

HABITAT FOR AMPHIBIANS IN WETLAND PROJECTS

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Frogs, toads, and salamanders that breed in ponds and other wetlands require particular habitat components at different development stages and different seasons. The following oversimplified list suggests the range of considerations for successful wetland restoration and creation for amphibians. It is specific to the species in western Washington and Oregon, but the general principles should apply to many wetland ecosystems in temperate regions.

OVIPOSITION AND EGG DEVELOPMENT

- Still water or very slow moving (less than 5 cm /sec.).
- Permanent water, *and* vernal pools that retain water for several months (shorter in high desert habitats), for the greatest diversity of species.
- Shallow water, depending on preferences of local species (5 cm for some species, 30 – 100 cm for others in this region). Broad shelf or gradual slope (10 / 1 or even less).
- Relatively constant water depth for duration of egg development period.
- Maximum sunlight and no shading vegetation over northern or northwestern shoreline, but shade or deep water along south shoreline. Sheltered from strong winds. If water source is a cold spring, then water must be spread widely to gain sufficient solar heat.
- Open water with scattered emergent or aquatic vegetation.
- Vertical and horizontal structures for egg attachment, a variety of diameters between 1 & 6 mm, preferably flexible. Some tall, some short. Branches and other stiff structures especially while vegetation becomes established, or where water depth is fairly constant.
- Water relatively free of suspended silt and pollutants.

HATCHLINGS

- Same as for eggs, i.e., still, shallow, sunny, protected, clean water with scattered vegetation.
- Vertical structures, including fine stems and leaf blades (e.g., *Scirpus*, *Carex*), for hatchling tadpoles to cling in sun, near surface, out of wind.
- Fallen leaves or other flat surfaces including fairly hard mud for hatchling salamanders to balance on.

LARVAE

- Gradual slope that maintains a band of water 1 – 2 cm deep as water level drops, for tadpoles to bask. In deeper water with less fluctuation in depth, logs and flat-topped rocks can provide shelves and heat reservoirs near the water surface.
- Maximum sunlight and wind protection.
- Scattered emergent and aquatic vegetation that provides tadpole food directly or as a substrate for diatoms and algae. The vegetation also provides rearing areas for copepods and other invertebrates of many sizes as prey for larval salamanders at different sizes. Hiding cover is also provided. Small spikerush (*Eleocharis parvula*) is excellent.
- Soft, organic surface mud for toad tadpole food, hiding cover, and mud screen that hides larvae fleeing from predators.
- Deeper water areas with emergent and aquatic vegetation and logs and limbs for hiding cover for larger larvae.

METAMORPHS

- Logs, rocks, and bark slabs that are just above low water level, but maintain dampness underneath, for hiding cover and holding areas while metamorphs wait for appropriate conditions for dispersal.
- Logs, rocks, bark slabs, and vegetation in dense but permeable clumps between low water level and surrounding upland wooded habitats, as stepping stones or bridges of cover during first stages of dispersal.
- Riparian areas and other damp, wooded or brushy corridors with hiding cover and invertebrate prey during later stages of dispersal.
- No roads or trails immediately adjacent to wetlands, or at least not crossing obvious dispersal corridors. Drift fences and underpasses can prevent mass roadkill.

JUVENILES AND ADULTS

- Spring through fall – Frogs and toads:
 - Extensive wetlands, stream and lake edges, riparian woods, and other cool, moist areas with logs, rocks, bark slabs, rodent burrows, and/or patches of dense vegetation for cover.
 - Adjacent upland foraging habitats, either forest or grassland depending on species, with diverse low vegetation structure and abundant invertebrate prey.
- Winter – frogs and toads:
 - Unknown for most species, but includes: springs; mud at the bottom of ponds that do not freeze solid; large logs, deep duff layer, and rodent burrows in forested habitats.
- Year round – salamanders:
 - Forest, woodland, and/or grassland with rodent burrows, logs and bark slabs, and diverse vegetation providing abundant invertebrates and small vertebrates.
- Safe routes for colonization of newly created breeding sites, and routes to and from breeding ponds. These should have no barriers to migration, no broad areas lacking hiding cover, and no roads adjacent to the wetlands (or at least not crossing obvious corridors).
- Logs, rocks, bark slabs, deep duff layer, and patches of dense vegetation within 100 m of wetland ponds, as hiding cover for females waiting for appropriate breeding conditions.
- Logs, rocks, bark slabs, and clumps of dense vegetation in and immediately adjacent to breeding ponds as hiding cover for males waiting for females to arrive.

Information taken from:

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