Forest Planning and Practices Regulation. The Field Card (**Appendix C**) is a flow chart that assesses the quality of the waterbody to support long-term breeding. The results of the Field Card should be used by the R.P.Bio. to inform management strategies. For the definition of a QRP (Qualified Registered Professional), refer to **Appendix E**.

## Reporting Observations

Reporting breeding areas and amphibian observations offers valuable data to inform good stewardship and enhances provincial databases for population trend assessments. The reporting protocols are as follows:

- Report breeding areas to the BCTS Planning Forester. The GIS Team will add these to the TSG Wildlife Map layer.
- Add breeding areas and observations of individuals or groups of frogs/toads to the internal Incidental Observation Tracker. Tracker entries will be submitted to the BC Conservation Data Centre (BC CDC) biannually by the Planning Forester.
  - Include the following information for your submission:
    - Observation information: observer first and last name, email address, phone number; date and time of observation
    - Location of observation (latitude/longitude)
    - Description of observation (number of individuals; map area occupied by toadlets if applicable)
    - Photos/videos
- Ensure Timber Sale Licenses (TSL) holders receive relevant information.

## Management Strategies

Adhering to legal and non-legal regulations to protect Species of Management Concern (SOMC) is the priority of this BMP. As such, the following management strategies can be employed to protect amphibians and their breeding habitats, and approaches will often vary by the context in which they occur. Some strategies may be managed by the Practices Forester, while others may require further expertise from an R.P.Bio.

Aligning forest activities with amphibian life stages can reduce the risk of disturbance, especially during breeding and dispersal periods. When planning forest activities, take note of the following **considerations**:

- **Seasonal sensitivity** – Management strategies should consider the peaks and troughs of activity within the breeding season. For example, the “peak” of a toadlet migration may occur at different times at different sites. Thus, one site may return to operational activities sooner than another.
- **Operational intensity** – Different operational stages vary in their impact to amphibians. For example, planning and development tend to be low impact, but harvesting and hauling are much more disruptive.
- **Frequency of disturbance** – Some activities require frequent site access, while others do not. For example, hauling causes frequent site disturbance, whereas planning does not.

The **Practices Forester** may employ several strategies to mitigate risks to amphibians, including the following:

- **Delay disturbance activities** – If feasible, delay disturbance activities until after the breeding window (March – August), or until the risk to amphibians have decreased.
- **Prescribe amphibian protection as a Riparian Management Zone measure** – Increased protection for the Riparian Management Zone (RMZ) may be prescribed to follow the same restrictions set out in section 51(1) of the Forest Planning and Practices Regulation (FPPR) for operating in the Riparian Reserve Zone (see **Appendix E**).

An **R.P.Bio.** may employ numerous management strategies to mitigate risks to amphibians. They vary in scope, timing, and context:

- **Fencing** – Exclusion fencing or amphibian passage structures may be recommended to prevent individuals from entering specific areas or to guide them toward safer zones. For example, fencing is often installed to prevent road mortality during toadlet dispersal events. The fencing is typically made of materials like plastic sheeting or fine mesh and must be properly installed to be effective, often requiring maintenance to ensure it remains functional.
- **Monitoring** – An R.P.Bio. may recommend that they monitor a construction site to ensure compliance with environmental regulations and mitigate impacts to amphibians. Monitoring is a good option for infrequent activities where risks to amphibians were identified as high (e.g., replacing a culvert).
- **Salvages** – Although not an immediate mitigation measure, amphibian salvages can be an effective strategy for one-time planned development projects that need to proceed within known amphibian breeding habitats during the breeding season due to other constraints. Amphibian salvages must be planned well in advance since obtaining salvage permits can be a lengthy process (expect 4 – 6 months). They must be led by a R.P.Bio. with knowledge of amphibian biology. Refer to the Best Management Practices for Amphibian and Reptile Salvages in British Columbia (MFLNRO 2016) for more details.
- **Deterrents** – Deterrents may be appropriate in situations where amphibians are found breeding in human-made waterbody, such as a quarry or a ditch line, and there are plans to re-activate the area in the near future. Some options are to install exclusion fencing, infill, or installing a culvert to drain standing water before breeding commences.
- **Riparian Management Area and Connectivity Reserve** – Such areas may be designed around occupied wetlands within proposed cutblocks, and should include windfirm buffers surrounding wetlands, a minimum 10m reserve zone, and windfirm corridors between two or more occupied wetlands. The design of wetland riparian management areas must follow the ecological characteristics outlined in IWMS (2004), Forest Stewardship Plans (FRPA 2004), and/or Forest Landscape Plans. For recommendations on buffer and road layout, refer to **Appendix D**.

**Land managers** may decide to employ multiple management strategies to address a situation. The following are several examples for common situations encountered in the TSG, yet the approach presented here may vary by each unique situation:

- 
- **Toadlet Dispersal Events** - In areas with historically documented dispersal events, exclusion fencing or amphibian passage structures for toadlets may be pre-emptively installed prior to dispersal events. A 30 m buffer zone should be adhered to around these features (Develop With Care 2014). Install signage adjacent to fencing and amphibian passage structures to alert workers of their presence.
  - **Breeding amphibians in Human-made waterbody** – For example, tadpoles may be observed in a quarry. Should such an observation be made, mitigation strategies include the following options: (a) delay activities until the breeding window has passed, (b) install exclusion fencing to contain and/or direct metamorphosing adults, (c) conduct a salvage, and/or (d) employ deterrents such as infilling the quarry (once the breeding season has finished).

## Adaptive Management

This protocol will be reviewed every 5 years (or as required, through continuous improvement), based on monitoring results and available literature related to Red-legged Frog and Western Toad biology and habitat management.

## Literature Cited

- Environment and Climate Change Canada. 2016. Management Plan for the Western Toad (*Anaxyrus boreas*) in Canada [Proposed]. Species at Risk Act Management Plan Series. Environment and Climate Change Canada, Ottawa. iv + 38 pp.
- Environment Canada. 2016. Management Plan for the Northern Red-legged Frog (*Rana aurora*) in Canada [Proposed]. *Species at Risk Act* Management Plan Series. Environment Canada, Ottawa. 4 pp.+ Annex.
- FPPR. 2004. Forest Planning and Practices Regulation. Forest and Range Practices Act. Ministry of Forests. <https://canlii.ca/t/56d45>.
- Gyug, L.W. 1996. Timber-harvesting effects on riparian wildlife and vegetation in the Okanagan Highlands of British Columbia. British Columbia Ministry of Environment, Lands and Parks, Wildlife Branch, Victoria, British Columbia. Wildlife Bulletin No. B-97. 112 pp.
- IWMS. 2004. Accounts and measures for managing identified wildlife. Version 2004. BC Ministry of Water, Land and Resource Stewardship, Victoria, BC.
- COSEWIC. 2012. COSEWIC assessment and status report on the Western Toad *Anaxyrus boreas* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xiv + 71 pp. ([www.registrelep-sararegistry.gc.ca/default\\_e.cfm](http://www.registrelep-sararegistry.gc.ca/default_e.cfm)).
- COSEWIC. 2015. COSEWIC assessment and status report on the Northern Red-legged Frog *Rana aurora* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xii + 69 pp. ([www.registrelep-sararegistry.gc.ca/default\\_e.cfm](http://www.registrelep-sararegistry.gc.ca/default_e.cfm)).
- MFLNRO. 2014. Guidelines for Amphibian and Reptile Conservation during Urban and Rural Land Development in British Columbia. Ministry of Forests, Lands and Natural Resource Operations.
- Ministry of Environment. 2012. BC FrogWatch Program: Western Toad. British Columbia Ministry of Environment and Parks. Retrieved from <https://www.env.gov.bc.ca/wld/documents/westerntoad.pdf>
- Ministry of Forest, Lands and Natural Resource Operations. 2016. Best management practices for amphibian and reptile salvages in British Columbia. <https://coms.api.gov.bc.ca/api/v1/object/a22973c8-ec10-4866-9c9b-709f56a3d601>
- South Coast Conservation Program. 2024a. Northern Red-legged Frog. Retrieved from <https://www.sccp.ca/species-habitat/northern-red-legged-frog>
- South Coast Conservation Program. 2024b. Western Toad. Retrieved from <https://www.sccp.ca/species-habitat/western-toad>
- Waldick, R.C., B. Freedman, and R.J. Wassersug. 1999. The consequences for amphibians of the conversion of natural, mixed-species forests to conifer plantations in southern New Brunswick, Canada. *Canadian Field-Naturalist* 113:404-418.
- Wind, E. 2003. Aquatic-breeding Amphibian Monitoring Program: Analysis of Small Wetland Habitats on Vancouver Island. Annual Progress Report 2002 prepared for Weyerhaeuser BC Coastal Group. Nanaimo, BC.
- Wind, E. 2008. Small Wetland and Amphibian Assessment Field Card. Developed for Western Forest Products, Campbell River, BC.

## Photographs Cited

- Batten, R. (2022). *Northern Red-legged Frog* [Photograph]. Salt Spring Island Conservancy. <https://saltspringconservancy.ca/portfolio-items/northern-red-legged-frog/>
- BCWF 2023. <https://bcwf.bc.ca/world-wetlands-day-2023/>.
- Gillingwater. (2012). Red-legged Frog [Photograph]. Canadian Herpetological Society. [https://canadianherpetology.ca/species/species\\_page.html?cname=Northern%20Red-legged%20Frog](https://canadianherpetology.ca/species/species_page.html?cname=Northern%20Red-legged%20Frog)

- Gross, S. (2023). Western toad (*Anaxyrus boreas*) tadpole swimming among Lily pads (Nymphaeaceae) in lake, Vancouver Island, British Columbia, Canada [Photograph]. Nature Picture Library.  
<https://www.naturepl.com/stock-photo-western-toad-anaxyrus-boreas-tadpole-swimming-among-lily-pads-nature-image01726389.html>
- Hakai Magazine 2016. <https://hakaimagazine.com/videos-visuals/secret-world-bog/>
- Leeson, P., and Leeson, T. (2012). Western Toad egg strings (*Anaxyrus boreas*, formerly *Bufo boreas*) [Photograph]. Tom & Pat Leeson Master Wildlife Photographers.  
<https://www.leesonphoto.com/image/I0000sRhFCsc396w>
- Nafis, G. (2024a). Eggs in early march [Photograph]. California Herps.  
<https://californiaherps.com/frogs/pages/r.aurora.tadpoles.html>
- Nafis, G. (2024b). Recently hatched tadpole [Photograph]. California Herps.  
<https://californiaherps.com/frogs/pages/r.aurora.tadpoles.html>
- Stuart, J. (2010a). Boreal Toad (*Bufo boreas*), 2-yr-old juvenile [Photograph]. Flickr.  
<http://www.flickr.com/photos/21786539@N03/4946076300>
- Stuart, J. (2010b). Boreal Toad (*Bufo boreas*), 2-yr-old juvenile [Photograph]. Flickr.  
<http://www.flickr.com/photos/21786539@N03/4946076300>
- USEPA 2012. [chrome-extension://efaidnbnmnnibpcjpcglclefindmkaj/https://dirtandgravel.psu.edu/wp-content/uploads/ESM\\_Field\\_Guide.pdf](chrome-extension://efaidnbnmnnibpcjpcglclefindmkaj/https://dirtandgravel.psu.edu/wp-content/uploads/ESM_Field_Guide.pdf)

# Appendix A

## Identification Keys: Amphibian Eggs and Adults

Click this [LINK](#) to access the web version.

**IDENTIFICATION KEY:  
AQUATIC AMPHIBIAN EGGS ON VANCOUVER ISLAND AND THE GULF ISLANDS**



Are the eggs small (diameter 1.5 mm) and black AND in long strings of jelly, which may be tangled together or amongst sticks or vegetation?



Are the eggs found singly, often attached to thin-stemmed plants or hidden in a folded leaf? AND, do they have a thin (less than egg diameter) jelly coat?



Are the eggs found singly or in a small (usually < 5 cm diameter), firm, globular or elongated cluster? AND, are individual eggs large (diameter ≥ 2 mm) surrounded by a thick jelly coat (>2 times egg diameter), making them appear widely spaced?



Are the eggs in a small (usually < 5 cm diameter), soft globular or elongated cluster? AND, are individual eggs small (diameter ≤ 1.5 mm) surrounded by a thin jelly coat (< 2 times egg diameter), making them appear closely packed?



Key developed by Kristiina Ovaska & produced by the Salt Spring Island Conservancy in partnership with British Columbia Ministry of Environment.



Are the eggs in a large ( $\geq 10$  cm diameter), firm, globular cluster, often attached to a stick or submerged vegetation? AND, are individual eggs within the cluster large ( $\geq 2$  mm diameter), surrounded by a thick jelly coat ( $> 2$  times egg diameter), making them appear widely spaced? *Green algae sometimes surround each egg* (see photo on left).



Are the eggs in a large ( $\geq 10$  cm diameter), loose, closely packed cluster, usually attached to vegetation or submerged debris, sometimes floating and spread out? Found in EARLY SPRING. *Green algae sometimes surround each egg.*



Are the eggs in a broad sheet of jelly floating on water surface, often over dense vegetation? AND is the egg mass LESS THAN 30 CM in diameter? Found in EARLY – LATE SUMMER.

Are the eggs in a broad sheet of jelly floating on the water surface over dense vegetation? AND is the egg mass MORE THAN 30 CM in diameter? Found in EARLY – LATE SUMMER.



Funding provided by:



**IDENTIFICATION KEY**

**FROGS AND TOADS OF VANCOUVER ISLAND**



Does the frog have parotoid glands and tough warts on skin?

**YES** **Western Toad** **YES**  
*Bufo boreas*

**NO**



Does the frog have prominent adhesive toe pads on the front feet?

**YES** **Pacific Treefrog** **YES**  
*Pseudacris regilla*

**NO**



Is the frog brown with a black facial mask with red on the inner thighs?

**YES** **Red-legged Frog** **YES**  
*Rana aurora*

**NO**



Does the frog have a prominent dorso-lateral fold?

**YES** **Green Frog**  
*Rana clamitans*



Does the frog have a skin fold following the shape of the eardrum?

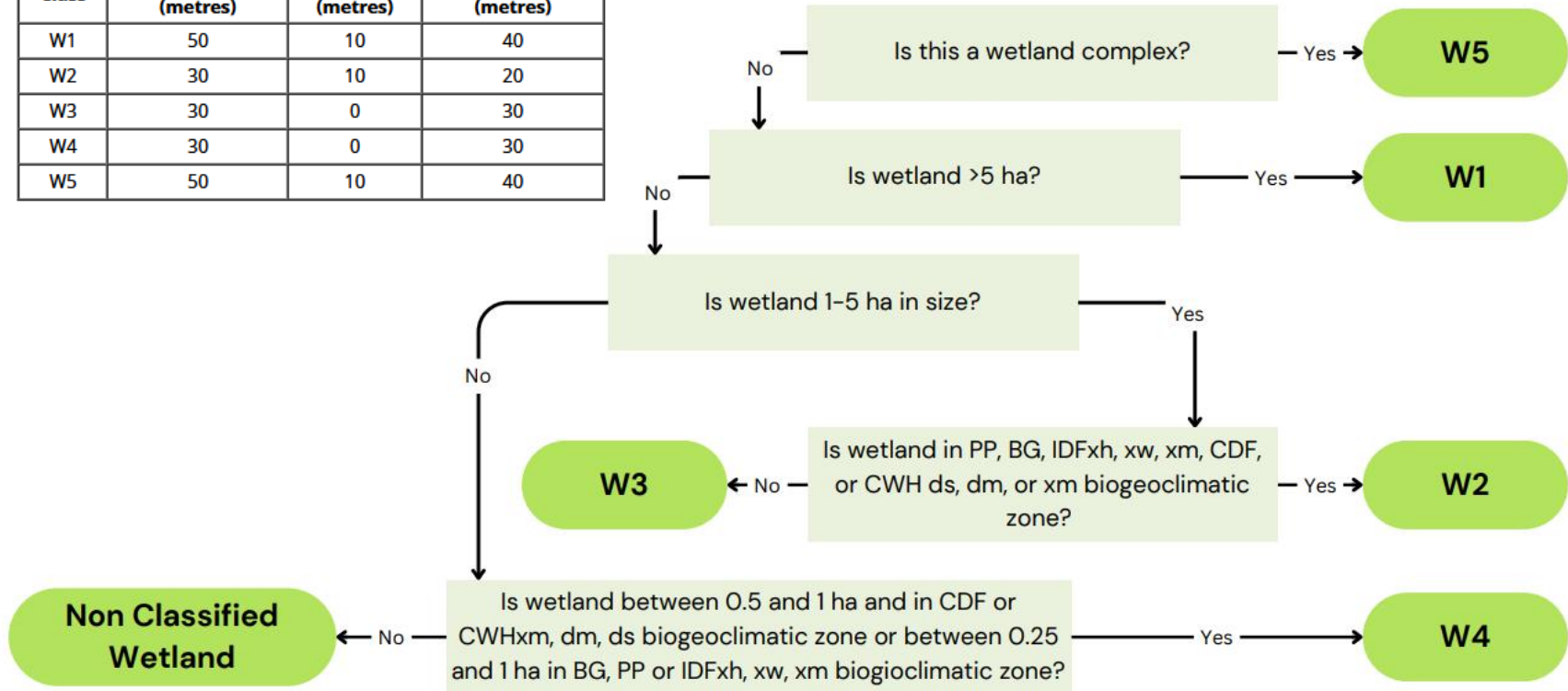
**Bullfrog** **YES**  
*Rana catesbeiana*

Both **introduced species** are brownish olive green with ear membranes larger than diameter of the eye. Males of both species have bright yellow throats during the breeding season.

Key to Riparian Classification of Wetlands and Lakes

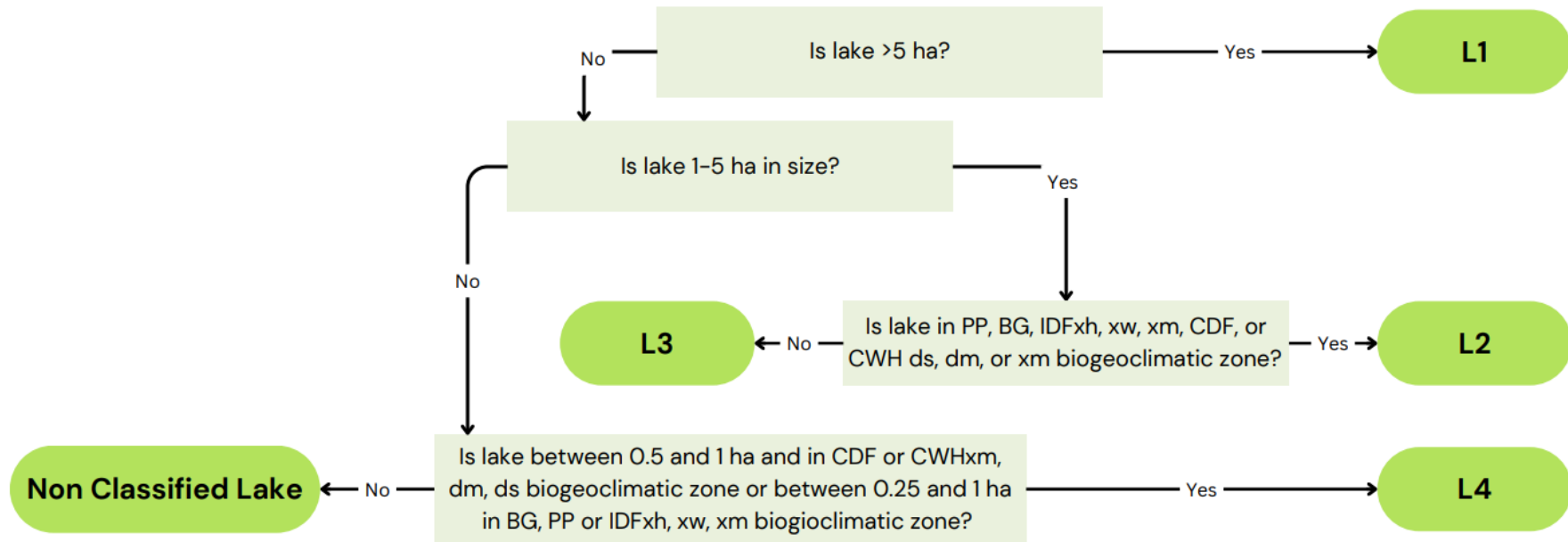
**Key to riparian classification of wetlands** Adapted from the Riparian Management Area Guidebook

Riparian Class	Riparian Management Area (metres)	Riparian Reserve Zone (metres)	Riparian Management Zone (metres)
W1	50	10	40
W2	30	10	20
W3	30	0	30
W4	30	0	30
W5	50	10	40



# Key to riparian classification of lakes

Adapted from the Riparian Management Area Guidebook

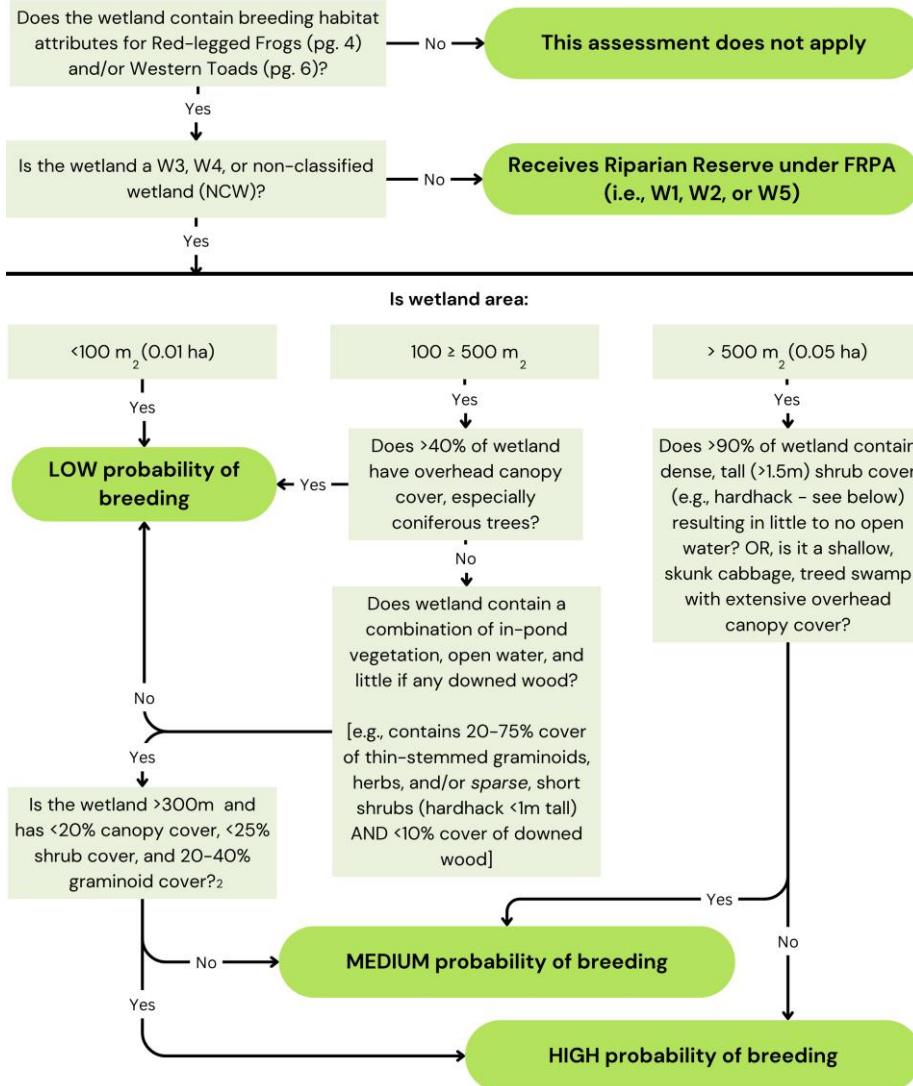


Riparian Class	Riparian Management Area (metres)	Riparian Reserve Zone (metres)	Riparian Management Zone (metres)
L1-A	0	0	0
L1-B	10	10	0
L2	30	10	20
L3	30	0	30
L4	30	0	30

## Small wetland and amphibian assessment field card

Adapted from Elke Wind

\*If conducting this assessment during the breeding season, survey the wetland for evidence of breeding amphibians (i.e. eggs and tadpoles)\*



### Definitions

**Wetland Area:** Based on the entire wetland, not just the wetted area (up to the high water mark/forest edge; maximum length x average width). Walk into and along the entire length of the wetland to be sure of its size and cover of in-pond vegetation

**Hardhack, or *Spiraea douglasii*:** A woody shrub that grows in wet areas and has a terminal cluster of tiny pink or deep rose flowers. It can grow very dense and tall, blocking light and reducing the amount of open water habitat.

Thin-stemmed graminoids are grasses, rushes, and some sedges (<5 mm across) used as egg attachment sites by amphibians.

**This field card assists in determining the probability of a waterbody to support long-term amphibian breeding. The results of the Field Card should be presented to an R.P.Bio. to guide management strategies.**

### Riparian Buffers, Management Zones, and Road Layout and Design for Red-legged Frogs and Western Toads

#### Objectives of Riparian Buffers

Riparian buffers may serve two main purposes:

1. to protect the integrity of the aquatic habitat (e.g., water temperature and quality), and
2. to provide terrestrial habitat for newly transformed juvenile amphibians (e.g., moist, cool microhabitats)

In order to provide adequate moisture and suitable temperatures within the terrestrial environment for small, newly transformed toadlets or newly emerged frogs (#2 above), riparian buffers may need to be larger. However, limitations may exist on the amount and/or configuration of retention that can be left at some blocks (e.g., when numerous small ponds exist throughout the block). In order to meet these objectives, it may be desirable to design some riparian buffers in ways that do not follow the standard 'donut' style configuration. For example, riparian buffers that are skewed towards the southwest section of the pond may shade the pond during the hottest part of the day and provide more suitable terrestrial habitat (e.g., be more windfirm and retain moisture longer; see Fig. 8).

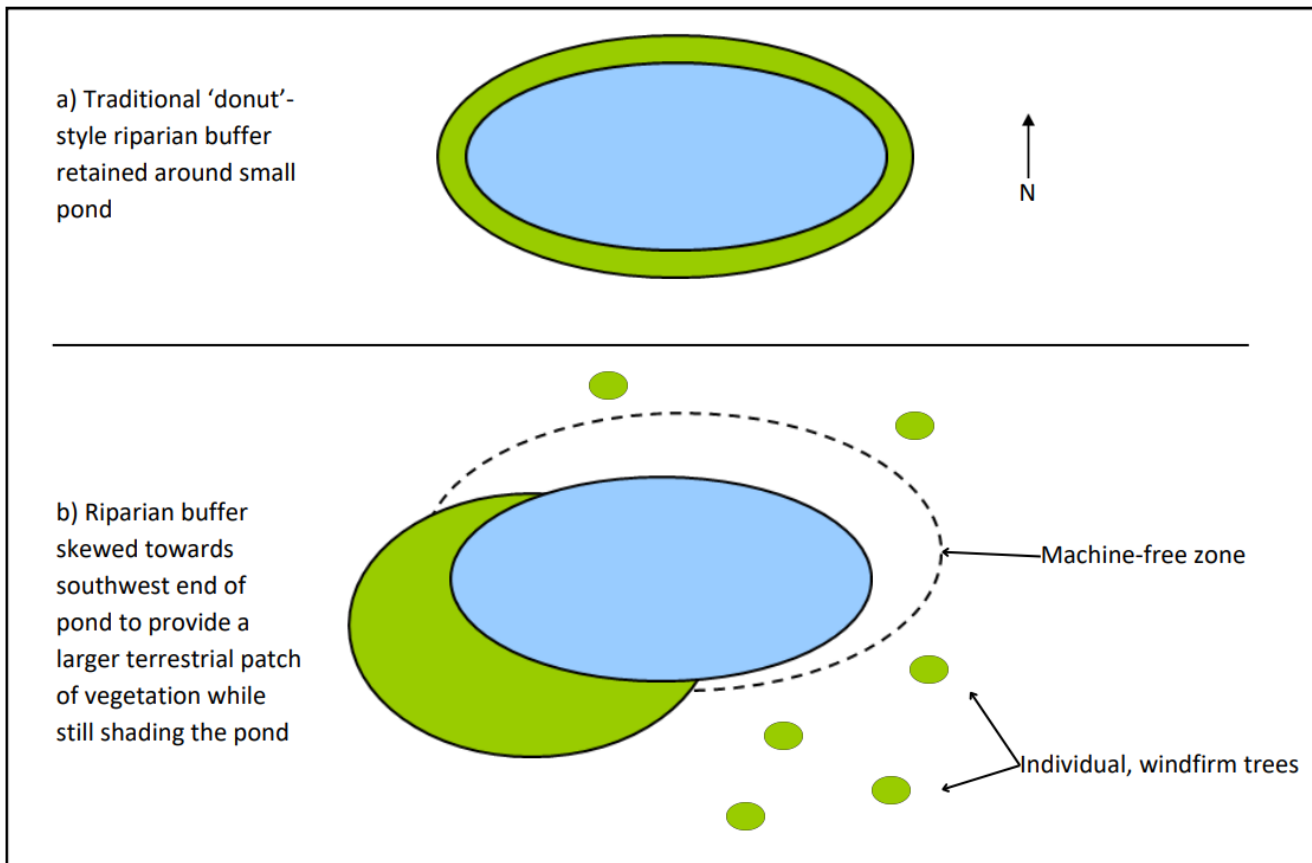


Figure 8. Riparian buffer option to protect both in-pond and terrestrial habitat.

When numerous ponds occur within a block, instead of retaining small patches of trees around many ponds, consider creating machine-free zones around the smaller ponds or those largely covered in Hardhack that may have short hydroperiods (e.g., those that dry in May or early June), and allocating extra retention around larger ponds with more open water and longer hydroperiods; these latter ponds are more likely to be utilized for breeding and/or provide moist habitats throughout summer. Ensure windfirm buffers by allocating extra trees to the buffer and/or pruning trees or feathering edges.

Besides breeding ponds, priority areas for retention for Western Toads and Red-legged Frogs include wet depressions and streams. The minimum protection for all wet areas, ponds, springs, and creeks (regardless of size or hydroperiod) should include the hanging of machine-free ribbon along the perimeter to ensure that ground vegetation is protected, limbs and debris do not end up clogging these areas, and to avoid soil compaction, changes to water flows, etc.

### **Road Design and Layout**

- Locate roads as far away from water bodies and wet depressions as possible.
- Plan roads to avoid crossing ponds and wetlands.
- Avoid placing roads between hill slopes and water bodies as this will intercept/impepe natural hydrological processes.
- Retain vegetation/riparian buffers along the shorelines of water bodies and wet depressions adjacent to roads.
- Avoid creating ponded water areas adjacent to roads (i.e., in ditches and around culverts on upstream/upslope sides of roads).
- Design ditches to drain quickly (e.g., within a day). Install more, versus fewer, culverts to allow water to follow natural drainage patterns.
- If practicable, road building within 50m of wetlands should occur outside of the breeding period (e.g. conduct road building from September to February).

## Appendix E

### Definitions

Human-made Waterbody	<p>Activities such as quarrying and ditching can lead to the creation of human-made water features. Such features are not formed under natural processes, are not part of any natural drainage system, and are usually located near existing road networks. Examples of human-made water features are abandoned quarries that have filled with water or constructed ditch networks adjacent to roads. Be mindful that some ditches may qualify as natural water features if a pre-existing stream has been channelized. Water presence is usually seasonal in human-made water features but may persist year-round. Moisture-tolerant vegetation is usually lacking but may occur in or around a feature that has been established for several years.</p>
Natural Waterbody	<p>Such features include rivers, streams, wetlands, and lakes that are established components of the landscape formed under natural processes. Natural water features are often associated with distinct vegetation types that are indicative of high soil moisture content, such as sedges, rushes, and reeds. The presence of water can be seasonal or perennial, depending on local hydrological regimes.</p>
Qualified Registered Professional (QRP)	<p>Applied scientist or technologist, specializing in a particular applied science including agrology, biology, forestry and/or engineering. The individual must be registered in good standing in British Columbia with their appropriate professional organization, acting under that association’s Code of Ethics and subject to disciplinary action by that association. Through suitable education, experience, accreditation and knowledge, this person may be reasonably relied on to provide advice with their area of expertise (APEGBC, 2012 and MOE, 2012). A QRP includes but is not limited to, those individuals with the following designations: Registered Professional Biologists (R.P.Bio.), Registered Professional Foresters (RPF), Registered Biology Technologists (R.B.Tech.), and Registered Forest Technologists (RFT).</p>
Riparian Management Area Restrictions	<p>A person must not construct a road in a riparian management area, unless one of the following applies:</p> <ol style="list-style-type: none"> <li>a. locating the road outside the riparian management area would create a higher risk of sediment delivery to the stream, wetland or lake to which the riparian management area applies;</li> <li>b. there is no other practicable option for locating the road;</li> <li>c. the road is required as part of a stream crossing.</li> </ol> <p>If a road is constructed within a riparian management area, a person must not carry out road maintenance activities beyond the clearing width of the road, except as necessary to maintain a stream crossing.</p> <p>A person who is authorized in respect of a road must not remove gravel or other fill from within a riparian management area in the process of</p>

- constructing, maintaining or deactivating a road, unless
- a. the gravel or fill is within a road prism,
  - b. the gravel or fill is at a stream crossing, or
  - c. there is no other practicable option.

Riparian Reserve Zone Restrictions

An agreement holder must not cut, modify or remove trees in a riparian reserve zone, except for the following purposes:

- a. felling or modifying a tree that is a safety hazard, if there is no other practicable option for addressing the safety hazard;
- b. topping or pruning a tree that is not wind firm;
- c. constructing a stream crossing;
- d. creating a corridor for full suspension yarding;
- e. creating guyline tiebacks;
- f. carrying out a sanitation treatment;
- g. felling or modifying a tree that has been windthrown or has been damaged by fire, insects, disease or other causes, if the felling or modifying will not have a material adverse impact on the riparian reserve zone;
- h. felling or modifying a tree under an occupant licence to cut, master licence to cut or free use permit issued in respect of an area that is subject to a licence, permit, or other form of tenure issued under the Land Act, Coal Act, Geothermal Resources Act, Mines Act, Mineral Tenure Act, Mining Right of Way Act, Ministry of Lands, Parks and Housing Act or Petroleum and Natural Gas Act, if the felling or modification is for a purpose expressly authorized under that licence, permit or tenure;
- i. felling or modifying a tree for the purpose of establishing or maintaining a recreation site, recreation trail, recreation facility, trail-based recreation area or interpretive forest site.

An agreement holder who fells, tops, prunes or modifies a tree under subsection (1) may remove the tree only if the removal will not have a material adverse effect on the riparian reserve zone.

An agreement holder must not carry out the following silviculture treatments in a riparian reserve zone:

- a. grazing or broadcast herbicide applications for the purpose of brushing;
- b. mechanized site preparation or broadcast burning for the purpose of site preparation;
- c. spacing or thinning

Riparian Management Zone Restrictions

A holder of a minor tenure who fells trees in a cutblock within a riparian management zone of a class described in Column 1 must ensure that

- a. the percentage of the total basal area within the riparian management zone specified in Column 2 is left as standing trees, and
- b. the standing trees are reasonably representative of the physical structure of the riparian management zone, as it was before harvesting:

Column 1 Riparian Class	Column 2 Basal Area to be Retained Within Riparian Management Zone (%)
S1-A or S1-B stream	≥ 20

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S2 stream	≥ 20
S3 stream	≥ 20
S4 stream	≥ 10
S5 stream	≥ 10
S6 stream	Not applicable
All classes of wetlands or lakes	≥ 10

An authorized person who cuts, modifies or removes trees in a riparian management zone for an S4, S5 or S6 stream that has trees that contribute significantly to the maintenance of stream bank or channel stability must retain enough trees adjacent to the stream to maintain the stream bank or channel stability, if the stream

- a. is a direct tributary to an S1, S2 or S3 stream,
  - b. flows directly into the ocean, at a point near to or where one or more of the following is located:
    - i. a herring spawning area;
    - ii. a shellfish bed;
    - iii. a saltwater marsh area;
    - iv. an aquaculture site;
    - v. a juvenile salmonid rearing area or an adult salmon holding area,
 or
  - c. flows directly into the ocean at a point near to the location of an area referred to in paragraph (b) and failure to maintain stream bank or channel stability will have a material adverse impact on that area.
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Approved by:

*Norman Kempe*

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Timber Sales Manager

BCTS Strait of Georgia

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