The Outside Story

The Great Duckweed Migration

By: Declan McCabe

The word ‘migration’ conjures images of vast wildebeest or pronghorn herds crossing plains in unison, or hummingbirds traversing the Gulf of Mexico. When charismatic birds leave our New England forests, migration is typically the explanation. But how can a group of plants disappear, without discarding leaves, stems, or other evidence of their presence?

Duckweeds are in the subfamily Lemnoideae and are the world’s smallest flowering plant. Their small oval leaves float on ponds and quiet backwaters. Root-like fibers dangle in the water. Although I’d noticed them on St. Michael’s College experimental ponds, as an entomologist, I’d never paid them close attention. Until they disappeared.

Two years ago in October, my Saint Michael’s College students and I visited the ponds and observed that they were densely carpeted with floating duckweed; when we returned in November, they were gone. A few dead leaves did not explain this dramatic loss. In spring of the following year, this magic trick played out in reverse. Mid-April: zero duck weed; early May: bank-to-bank coverage. Winged migration seemed unlikely. I was baffled and intrigued.

Last fall, I regularly visited the ponds to get to the ‘bottom’ of the mystery, and this insect guy learned what aquatic botanists already knew. As fall progresses, duckweed leaves gradually thicken and sink below the water’s surface. Fallen leaves obscure the plants on the pond floor, where they lie safe from the damaging effects of ice.

During this year’s spring melt, I visited the ponds daily and observed how the duckweed popped up again across the pond surfaces. They emerged shortly after the spring peepers. I imagined that the frogs had sung them to the surface.

What actually causes them to sink, and later to surface, is less romantic than the call of a frog. It all comes down to density, buoyancy, and some tricks of plant physiology. Duckweed leaves float because of air pockets between their cells. As fall progresses, the duckweed in the college ponds, *Lemna minor*, accumulates starch in its leaves, filling up the air pockets and increasing plant density. Eventually, the plants sink. But how do they come back up?

Mid-April was peak season for duckweed reappearance in our ponds, although some stragglers are still returning. The plants have arrived en masse, just like the swallows to San

Juan Capistrano. On April 17, I netted some floating duckweed and some still-sunken duckweed from the pond floor. Nearly every floating plant consisted of three leaves: a larger, darker leaf that tended to hang just below the pond surface, and two smaller, vibrantly bright green, more buoyant leaves growing from its edge.

The still-sunken plants had larger, darker leaves and less developed bright green leaves. I put some of these plants in glass beakers on my office window ledge to watch them develop. Sure enough, within a day, the first plant came to the surface. The growing bright green leaves were serving as the plant's water wings.

I was curious about the starch, and a quick splash of iodine told the story. Iodine turns starch a blueish black. The sunken plants were full of starch. In the floating plants, starch had migrated from the old leaf to the new sprouts, which also had air pockets. It seems that over-wintered leaves provide starch to the new spring generation whose metabolism and growth produce enough carbon dioxide to float them to the surface. Photosynthesis-producing oxygen also helps keep them afloat.

I'll admit, this process lacks the drama of wildebeests, but it is a form of migration, measured in feet and inches. My ponds are small, plastic, and quickly warmed by the spring sun. Natural ponds are deeper and warm more slowly, so there may be time to witness the return of duckweed "herds" this May in a pond near you.

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