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Beginning this year, the Southern Highlands Reserve will institute a comprehensive phenology monitoring program. Phenology is the study of recurring biological events in the animal and plant world. By recording, on a consistent and long-term basis, the timing of these events, we will contribute to the scientific data being accumulated regarding climate change.

So, how does this work?

In its simplest terms, phenology is collecting scientific data about the world around us and how it changes on a day-to-day basis. The passing of the seasons is one of the most familiar phenomena on Earth.

Consider the onset of spring. As winter ends, our surroundings burst with new life - trees fill with vibrant greens, flocks of birds migrate in formation to northern breeding grounds, and brilliant wildflowers and their insect pollinators appear across hillsides, roadsides, lake margins, and fields. Similarly, as autumn approaches, the deciduous forest canopy progresses towards a colorful demise, birds navigate their return to southern wintering grounds, and many plants ripen their last fruits before the onset of winter.

These are the constant reminders of the changing seasons. By studying the seasons in greater detail, we can deepen our connection with, and understand-



ing of, the landscapes we inhabit. We also develop our ability to observe and to measure the pace and the timing of the seasons, the onset and duration of which are beginning to shift with the changing climate.

In short, phenological studies measure the pace of nature's clock. In doing so, one can detect the changing pulse of the planet.

The timing of phenological events can be quite sensitive to environmental conditions. For example, in a particularly warm and dry spring, leaf budburst and first flower might occur weeks earlier than usual. In an exceptionally cool and wet spring, they could be equally delayed. As a result, the timing of phenophases tends to vary among years based on patterns of weather, climate and the resources available. Phenological observations are therefore integrative measures of the condition of the physical, chemical, and biological environment. This environmental sensitivity means that phenological studies are simple and cost-effective ways to measure environmental changes, including climate change, over the long-term.

From individuals and populations to communities and ecosystems, the phenology of living systems influence





their ecological interactions and therefore the probability of their persistence in the future. If species that depend on each other, such as a plant and its pollinator, do not thrive at the same time then both species may suffer.

All species depend on each other to survive. The phenology of plants influences the abundance of insects that eat or pollinate them as well as the birds and small mammals that depend on them for fruit and seeds. The phenology of plant-eating insects and small mammals, in turn, affects the reproduction of their plant prey. The phenology of pollinating insects affects the reproductive success of the plants they visit. And, to top it all off, the phenology of insect-eating birds affects the larvae on which they depend and the plants on which those larvae are found.

*The only thing that doesn't change
about the natural world is that
it is constantly changing.*

Some of the plant life-cycle dates to be recorded here at the Southern Highlands Reserve are timing of budburst, leaf elongation, flowering stages, fruiting stages, leaf coloration and leaf drop. Each observed plant will be tagged, photographed, located with GPS and entered into a database. Information regarding latitude/longitude, forest type, aspect and slope will also be recorded. Additional information such as soil tests, freeze damage, ambient temperature, soil temperature and soil moisture will be noted also.

Japan has the oldest existing and still on-going phenological monitoring program. The flowering of cherry trees in Japan has been observed and recorded for 1300 years. In France, Switzerland and Germany, records regarding grape picking have been kept since 1480.

Although important from a scientific standpoint in

recording the long-term effects of a changing environment on the timing of natural events, phenology is also a fun way to get children involved in the natural world around them. Compared to trying to memorize the botanical names of plants or listening to an adult

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explain how the vascular system of a tree works, imagine how much fun it would be to observe plants to see when they first put out leaves, when the first bees visit for pollen or when the first leaves begin to color in the fall.

Observing and recording this data on a simplified form brings a child into close proximity with the natural world and helps to develop a sense of how all the natural systems are connected and dependent on each other.

If you are interested in learning more about phenology, visit the USA National Phenology Network website at <http://www.usanpn.org>.

You can also visit Project Budburst, the citizen-scientist arm of the National Phenology Network at http://www.windows.ucar.edu/citizen_science/budburst/

To download an informative and easy to understand pdf of The Phenology Handbook go to, http://www.ucsbphenology.christophercosner.com/The_Phenology_Handbook-Haggerty_Mazer_2008_v1.pdf

(Source: The Phenology Handbook, Haggerty and Mazer, University of California at Santa Barbara).

