

**Standardized Inventory Methodologies for  
Components of British Columbia's Biodiversity:  
Pond-breeding Amphibians and Painted Turtle**

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### 3. Protocols

The rationale for using standard techniques in inventory and monitoring work is that the results of different studies are much more likely to be comparable (Heyer *et al.* 1994:17). However, simply using the same methods will not guarantee that the data gathered are equivalent. This is partly because the ecological role of individuals and species is context-dependent. Local weather conditions and topography, intrinsic population characteristics, and chance events can cause population fluctuations from year to year. Life history characteristics and the ecological role of a species can vary temporally, geographically, and with the presence or absence of other species with which it interacts. Also, the efficiency of a particular method of sampling can vary with the physical conditions of the site, weather conditions, and the experience of the collectors. Thus, caution should be exercised when attempting to compare results among studies, sites, or through time.

The objectives of the study, the urgency of the management decisions to be made, and cost effectiveness will dictate the methods to be used and the number and type of replicate samples required. Often, several different methods may be needed to address different aspects of a study. As new information is obtained, new questions and hypotheses may be formed, the objectives redefined and the methods modified. Typically, there will be a trade-off between the amount of time and money an investigator can devote to a particular plot or site and the number of replicate plots or sites that it is possible to establish (Hairston 1989).

The first step in any inventory project is to clearly state the objectives of the study. The objectives addressed by the methods presented in this manual include: verification of presence, assessment of species richness, estimation of relative abundance, determination of density, and documentation of habitat use. Because amphibians have both terrestrial and aquatic phases, both habitats sometimes need to be sampled. Cover boards, pitfall traps, and quadrat sampling are suitable for terrestrial habitats, while larval surveys focus on aquatic habitats. Systematic surveys, breeding surveys and auditory surveys are applicable to both habitats. Over the year, repeated surveys of both terrestrial and aquatic habitats may be needed to provide the required data.

Table 2 presents the recommended methodologies on a species by species basis for three levels of inventory: presence/not detected (possible), relative abundance, and absolute abundance.

**Table 2. Applicability of described herpetofauna inventory methods to individual species in the inventory group.**

Species	Inventory Methods		
	Presence/ Not detected (possible)	Relative Abundance	Absolute Abundance
<b>Tiger Salamander</b>	Time-constrained search Systematic survey	Systematic survey Larval survey Pitfall and funnel traps	Mark-recapture
<b>Northwestern Salamander</b>	Time-constrained search	Systematic survey	Mark-recapture

	Systematic survey	Larval survey Pitfall and funnel traps	
<b>Long-toed Salamander</b>	Time-constrained search Systematic survey	Systematic survey Larval survey Pitfall and funnel traps	Mark-recapture
<b>Rough-skinned Newt</b>	Road survey Time-constrained search Systematic survey	Systematic survey Larval survey Pitfall and funnel traps	Mark-recapture
<b>Great Basin Spadefoot Toad</b>	Auditory survey Time-constrained search Systematic survey	Systematic survey Larval survey Pitfall traps	Mark-recapture
<b>Western Toad</b>	Road survey Time-constrained search Systematic survey	Systematic survey Larval survey Pitfall and funnel traps	Mark-recapture
<b>Pacific Treefrog</b>	Auditory survey Time-constrained search Systematic survey	Systematic survey Larval survey Pitfall traps	Mark-recapture
<b>Striped Chorus Frog</b>	Auditory survey Time-constrained search Systematic survey	Systematic survey Larval survey Pitfall traps	Mark-recapture
<b>Red-legged Frog</b>	Time-constrained search Systematic survey	Systematic survey Larval survey Pitfall traps	Mark-recapture
<b>American Bullfrog</b>	Auditory survey Time-constrained search Systematic survey	Systematic survey Larval survey Pitfall traps	Mark-recapture
<b>Green Frog</b>	Auditory survey Time-constrained search Systematic survey	Systematic survey Larval survey Pitfall traps	Mark-recapture

<b>Northern Leopard Frog</b>	Auditory survey	Systematic survey	Mark-recapture
	Time-constrained search	Larval survey	
	Systematic survey	Pitfall traps	
<b>Spotted Frog</b>	Time-constrained search	Systematic survey	Mark-recapture
	Systematic survey	Larval survey	
		Pitfall traps	
<b>Wood Frog</b>	Auditory survey	Systematic survey	Mark-recapture
	Time-constrained search	Larval survey	
	Systematic survey	Pitfall traps	
<b>Painted Turtle</b>	Time-constrained search	Systematic survey	Mark-recapture
	Systematic survey	Floating pitfall traps	

### 3.1 Sampling Standards

#### 3.1.1 Habitat Data Standards

A minimum amount of habitat data must be collected for each survey type. The type and amount of data collected will depend on the scale of the survey, the nature of the focal species, and the objectives of the inventory. As most, provincially-funded wildlife inventory projects deal with terrestrially-based wildlife, the terrestrial Ecosystem Field Form developed jointly by MOF and MELP (1995) will be used. However, under certain circumstances, this may be inappropriate and other RIC-approved standards for ecosystem description may be used. For a generic but useful description of approaches to habitat data collection in association with wildlife inventory, consult the introductory manual, *Species Inventory Fundamentals (No. 1)*.

Although they may be inappropriate to describe fully aquatic habitats, ecosystem field forms may still be used to describe terrestrial habitats of amphibians and shoreline portions of a pond habitat, such as those delineated by habitat strata in recommended protocols below.

#### 3.1.2 Time of survey

If the results of surveys from different studies are to be comparable, the timing of breeding and daily activity cycles of the target species must be considered. For this inventory group, these are species-specific and vary geographically among populations of the same species. Reference to the primary literature and field guides will provide general guidelines, but details for most species in most areas are unknown.

In general, the best time to survey for amphibians is after a rainfall, during wet weather in the spring or fall. The start of the survey period should be dictated by the probable time of breeding of the species in the area of interest.

