4.6.5 Torrent Salamanders and Tailed Frogs

4.6.5.1 Species Status

The Columbia torrent salamander (*Rhyacotriton kezeri*), also commonly known as the Columbia seep salamander, is classified by the ODFW as “Sensitive-Critical”. The species has Natural Heritage Network ranks of Global-3 and State-3 (ORNIC 2004). The tailed frog (*Ascaphus truei*) is classified by ODFW as “Sensitive-Vulnerable” and has Natural Heritage Network ranks of Global-4 and State-3 (ORNIC 2004). The U.S. Fish and Wildlife Service (USFWS) considers the tailed frog a Species of Concern in Oregon (USFWS 2004). Neither the torrent salamander nor tailed frog have been determined to be Threatened or Endangered under the Endangered Species Act.

4.6.5.2 Natural History

Columbia Torrent Salamander

The Columbia torrent salamander is one of four species (*R. olympicus, R. cascadae, R. variegatus,* and *R. kezeri*) in the genus *Rhyacotriton*. Until 1992, the genus was considered to be a single species, all of which were formally known as *R. olympicus*. The geographic ranges of the four species are almost entirely isolated from one another—the single exception being a possible area of overlapping ranges of *R. kezeri* and *R. variegatus* in southern Tillamook County, Oregon (Csuti et al. 1997). The Columbia torrent salamander occurs north of the Little Nestucca River and south of the Chehalis River in the Coast Range of Oregon and Washington (Good and Wake 1992). The four species of *Rhyacotriton* are morphologically very similar, but can be differentiated based on pigmentation features, minor variation among some life history characteristics (Good and Wake 1992), and genetics (Good et. al 1987). There is apparently little variation in habitat selection among the four species of *Rhyacotriton* (Good and Wake 1992).

Torrent salamanders are usually found along the wetted edge of steep streams, seeps, and waterfall splash zones. Torrent salamanders prefer cold environments and begin to exhibit signs of stress at relatively low temperatures (17.2 C) compared to other salamanders (Brattstrom 1963). The highest abundances of torrent salamanders are observed in water temperatures of 8-13 C (Welsh and Lind 1996). Adult torrent salamanders are occasionally found in moist, riparian environments as well. However, they are extremely vulnerable to desiccation in terrestrial environments. Ray (1958) demonstrated experimentally that torrent salamanders become physically incapacitated when subjected to more than a 7.4% loss of body water, a much lower threshold for water loss than any other salamander tested. Not surprisingly, torrent salamanders are only able to persist out of water in closed-canopy forests (Good and Wake 1992). Welsh and Lind (1996) suggested that torrent salamanders are dependent on the microclimate and habitat structure associated with late-successional forests. Diller and Wallace (1996) concluded that highly suitable microhabitats are most likely to exist in late-successional forests, but torrent salamanders are widespread in other habitat types.

Given its low tolerance for warm, dry environments, it would seem likely that torrent salamanders would prefer sites on northerly aspects. Diller and Wallace (1996) found evidence that torrent salamanders were more likely to occur in streams on northern

slopes than other aspects when aspect measurements were averaged at a landscape-scale using a geographic information system (GIS). But the same study failed evidence of habitat selection for aspect at a microsite scale. This is not particularly surprising because stream water temperature (and presumably torrent salamander abundance) is more strongly affected by upstream conditions than aspect or other conditions at the point of temperature measurement. Another California study (Welsh and Lind 1996) tested, but failed to find a significant association between torrent salamander abundance and landscape-scale aspect.

Torrent salamanders reportedly are most abundant in streambed substrates composed of coarse gravel and cobble (Good and Wake 1992, Diller and Wallace 1996, Welsh and Lind 1996). The interstitial spaces among streambed particles are used as oviposition sites and hiding cover by adults and larvae. Good and Wake (1992) report that adult salamanders tend to be found among rocks, while larvae tend to use coarse gravel. Welsh and Lind (1996) suggest that stream reaches having a variety of particle sizes provides the most suitable torrent salamander habitat for hiding, foraging, and reproduction. However, habitat is degraded where interstitial spaces become filled with sand or fine sediment. Lowell and Diller (1996) found that consolidated geological formations (vs. unconsolidated sedimentary formations) and stream gradient were among the best predictors of torrent salamander occurrence. The authors believed the relationship could be explained by the relatively large streambed particles that result from the decomposition of consolidated bedrock, and the downstream transport of fine particles caused by fast water moving down steep slopes.

Tailed Frog

In Oregon, tailed frogs are distributed throughout the Coast Range, Siskiyou region, western Cascades, and the Blue Mountains (Csuti et al. 1997).

Tailed frogs are almost always associated with cold, mountain streams. Unlike most other frogs in the Pacific Northwest, the species does not use lakes or wetlands. deVlaming and Bury (1970) reported that first year tailed frog tadpoles tend to prefer water temperatures <10° C, while older tadpoles prefer temperatures 10-22° C. In a stream amphibian survey conducted in the Kilchis River basin (Tillamook Co., OR), water temperatures where tailed frogs were captured averaged 11.2° C (Pacific Wildlife Research, unpublished data)

Adult tailed frogs are also found outside of stream channels in riparian and upslope forests (Gomez and Anthony 1996, McComb et al. 1993). Research on tailed frogs does not clearly describe a relationship between forest conditions and tailed frog occurrence or abundance. However, Blaustein et al. (1995) suggested that tailed frogs are among the amphibian species most sensitive to the loss of old-growth forests in the Pacific Northwest. Furthermore, Gomez and Anthony (1993) found tailed frogs to be more abundant in large conifer and old-growth forests than in younger forest types in the Oregon Coast Range. In contrast, Bull and Carter (1996) did not find evidence of a relationship between tailed frog abundance and timber harvest intensity in northeastern Oregon. Wahbe and Bunnell (2003) concluded tailed frog abundance was more strongly affected by stream microhabitat features than the logging history of the site.

Cobbles and large rocks in stream channels are important habitat elements for tailed frogs. Tailed frog tadpoles use a specialized oral disk to attach themselves to cobbles

and boulders while feeding on diatoms and periphyton (Altig and Brodie 1972, Bull and Carter 1996). The interstitial spaces between rocks are used as oviposition sites and as hiding cover by tadpoles and adults.

4.6.5.3 Population Distributions in the Miami Watershed

A review of scientific literature, state and federal agency reports, and watershed analyses for the Miami River basin failed to reveal any evidence that the watershed has ever been systematically surveyed for stream-dwelling amphibians. However, there are a number tailed frog observations recorded throughout the watershed during fish surveys conducted from 2002 to 2004 (Table 24). Without systematically collected amphibian data from the Miami River watershed, predicting the distribution of torrent salamanders and tailed frogs in unsurveyed reaches is tempered by a great amount of uncertainty. Research conducted on torrent salamanders and tailed frogs have described general associations between the probability of their occurrence and variations in the physical or biological environment. Such associations have been commonly used to make spatially-explicit, model-based inferences about other wildlife population distributions—providing that the requisite habitat data are available for the area of interest. In the case of torrent salamanders and tailed frogs, research indicates that water temperature, stream gradient, average streambed particle size, and possibly forest seral stage best indicate the likelihood of their occurrence. This information was collected during ODFW aquatic inventory surveys conducted in the Miami watershed, but the surveys were restricted to stream reaches where salmon are present. Torrent salamanders and tailed frogs are able to utilize headwater habitats that are inaccessible to anadromous fish. Thus, model-based maps of stream amphibian distributions must either be limited to the geographic extent of ODFW inventory data, or rely on a set of indicators that are assumed to be reliable surrogates for the water temperature, streambed particle size, and other requisite variables. The former approach would be unable to meet the information needs of ODF, while the latter approach would require research and fieldwork unaffordable for this assessment.

Anecdotal observations of tailed frog tadpoles recorded during fish surveys suggest that the species is probably well distributed throughout the Miami watershed. No similar observations were made of torrent salamanders in the watershed. However, a 1998 amphibian survey that included 33 stream reaches in the Kilchis watershed resulted in a dataset (Pacific Wildlife Research, unpublished data) that may offer some further information as to the general distribution of torrent salamanders and tailed frogs in the Miami watershed. The Kilchis River lies immediately southeast of the Miami River and the two watersheds are generally similar in geology, topography, stream habitats, and forest cover (See Figures 29-32). Only the lowest reaches of the mainstem Kilchis River (elevation <100 ft ASL) were excluded from the survey because investigators assumed they were unsuitable for most stream-dwelling amphibians. Survey results indicate that torrent salamanders and tailed frogs were widespread throughout the upper Kilchis watershed. Torrent salamanders were observed at 61% of the surveyed reaches and tailed frogs were observed at 81% of the reaches. A visual examination of survey locations classified by number of individuals animals counted and overlaid on maps of elevation, bedrock geology, stream size classes, and timber size classes does not reveal any strong pattern of torrent salamander or tailed frog abundance with any of the four landscape features (Figures 29-32). It seems likely that the two species could potentially be present in any reach of the Upper Miami or Moss Creek sub-basins based on their proximity and similarity to the Kilchis watershed. More precise estimates of

torrent salamander and tailed frog distribution in the Miami watershed will require more information about microhabitat conditions in all permanent and intermittent stream reaches than is currently available in the watershed.

Table 1. Observations of tailed frog tadpoles in the Miami River watershed recorded during fish surveys performed from 2002 to 2004. Source: Dave Plawman, ODFW Tillamook Office.

YEAR	STREAM	UTM EASTING	UTM NORTHING	TADPOLE COUNT
2002	NORTH FORK MIAMI R.			2
2003	POWDERHOUSE			10
2003	UN-NAMED TRIB [A] TO MIAMI R.	436732	5052398	5
2003	UN-NAMED TRIB [B] TO MIAMI R.	439020	5053409	10
2003	UN-NAMED TRIB [C] TO MIAMI R.	440267	5054349	10
2004	STUART			3
2004	DIAMOND			6
2004	CARPENTER			15
2004	UN-NAMED TRIB TO CARPENTER CK			6
2004	UN-NAMED TRIB [1] TO MIAMI R.	432544	5049625	1
2004	UN-NAMED TRIB [D] TO MIAMI R.	437727	5054475	1
2004	UN-NAMED TRIB [K] TO MIAMI R.	44291	5053409	6

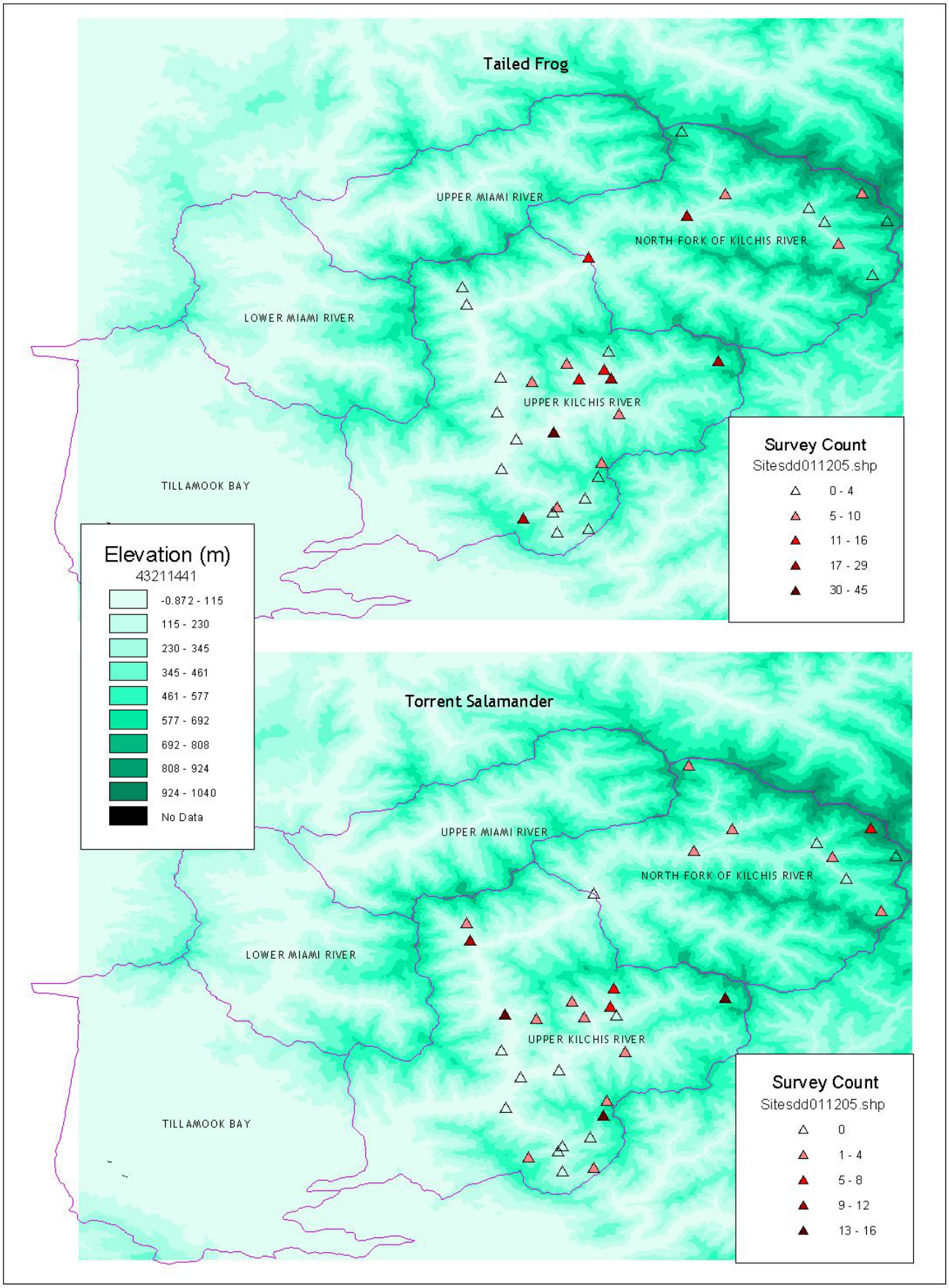

Figure 1. Numbers of tailed frogs (top map) and torrent salamanders (bottom map) by elevation at sampling locations in the Kilchis River basin.

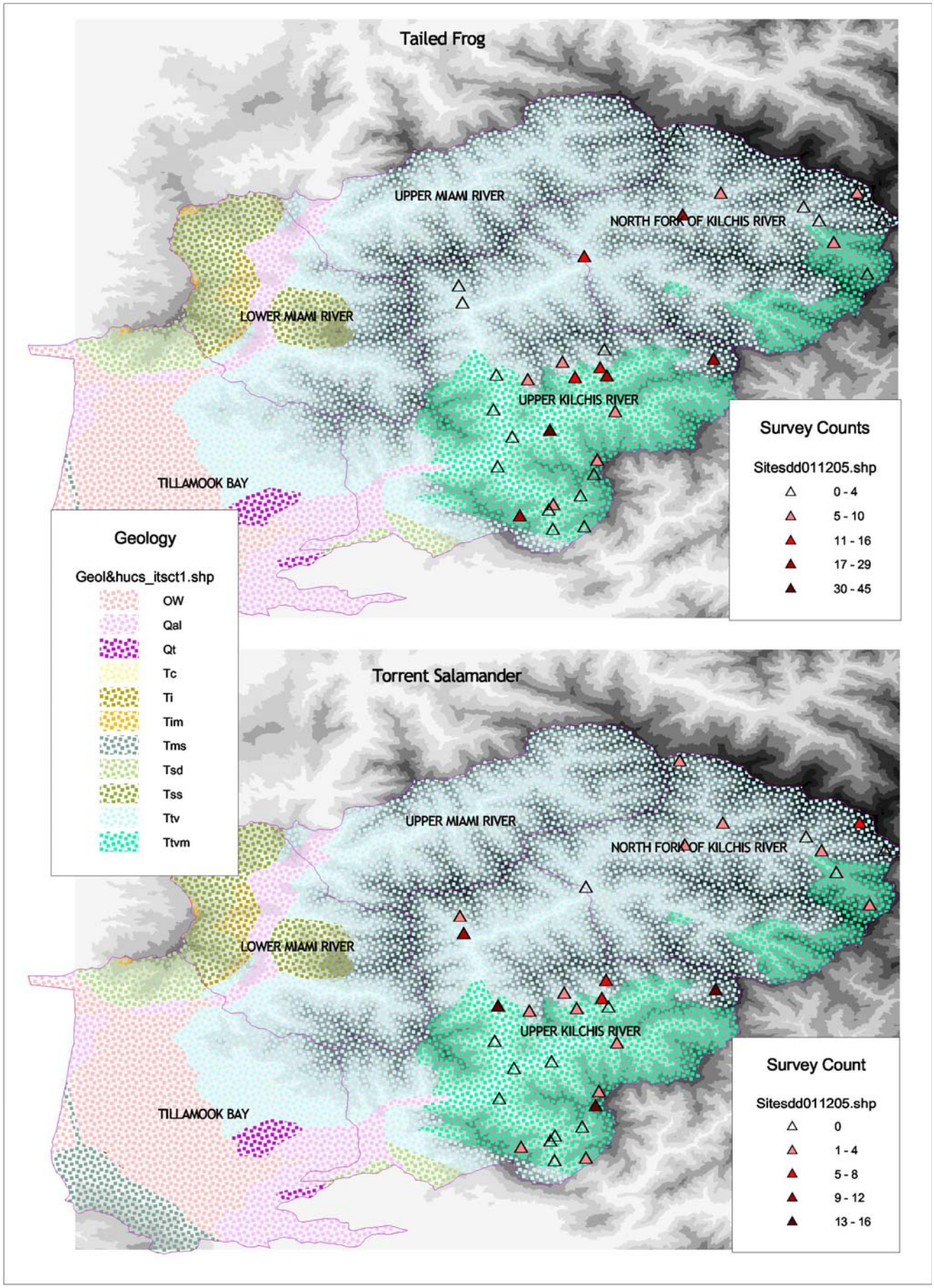

Figure 2. Numbers of tailed frogs (top map) and torrent salamanders (bottom map) by geologic type at sampling locations in the Kilchis River basin.

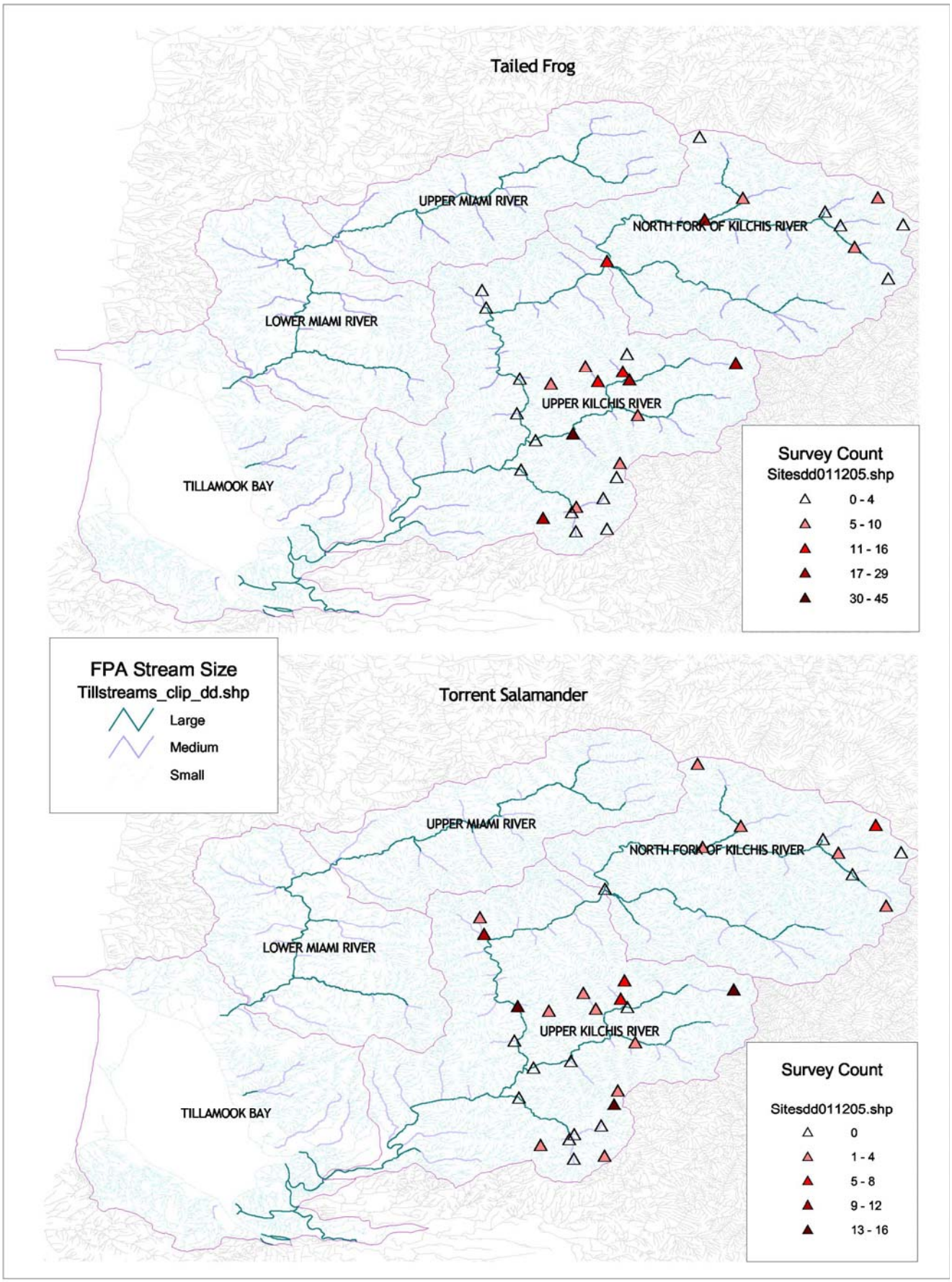

Figure 3. Numbers of tailed frogs (top map) and torrent salamanders (bottom map) by stream size at sampling locations int he Kilchis River basin.

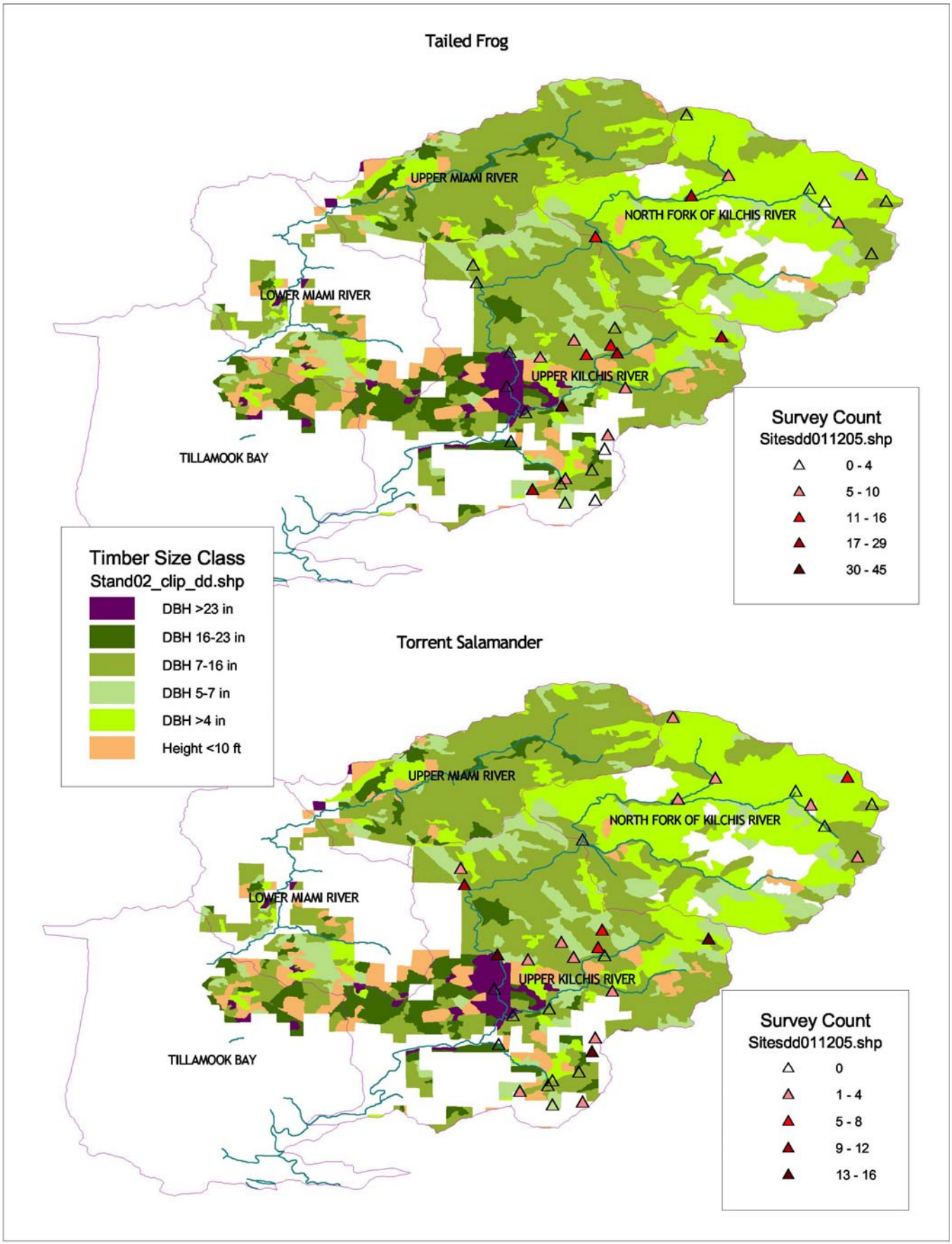

Figure 4. Number of tailed frogs (top map) and torrent salamanders (bottom map) by forest cover type at sampling locations in the Kilchis River basin.