Gray treefrog (*Hyla versicolor*) calling from a tree branch over an ephemeral wetland pool. Gray treefrogs forage on a variety of invertebrates, especially ants, thereby influencing food webs.

What do frogs do all day?*

*With apologies to Richard Scarry, whose children's book inspired this title.

We know that frogs eat mosquitoes, but what else do they do, and how do we benefit? Our former visiting amphibian expert, Dr. Tracy Rittenhouse, just sent me a newly-published paper that details the answer. In a sentence, frogs and other amphibians provide all four types of ecosystem services (i.e., functions of value to human well-being; MEA 2005). The exhaustive list (below) was compiled by two of Tracy's colleagues, Daniel Hocking and Kim Babbitt, at the University of New Hampshire. Since moving to the U. of Connecticut, Tracy published her test of the effect of reed canary grass on frog larval habitat, which made good use of 40 mesocosms (and all the RCG she could harvest for the experiment) at the Arboretum. Her 2011 paper is listed at the end of this leaflet.

Here, with quotes from Hocking and Babbitt (2014), is what frogs (and their near relatives) do all day, listed by type of service:

Provisioning: Amphibians "serve as a food source for some human societies, especially in Southeast Asia. They also serve as models in medical research and provide potential for new pharmaceuticals such as analgesics and anti-viral drugs derived from skin secretions."

Regulating: Amphibians reduce "mosquito recruitment from ephemeral wetlands, potentially controlling other pest species, and indirectly through predation of insect pollinators."

Cultural: They "increase the quality of human life through recreation, religion, spirituality, and aesthetics. As an abundant and diverse class of vertebrates, amphibians also play prominent roles in the culture of human societies through pathways such as mythology, literature, and art."

Supporting: The greatest contributions of amphibians are likely their support of ecosystem structure and function. "Amphibians can affect ecosystem structure through soil burrowing and aquatic bioturbation and ecosystem functions such as decomposition and nutrient cycling through waste excretion and indirectly through predatory changes in the food web. They also can control primary production in aquatic ecosystems through direct consumption and nutrient cycling."

Throughout much of the northern and eastern U.S., springtime wouldn't be complete without the loud, piercing chorus of spring peepers (*Pseudacris crucifer*). The occasional trill indicates that one male is encroaching on the calling territory of another male.

Red-backed salamanders (*Plethodon cinereus*) can be extremely abundant in northern and eastern forests (> 4,000/acre). Although individually quite small (~1 gram or the weight of a paper clip), their effects can add up to changes in leaf litter decomposition and carbon storage on the forest floor.

These summaries are just teasers—the paper makes great reading, extolling the virtues of amphibians, from cleaning up algal blooms to helping cure disease, in wetlands and uplands, and by moving from water to the land and back again.

Whether or not frogs can continue to provide these services day after day depends entirely on how well we conserve their habitat—both habitat area and water quality. Amphibian populations are experiencing major declines globally—such that 41% of >7,000 species are threatened with extinction. Why? The major causes, according to Hocking and Babbitt are disease, habitat loss, habitat alteration, and pollution from fertilizers and pesticides.

Hocking and Babbitt conclude that amphibians not only provide the basic ecosystems services but also "find ways into our homes, hearts, and art, contributing to cultural services that are important for social, spiritual, and psychological well being." The Arboretum does its part in conserving amphibian habitat by connecting wetland and upland habitats, minimizing herbicide use, and promoting the need to conserve biodiversity. What else do you think we should do? Ideas are welcome (jbzedler@wisc.edu).

Amphibians have long been part of human cultures, finding their way into our homes via writings (e.g., Shakespeare; Ray Bradbury) and art (e.g., ceramic frogs, stuffed toys, and even gummy frogs).

References cited:

Hocking, D., and K. Babbitt. 2014. Amphibian contributions to ecosystem services Journal of Herpetological Conservation and Biology 9(1):1-17.

MEA (Millennium Ecosystem Assessment). 2005. Ecosystems and Human Well-being: Synthesis. Island Press,Washington, D.C., USA.

Rittenhouse, Tracy. 2011. Anuran larval habitat quality when reed canary grass is present in wetlands. Journal of Herpetology 45(4):491-496.

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