The Northern Red-legged Frog (*Rana aurora*) on the Proposed Green Valley Glen Development Site

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Many amphibian species are in decline globally. These losses have been much publicized and biologists are often asked for an explanation of their cause. Factors leading to a reduction in amphibian numbers are usually numerous, species specific, and many variables may interact synergistically (e.g., Kiesecker et al., 2001). Selected Oregon amphibians have declined as well (Nussbaum et al. 1983, ODFW 1997, Kiesecker et al. 2001, , Wente et al. 2005). One example in the Willamette Valley is the northern red-legged frog (*Rana aurora*). Sufficient concern has arisen for red-legged frog numbers in the Willamette Valley for the species to be considered "Sensitive-Vulnerable" by the Oregon Department of Fish and Wildlife (ODFW 1997) and a "Priority Management Species" by the Bureau of Land Management.

Northern red-legged frogs are distributed from northwestern California north to Vancouver Island, British Columbia (Leonard et al., 2005). Populations in the Willamette Valley have been subjected to an array of stressors, including loss of wetland habitat, changes in water quantity and quality, and introduction of non-native predators (Nussbaum et al. 1983, Blaustein and Wake 1990, Pearl et al. 2005). Red-legged frog adults use moist upland and riparian forests (Hayes, et al., 2001). During late winter rains, red-legged frogs migrate from terrestrial habitats to breed in quiet ponds or streamside pools, usually when water temperatures are from 6-7C (Storm 1960, Pearl 2005). Egg clusters contain 530-830 eggs and are attached to aquatic vegetation in 6" to several feet of water (Storm 1960, Pearl 2005). Tadpoles metamorphose from June through July (Storm, 1960), depending on temperature and available food. Breeding sites can include temporary water, but must remain wet into late spring and early summer for successful metamorphosis

Red-legged frogs have been documented on the site of the proposed Green Valley Glen development. Three red-legged frogs have been sighted in three different areas on each of three separate visits to the site. One frog was photographed and its identity confirmed by me. The Green Valley Glen site contains moist forest habitat typical of non-breeding red-legged frog habitat. Moreover, the site contains a forested riparian corridor typical of those favored by frogs migrating to breeding sites. Frog sightings were made without the benefit of a thorough amphibian survey by trained biologists and a formal survey during favorable timing and temperature and moisture conditions is very likely to reveal more frogs.

Potential impacts of the Green Valley Glen Development on northern red-legged frogs include:

1. **Loss of terrestrial habitat.** In general, increasing forest cover is associated with increasing amphibian diversity (Hecnar and McCloskey, 1996). Outside of the breeding season, Red-legged frogs are tied to moist forests , and loss of vegetation and concomitant loss of moisture has been shown to negatively affect red-legged frogs (Chan-McLeod 2003, Chan-McLeod and Wheeldon 2004, Pearl et al. 2005). Development on this site will reduce moist upland forest habitat utilized by red-legged frogs by converting it to uninhabitable housing sites, driveways, and roadways. Other habitat loss will likely result from removal of native vegetation and planting of nonnative ornamental species. Although irrigation might have a positive impact by increasing surface moisture during the dry summer months, it is unlikely that areas of native vegetation will be watered. Red-legged frogs are an indicator of the unique nature of a mature second growth habitat island in close proximity to an urban area.

2. **Increased traffic.** Increased road density is correlated with lower amphibian diversity (Findlay and Houlahan, 1997). Traffic can be a major source of mortality for amphibians that migrate to breeding sites (Carr and Fahrig, 2001; Mazerolle, 2003). Red-legged frogs migrate as far as 1.5 miles from breeding sites (Hayes et al., 2001), with movement occurring primarily on rainy nights in late winter (personal observation). Because the majority of frogs migrate in groups over short periods of time, they can be killed in large numbers when breeding migrations coincide with heavy traffic. The Green Valley Glen development will substantially increase traffic in the area, and this has potential to negatively affect red-legged frog abundance.

3. **Increased use of herbicides and fertilizers.** Development of the Green Glen site is likely to result in increased use of chemicals toxic to amphibians. The herbicides containing glyphosate (including Roundup, a popular lawn and garden chemical), while not directly toxic, contain surfactants that are highly toxic to amphibians (Relyea, 2004). Nitrates and nitrites that are by-products of fertilizers can also be toxic to red-legged frog tadpoles as well as larvae of other Willamette Valley amphibians (Marco et al., 1999).

In short, no positive outcome can be projected for the red-legged frog population in the Amazon Headwater forests as a result of the Green Valley Glen development. Habitat loss and a marked increase in human activity in the area, especially driving, will reduce the numbers of this declining amphibian species in the Willamette Valley. It is important to view a decline in red-legged frogs within a larger context. A more thorough survey of the site is very likely to reveal other amphibian species that inhabit the surrounding area, including the Roughskinned Newt, Clouded Salamander, Oregon Ensatina, and Pacific chorus frog. Each of these species is likely to be negatively impacted by development. Many have suggested that amphibian declines are indicative of an overall deterioration in local and global ecosystem health. Our community would be better served by maintaining healthy ecosystems in close proximity to urban areas through the creation of a green belt encompassing areas around the Ridgeline Trail of the South Hills. Housing and other economic development should be focused vertically in areas already disrupted by human activity.

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