SYMPOSIUM. INVASIVE SPECIES

MULTIPURPOSE MONITORING OF NON-NATIVE INVASIVE SPECIES: PERSPECTIVES FROM REGIONAL FOREST RESOURCE INVENTORIES. V.A. Rudis, USDA Forest Service, Southern Research Station, Forest Inventory and Analysis Unit, Starkville, Mississippi

ABSTRACT

Managers often note the occurrence of non-native invasive plant species (NNIS) to estimate the infestation and size of the management task, but what they and scientists may also want is to predict the area and amount likely to be present and their environmental associations. Such information helps in management planning, assessing economic impacts, and increasing public awareness about needed efforts. Over a large area, sample-based inventories provide such estimates with a stated degree of confidence, ground-based measures for calibrating remote sensors, and if permanent, field locations for monitoring change over time. An Operational Inventory (OI) of nonnative invasive plant species (NNIS) estimates populations within a given management area so that effective treatments can be accomplished. A Strategic Inventory (SI) of NNIS estimates populations to make an efficient allocation of management activities. A Strategic Multipurpose Resource Inventory (SMRI) estimates two or more objects, and the two that this presentation focuses on are forest resources and NNIS that potentially affect forest resources.

All such inventories reference the area sampled, with SIs providing precise estimates at regional scales, and OIs at local scales. Due to their larger area coverage and broader array of measurements, systematic sample-based SMRIs serve as bases for testing significance of associations among NNIS and resource measures to generate conceptual models and plausible hypotheses. The data provide the means to (1) evaluate associations between NNIS and the resource of interest, including potential costs and benefits within definable environmental conditions; (2) estimate the range and density of species occurrence for further study; (3) model invasion risk and effectiveness of suitable treatments; and (4) describe invasion hot spots. The presentation references one SMRI that assesses nonnative invasive species as part of an ongoing forest resource inventory, but SMRIs of pastureland and other nonforest land are needed as well to provide comprehensive NNIS population estimates. OIs of test locations in smaller areas also are needed to provide definitive causal inferences and knowledge of effective management activities.

Example SMRI results reference Chinese tallow (*Triadica sebifera*), Kudzu (*Pueraria montana*), Japanese honeysuckle (*Lonicera japonica*), *Melaleuca quinquenerva*, Multiflora rose (*Rosa multiflora*), Privet (*Ligustrum* spp.), Royal Paulownia (*Paulownia tomentosa*) and Tree-of-Heaven (*Ailanthus altissima*)—species of widespread concern on forest land—identified as part of the USDA Forest Service, Forest Inventory and Analysis (FIA) surveys. Procedures and maps presented primarily refer to 1984-1997 surveys of southeastern U.S. forests (Rudis and Jacobs, manuscript in review). The current FIA survey includes a four-season identification guidebook for 32 taxa, and additional species for Florida. See the FIA "Southern Research Station Field Guide" at "http://www.srs.fs.fed.us/fia/manual/p2manual.htm" for the guidebook, detailed sampling protocols, quality assurance procedures, and an array of other attribute measures. Lists of added species since 2001, monitoring progress, and contacts for further information are available from the author.

Many specialized NNIS monitoring efforts are provincially applicable but may be poorly coordinated regionally. Wider public acceptance of the NNIS problem and needed control requires orchestration of public demand for economic, social, or biological justice regarding plant invasion impacts, as in a comprehensive assessment report. Having consistent monitoring information in one place makes it easier to engage in dialogue about potential costs and benefits

with potential stakeholders, e.g., those in the agricultural, timber, and landscape nursery trades, highway maintenance crews, even landowners. Repeating the assessment process with a re-inventory at some fixed future date will permit opportunities for refining data collection and reporting procedures, involvement of stakeholders, and may engender additional support.

A logical NNIS management strategy includes a socioeconomic impact evaluation and public education, both of which benefit from having strategic inventory information. With SMRI studies involving FIA surveys, Rudis (In press. Comprehensive regional resource assessments and multipurpose uses of Forest Inventory and Analysis data, 1976-2001. General Technical Report. Asheville, NC: USDA Forest Service, Southern Research Station) found such data most used when they shared certain traits. Lessons for NNIS inventories suggest the data obtained will be most useful when they: (1) are collected consistently across spatial and temporal scales important to the geographic region and questions being addressed, (2) are well-documented, stored in a form suited to common analytical techniques (3) lend themselves to accommodating changing information needs, (4) can be reassembled without bias to suit other disciplinary assumptions, and (5) have logical spatial and temporal associations with other data important to a more comprehensive monitoring strategy.