Exotic Plants Monitoring in the Southern Plains, Sonoran Desert, and Chihuahuan Desert Networks

PROTOCOL SUMMARY

NPS/H. SOSINSKI

Kochia (foreground), Pecos National Historical Park.

Importance

Globalization of commerce, transportation, human migration, and recreation has introduced invasive exotic species to new areas at an unprecedented rate. Invasive species have been directly linked to the replacement of dominant native species, the loss of rare species, changes in ecosystem structure, alteration of nutrient cycles and soil chemistry, shifts in community productivity, and changes in water availability. The damage caused to natural resources by these species is often irreparable, and our understanding of the consequences incomplete.

For the National Park Service (NPS), these invasions present a significant challenge to the management of the agency's natural resources "unimpaired for the enjoyment of future generations." National parks, like other publicly managed lands, are deluged by new exotic species arriving through predictable (e.g., road, trail, and riparian corridors), sudden (e.g., long-distance dispersal through cargo containers and air freight), and unexpected anthropogenic pathways (e.g., weed seeds mixed in with restoration planting mixes). Non-native plants claim an estimated 4,600 acres of public lands each year in the United States, significantly altering local flora. For example, exotic plants comprise an estimated 43% and 36% of the flora of the states of Hawai'i and New York, respectively. Invasive plants infest an estimated 2.6 million acres of the 83 million acres managed by the NPS.

Monitoring Objectives

Our monitoring objectives for exotic plants are:

- To detect the initial occurrence for any of a subset of high-priority species in zones of high and low invasion probability.
- To determine changes in the status and trend (density, abundance or extent) of a subset of high-priority species in zones of high and low invasion probability.
- To determine changes in species composition of a subset of high-priority species in zones of high and low invasion probability, taking into account any management treatments that occurred between sampling intervals.

Methods

Our overall approach incorporates four different components (tiers) of sampling, each intended to complement the other. Although these methods will not provide a comprehensive monitoring of interior (e.g., backcountry) habitats, they will provide a financially feasible means for early detection of the highest-risk species along the highest-risk vectors. The sampling design for each tier is presented below.

Systematic rotating-panel design for the highest-risk vectors

Highest-risk vectors (e.g., roads, trails, rivers) are sampled in 50-m blocks running parallel to the vector (see figure, next page). Within each block, a field-crew member walks a transect parallel to the vector. This transect is inset from the edge of the vector and, when possible, located along the interior edge of a mow strip.

When an exotic species is found, its distance from the vector provides an indication of whether that species has a tendency to invade interior habitats or remain localized near the source of the invasion. The greatest variety and density of exotic plants tend to be found closest to vectors, decreasing as distance from the vector increases. Observations of a given

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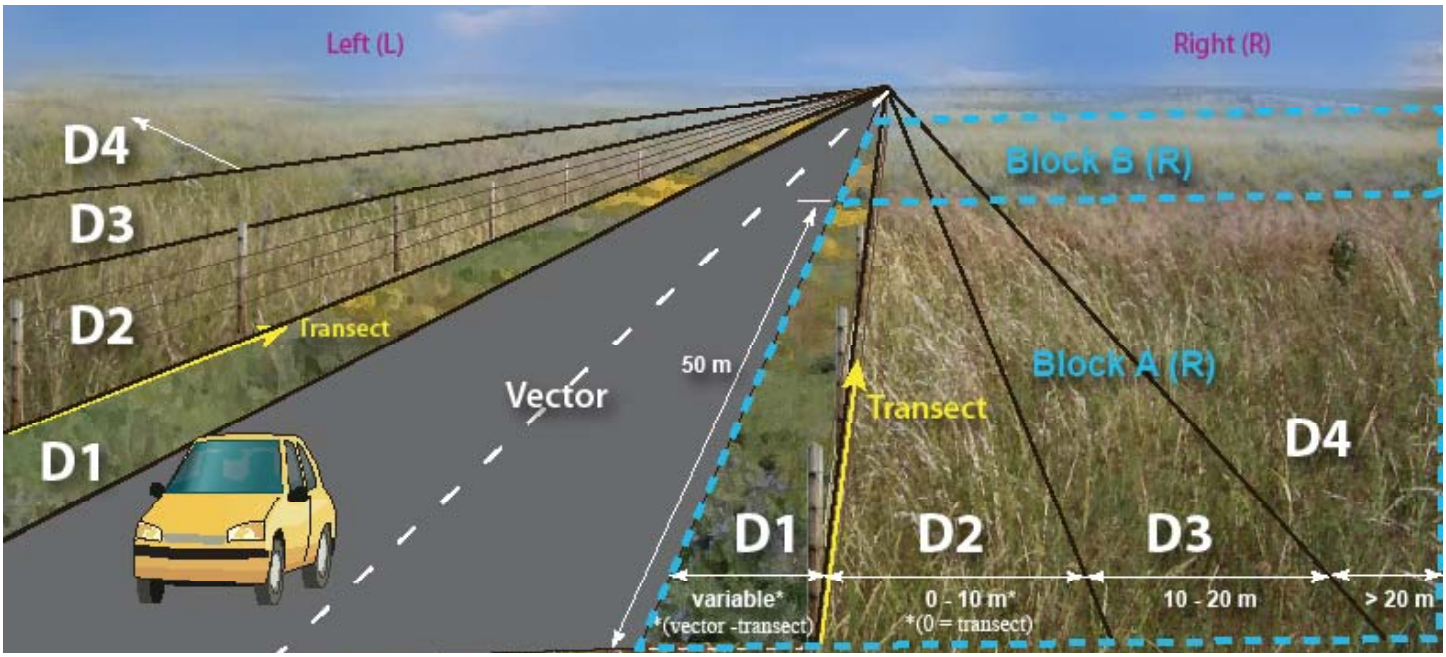

Fifty-meter blocks are sampled on each side of vectors (e.g., roads and trails) in each of four distance classes.

species are recorded in each of four parallel distance classes (D1–D4) from the vector (see figure). Distance Class 1 (D1) represents the distance between the vector and the transect. Distance classes D2 and D3 represent 10-meter increments from the transect (10 and 20 meters), and D4 represents any distance over 20 meters.

Density classes are used to describe exotic-species occurrence within a block in one of four ways: less than five plants; scattered throughout the block in a patchy or clumped manner; scattered throughout in an even distribution; or forming a matrix. This distribution corresponds to an initial introduction, establishment, spread, and complete invasion of the habitat, and will also allow for future monitoring of overall changes to exotic populations.

Systematic monitoring of interior sites as part of grassland/riparian monitoring

Interior habitats away from high-risk vectors are monitored as part of other, concurrent vegetation monitoring (see network-specific vegetation monitoring protocols for details).

Supplementary monitoring of additional vectors using same field methods as Tier 1

Some parks provide supplementary monitoring of additional high-risk vectors using park staff, volunteers, or citizen science groups. These groups follow the same general protocol described above, but may be more opportunistic in their implementation.

Opportunistic encounters using LCAS training products

Parks can use identification and training aids, developed for and available at the Learning Center of the American Southwest (www.southwestlearning.org), for opportunistic detection of high-risk species by park personnel, visitors, volunteers, or other groups.

Protocol Status

The initial protocol and standard operating procedures for the Southern Plains Network were developed and field-tested in 2008 and 2009. The protocol is currently being revised to incorporate parks of the Sonoran Desert and Chihuahuan Desert networks. A report from the Southern Plains Network for 2009 is available at the Learning Center of the American Southwest (http://www.southwestlearning.org/node/764).

Project Contact

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