Beyond NAWMA

(Stohlgren *et al.* 2005)

Description

The North America Weed Management Association (NAWMA) established minimum mapping standards and bare minimum data requirements to promote data comparability and sharing across boundaries. Although this effort is commendable, data quality and usefulness could be improved by including quality assurance and quantitative assessments. Such efforts would increase the accuracy of repeated measurements and yield comparable data at multiple scales that can be included in spatially explicit predictive models for early detection and rapid response, monitoring, control, and restoration efforts. The existing NAWMA standards can be found at www.NAWMA.org. The Beyond NAWMA standards increase the value of the non-native plant information collected on the landscape by combining both mapping and polygon sampling. Beyond NAWMA provides a thorough description of patterns of plant invasions and is sensitive to change in pattern and composition of species when implemented over time.

Pros/Cons

Pros

- Delimiting the gross area of infestation patches allows for a better understanding of the spread of populations, the reaction of these populations to control efforts, and how infestation might overlap with other areas of importance to management of the landscape.
- Records absence locations as well as presence locations.
- Ancillary data is recorded (i.e., slope, aspect, elevation, geologic features, distance to water, distance to nearest road, and disturbance features)
- Increases ability to generate predictive spatial models.
- The small and consistent size of this plot allows for accurate, repeatable, and comparable measures of cover.
- The fixed size and location of circular plots adds a component of rigor to inventory systems as changes in non-native plant cover and presence in each of the three subplots can be monitored.
- Mapping can accurately display changes in spatial distribution, and plot data can highlight changes in a fixed and repeatable space.
- Plot data provides information about the native species that co-occur with the non-native species. This allows for an assessment of trends in native species and cover that could be altered as non-native cover changes or new species invade.
- Collection of multi-scale data allows comparison of data to many national sampling efforts such as the US Forest Service Forest Inventory Analysis (FIA).
- Stratified-random plots can be used to assess the spatial bias of subjective, NAWMA mapping efforts. Additionally, random plot sampling identifies locations where weeds do not exist.
- The plot and ancillary data collected at sampled and mapped locations can be related to remote sensing data, topographic data, and other abiotic variables and

derived variables to create spatial predictive models that estimate distribution and concentration of non-native species.

Cons

- Beyond NAWMA requires a greater investment of time than the original NAWMA standards.
- Committing time to establishing a plot increases the time spent in a given area. For an equal amount of person-hours, less area can be mapped.

Methodology

Locate the predetermined plot, a center pin is inserted and flagged. Transect lines (T1, T2, T3) are located on the 30°, 150°, and 270° azimuths from subplot center, radiating out 24 ft (7.32m). Transects are flagged at the 24ft (7.32m) mark to delineate the perimeter of the subplot. Vegetation quadrats are located at 15ft and 18.3ft (4.57m and 5.57m) along transects. Flag all four corners of each quadrat to prevent trampling. Note: all distances are horizontal distance, therefore transect lines are corrected for slope.

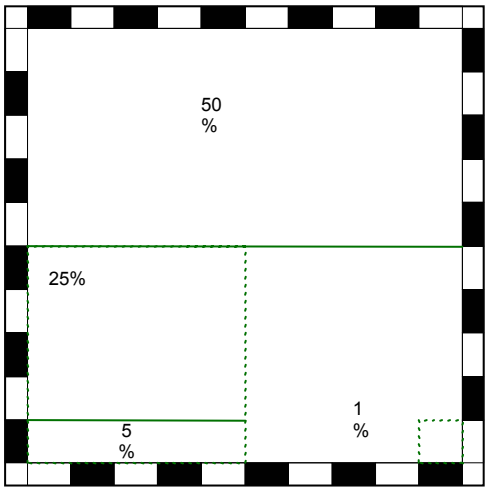
Vegetation diversity and cover measurements are taken with a small 1-m^2 quadrat. On each quadrat, the following types of data are recorded: species identification and dominant microhabitat codes, and cover estimated to the nearest 1% for each plant species and microhabitat variable present. The botanist identifies each plant species in the quadrat and enters its corresponding standardized NRCS (Natural Resource Conservation Service) PLANTS database code (USDA, NRCS. 2001. The PLANTS Database, Version 3.1 (http://plants.usda.gov). National Plant Data Center, Baton Rouge, LA 70874-4490 USA). Percent cover to the nearest 1% is estimated for each species. Cover is then estimated to the nearest 1% for each ground variable listed in the Microhabitat Variables Table.

Microhabitat Variables

Code	Definition
1	Dead wood; log and slash (>10cm diameter), stump, branches and limbs
2	Dung
3	Fungus
4	Lichen
5	Litter / Duff; accumulation of organic matter over forest mineral soil.
6	Live root / bole; living roots at the base of trees or exposed at the surface of the forest floor or soil and cross-sectioned area of live tree boles at the ground line.
7	Mineral soil / Sediment; physically weathered soil parent material that may or may not also be chemically and biologically altered.
8	Moss
9	Road
10	Rock; a large rock or boulder or accumulations of pebbles or cobbles.
11	Standing water / flooded; ponding or flowing water that is not contained within banks.
12	Stream; body of flowing water contained within banks.
13	Trash / junk

Each 1-m^2 quadrat frame is calibrated (painted in 10 cm sections) to make cover estimates easier. Only estimate cover on plants or portion of plant that falls inside the quadrat frame. Visually group species together into a percent cover. Fine tune that estimate by subtracting out any spaces or gaps. Familiarize yourself with what certain

cover estimates (e.g., 1%, 10%, 15%, etc.) look like and use them as reference sizes. For example, if you know that 1% cover is about the same size as your fist, use your fist as a reference. There will often be overlap of plant species. Therefore, your total cover for a quadrat may exceed 100%.



After completing the three quadrats, the botanist does a walking search of the entire subplot looking for and recording any new species that were not previously found on any of the quadrats, adding species to the total species list.

The following ancillary data are collected:

1. UTM location of the center stake
2. Trees >10 cm at 2.3m above the ground: record dbh of trees by species (live and dead trees separately).
3. Tally trees <10cm: record dbh by species.
4. Total tree canopy cover (estimate to nearest 5%)
5. Topographic position (slope, aspect, elevation)
6. Distance to stream (or water), distance to road, and distance to crops if the distances are <100 m; and land use notes on disturbance, grazing intensity, small mammal mounds, etc, that make sense for a later synthesis of plots from many such studies.

Suggested add-on:

1. Collect soil samples after litter is removed -- Four soils samples, one at each point where transects meet the perimeter of the subplot and one in the center. Take samples with 2.5cm diameter core to a depth a 15cm and pool into one composite sample. Analyze for texture (%sand, silt, and clay), total N and C, other nutrients where appropriate.

2. Permanent stake -- copper top engraved survey stake -- for long-term monitoring if that is a study objective. Permanent pins may also be used to mark quadrat corners at the 15ft and 18.3ft (4.57m and 5.57m) points along transects.
3. Collect and store data using MS Access friendly software programs loaded onto handheld computers that interface with GPS units. Objective: Efficient movement of data from field to lab for analysis and modeling.

Materials Needed

Stohlgren T.J., Barnett D.T. & Crosier C.S. (2005) Beyond NAWMA-The North American Weed Management Association Mapping Standards. ***In Progress***

Figures

Design