Introducing The Pollinator Site Value Index (PSVI)

Estimating Pollen & Nectar Relative Values for a Pollinator in a Landscape

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Pollinators preferentially select food resources among multiple plant choices. Traditionally natural scientists preferences through pollinator's identified а observation and experience. New research methods can now track a pollinator's actual use of habitat with a combination of direct observation, remote sensing, GPS, plant surveys, genetic analysis of individuals using nonlethal techniques, as well as nest and colony surveys allowing direct measurement of pollinator preferences (1). The PSVI is a summary statistic which estimates the total relative value of pollen and nectar at a sampled site for a specific pollinator.

Characteristics of the Pollinator Site Value Index (PSVI)

O The PSVI is pollinator-specific and can be applied to insect, bird, reptile (e.g. lizards and geckos) and mammalian species (bats, sugar gliders).

O The PSVI tool evolved from traditional ecological measurements such as diversity, richness, evenness etc. The PSVI provides a summary statistic which is based in quantitative ecology and uses data from traditional collection methods and then matches the field data with a database of pollinator preferences by plant species (or to the genus level).

O The PSVI depends on creating a simple scale of a plant species' Relative Plant Value (RPV) to a specific pollinator (bumble bee, beetle, butterfly etc.) for a list of vegetation present within a landscape. A six-level scale for the value of pollen to the specific pollinator has been used so far (0=no value, 1-5 with 5 as the maximum value), RPV in Equation 1 below.

O The PSVI is consistent particularly for longitudinal tracking of changes in the value of habitat for pollinators over time such as in rights-of-ways, remediation fields, and species recovery landscapes.

O The PSVI is a relative index. This means that values derived are not absolute numbers (i.e. not actual kilograms of pollen or nectar produced).

O As an index, the PSVI has a range, typically from a low of zero to a theoretical maximum of depending on the number of scale levels. Ultimately, the PSVI can estimate what percent of a theoretical maximum the site can be expected to yield for the pollinator on study.

Better Understanding of Pollinator Habitat Value

O Incorporating the PSVI into power line rights-of ways management would provide an on-going measure of the effects on a particular pollinator or set of pollinators. Having the tracking ability the PSVI allows, in concert with Integrated Vegetation Management (IVM), businesses, funders, and government a metric created specifically for pollinators.

O Incorporating the PSVI into road rights-of-ways management would provide an on-going measure of the effects on a particular pollinator or set of pollinators. Having the tracking ability the PSVI allows, gives businesses, funders, and government a metric specifically for pollinators.

Data for Pollinator Site Value Index (PSVI)

O Vegetation sampling in the landscape which yields a list of plant species and the percent cover of each species within a sample area, plot or quadrat.

O Compile a master database of state, regional and national plant species lists. Next add variables for the relative ranking for pollen and nectar values for the particular pollinator of interest. A compilation of such a list which is applicable in the mid-Atlantic states has been made for the European Honey Bee and the genus Bombus (2). New research methods referred to earlier will generate actual measures of pollinator preferences and should be used together with these lists.

Figure 1: Examples of Pollinator Plant Preferences.



* Bumble bee on purple tulip, sugar glider on bottle brush flower, and monarch butterfly on milkweed.

Calculating the PSVI

The general PSVI equation multiplies the RPV of a plant by the percent cover of that plant in the quadrat and then adds up these values across all the plant species present for a total PSVI.

Using the field data collected and a database of RPV for the species present, then apply the following formula to calculate a general PSVI.

The General PSVI Equation for a Selected Pollinator

Equation 1: PSVI = $\sum (Pct Cover_i \times RPV_i)$

i=1..N

Where –

N is the total number of plant species in the sample plot.

i is the count of plant species present in the sample plot from 1 to N.

RPV_i or Relative Plant Value is the plant pollen and/or nectar value for plant species i, from a database of such values. For example, a range 0-5, where 0 has no nutrition value, 1 has a small amount of value and 5 is the maximum relative value to the pollinator.

Cover_i is the percent cover for plant species i, range 1-100 depending on decimal use.

This is a very general equation with flexible parts such as choosing your own RPV scale; calculating for pollen and nectar as separate PSVI or combining pollen and nectar into one PSVI.

Expanding PSVI Research

o Building the underlying master database which links a particular pollinator to the relative rankings of pollen and nectar values using state, regional and national plant lists beginning with research documented assigned values. O Finding collaborators who will help test the PSVI with existing datasets. Particularly valuable would be long-term vegetation studies whose data are amenable to having the PSVI applied such as those published by Johnstone et. al. (3).

O Researching the influence of other factors on PSVI estimates such as plant flowering months, flower color variations, plant hardiness zones, edge effects, with existing datasets.

O Fund a spreadsheet and ultimately an App that allows citizen's to calculate their own PSVI in the field, anywhere around the globe.

O Make funds available so that project team members are able to spearhead efforts to communicate the value of using the PSVI. Specifically, presenting the PSVI to individuals, groups, businesses, government agencies and any other stakeholders on the health status of our pollinators, with a presentation on using the PSVI for their projects in order to gain widespread acceptance of the metric.

O Incorporate PSVI into a significant number of new IVM projects across America and the globe with the technical support from the project team members.

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