

Applied Polymer Systems, Inc.

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Living Proof

In Environmental Impact

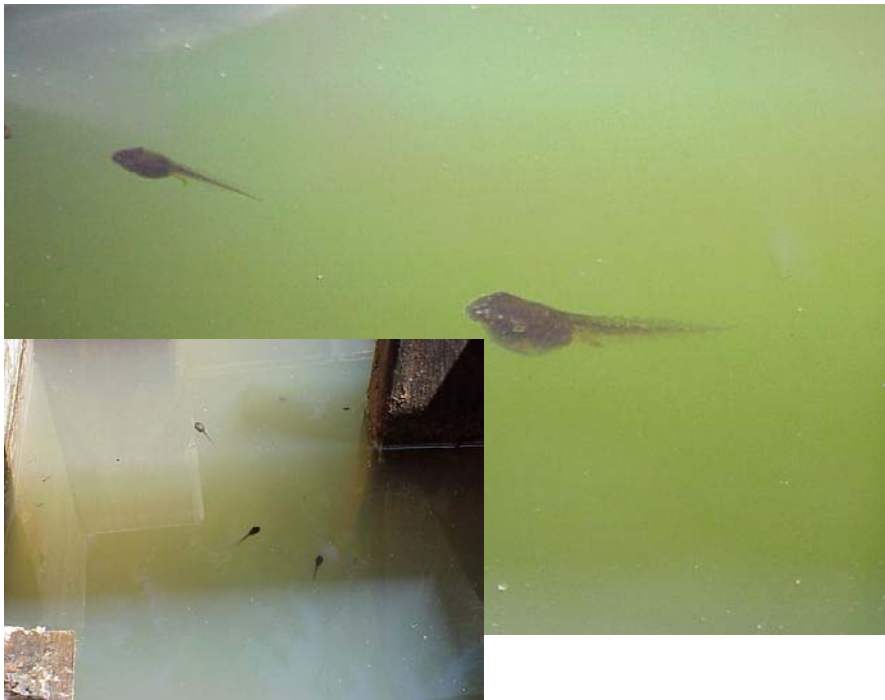
Applied Polymer Systems, Inc. (APS) *Floc Logs*® enable environmentally safe, economical clarification of nearly all surface waters contaminated by suspensions of natural soil particles. All APS products are tested for toxicity and meet the following specifications: ANSI/NSF Standard 60 Drinking Water Treatment Chemical Additives, EPA/600/4-90/027F 48Hr. Acute Static Screen Toxicity Test (*Daphnia Magna*), EPA/600/4-91/002 7 Day Chronic Toxicity Test (*Pimephales promelas*).

To the right is a testing device to put Floc Logs into solution. This device tested the longevity of the Floc Log and the efficiency in mixing. In late October of 2003, we placed seven 706b Floc Logs in the grid chamber where they sat through various weather events. The Floc Logs were frequently monitored through the course of the fall, winter and spring.



Right: The grid chamber the tadpoles were hatched in. Notice the color of the water.

Below: The concentration levels of 6834 milligrams per liter did not inhibit the tadpoles in any way



In the spring of 2004, we noticed that some type of eggs had been laid in the water. Two weeks later tadpoles inhabited all eight sections of the grid chamber. As the weeks progressed more eggs were laid and more tadpoles had hatched. We watched as the tadpoles flourished despite the extraordinarily high concentration levels of the Floc Log materials in the water. The Floc Log concentration in the water was measured at approximately 6,834 mg/l (milligrams/liter), a level far greater than the standard 2.0 – 2.1 mg/l concentration suggested for applications.

Calculations:

The grid chamber is 4' x 8' and holds 12 " of water or 32 cubic feet. ~240 gallons or 930 liters will fill the grid.

7 Floc Logs were used, each weighing ~ 8 lbs for a total of 56 lbs.

We assume that ¼ of the initial weight or 14 lbs or 6,356,000 mg remains.

930 L/6,356,000 mg gave us approximately 6,834 mg/l

Amphibious larval stages have several qualities, which make them a useful indicator of harmful levels of pollutants in bioassay tests. Amphibian tadpoles show a variety of sub lethal responses such as changes in growth, development rates, pigmentation and expression of morphological deformities in a lesser time of exposure to the environmental pollutants. Over the past decade, there have been troubling reports worldwide on disappearing amphibian populations, with declines sometimes associated with malformations (Fisher and Shaffer 1996). The recent malformations and declinations of amphibian populations unveil some aquatic organisms' sensitivity to toxins. Today, because of these malformations and population declinations, there is a major concern on the effects of aquatic toxins.

Amphibians may have relatively great vulnerability to environmental perturbation due to several factors. Each species has a complex of specific habitat and dietary needs related to complete metamorphosis, including the transitional period between larva and adult. Problems with pollutants may be exacerbated because amphibians permeable skin makes transdermal movement of toxins easy. Eggs of many species require pure, well-oxygenated water and are susceptible to siltation, pollution, and predation (Robert L. Bugg, SAREP, & Peter C. Trenham: Section of Ecology & Evolution, UC Davis).

Frogs generally take between 11 and 13 weeks to complete the metamorphosis from egg to tadpole (7 to 21 days) and from tadpole to frog (roughly 12 weeks), but can take as long as a year depending on the environment they are living in.



Above (large pic): One of our tadpoles/frogs before shedding off its tail. This frog is about 1 cm in length

Above (small pic): The female frog responsible for laying the eggs. Full grown frogs can reach 2 1/2 inches.

Below (large pic): One of our tadpoles after complete metamorphosis into a frog

Depending on light and mood these tree frogs can change color

Below (small pic): The fibrous mass is the skeleton from within the Floc Log



We determined that our frogs were Hybrid "Gray" Treefrogs – (*Hyla chrysoscelis X Hyla avivoca*).

The tadpoles/frogs did not exhibit any changes in growth, development rates, pigmentation, and expression of morphological deformities. In due course (11 – 12 weeks) the frogs began leaving the water for limited periods of time, perching themselves on the coconut fiber skeletons of the Floc Logs. By the 13th week we noticed the frogs were venturing out of the grid. The tadpoles/frogs were thus unhindered by the Floc Log. The frogs suffered no malformations. In contrast, they seemed to thrive during their developmental stages while inhabiting the polymer-containing environment.

For product and distributor information please contact us at: Applied Polymer Systems, Inc.

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