Article 85

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Dragonfly Naiads as an Indicator of Pond Water Quality

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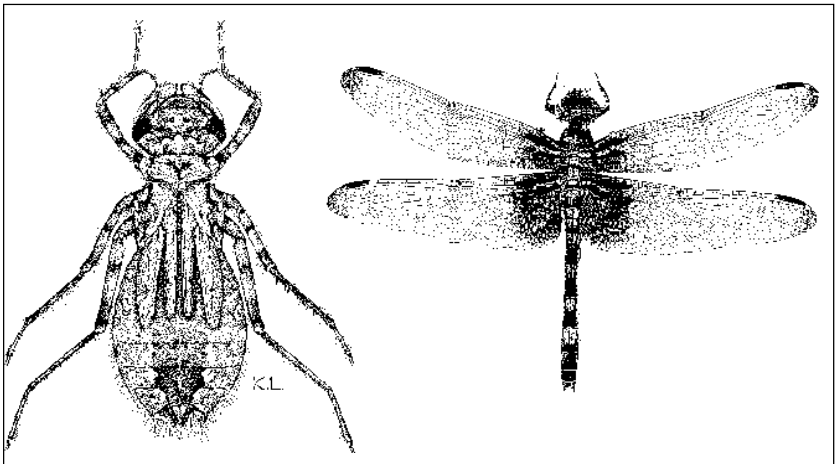
The whir of a dragonfly is a common sound along the edge of freshwater ponds. The adult dragonfly, however, begins its life cycle within the pond. The juvenile stage, known as a naiad, burrows in the mud or lurks within the shoreline vegetation (see Figure 1). Despite their small size, dragonfly naiads are voracious predators, feeding on other aquatic macroinvertebrates and even larger prey items. Given their position in the pond food web, dragonfly naiads could be a useful indicator of pond water quality. A simple way to test their value as an environmental indicator is to compare dragonfly naiads found in undisturbed freshwater ponds with those that inhabit the more stressful conditions of stormwater ponds.

The Lower Colorado River Authority recently examined this issue as part of an intensive biological study of a recently constructed stormwater pond. Wet ponds are generally considered experimental in the semi-arid climate of Central Texas because high evaporation rates often require ponds be augmented with water in order to maintain a permanent pool and sustain an aquatic ecosystem.



Courtesy of Charles Bayer — Courtesy of Forrest Mitchell

Figure 1: Dragonfly Naiad and Adult (Dythemis species)

Indicators for Lentic Systems

The stormwater pond was built in Travis County, Texas, on LCRA property known as the Mansfield Tract. The wet pond captured runoff from a newly constructed bridge over Lake Austin and a roadway. Constructed in a natural depression in the floodplain of the Colorado River adjacent to Lake Austin, the pond was augmented by Lake Austin water. The soils surrounding the wet pond contained alluvial silt and clay. The pond had a drainage area of approximately 9.5 acres, and was 150 feet long, 90 feet wide and five feet deep. The structure was designed with a permanent pool of approximately 0.4 watershed inches.

Since most macroinvertebrates are habitat specific, scientists planted local emergent and submergent vegetation within the wet pond to provide habitat structure. The vegetation was planted around shallow peripheral areas of the pond. Miller *et al.* (1989), Engel (1985) and Dvorak and Best (1982) have shown that aquatic macrophytes are heavily colonized by macroinvertebrates. Among the submergent vegetation planted were two obligate wetland plant species predicted to do well in these types of systems, *Elodea canadensis* (waterweed) and *Myriophyllum spicatum* (eurasian watermilfoil). A third obligate wetland macrophyte, *Najas guadalupensis* (southern naiad) established itself unexpectedly in the middle of the study. All three species are adapted to the low flow velocity and low turbulence associated with lentic areas. Emergent vegetation was also planted, including *Phragmites australis* (common reed), *Scirpus validus* (soft-stem bulrush) and *Saggitaria latifolia* (arrowhead).

Researchers conducted five macroinvertebrate surveys of the wet pond vegetation between November 1994 and July 1996. Organisms were collected qualitatively with a standard 500 micron mesh dipnet. Four one meter "drags" were made through submerged vegetation with the dipnet for one minute. Samples were preserved in the field and later sorted, enumerated, and identified to the lowest possible level using taxonomic keys by Merritt and Cummins (1996).

In lotic (running waters) systems, macroinvertebrates have been widely used as reliable water quality indicators (Shackleford, 1988; Plafkin *et al.*, 1989). This is not true for lentic systems (ponds and lakes). Indicators for lentic systems such as wet ponds are still under development. In the absence of such indicators, scien-