

Title: Biology and Management of Non-Native Plant Species in the Santa Monica Mountains National Recreation Area

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Problem Statement

Non-native invasive species are recognized as a serious threat to biodiversity. They are the number one cause of species endangerment (Czech and Krausman 1997). Studies of individual species have found that invasive species can alter basic ecosystem functions such as nutrient cycling, disturbance regimes, water cycling, and soil retention. Most invasive species provide little to no habitat value and frequently have traits that make them inhospitable to native plants and animals such as toxic sap, thorns, etc. A wide variety of methods exist for removing specific species but each method tends to have a trade-off (chemical impacts on the environment, increased siltation from hand digging, high time input for hand cutting).

There are over 300 non-native species in the Santa Monica Mountains National Recreation Area (SMMNRA). Of these 300, local experts consider 19 to be invasive, with significant impacts on native biodiversity. A comprehensive 2 year survey of public lands for these 19 invasive species identified over 4000 infestations within the SMMNRA. With limited staffing and budgets, land managers within the SMMNRA need to find the most efficient approach to protecting natural resources from the invasive species threat. This approach will likely involve: identification of high quality habitats that currently have no invasive species for targeted monitoring and protection, prioritization of infestations for eradication, identification of invasive species fronts, and design of monitoring protocol to assess species spread and detect new satellite populations.

Project Objectives

The project will address a series of objectives related to the ecology and management of exotic species in the SMMNRA.

Scientific Objectives:

- 1) The existing list of 19 species considered to be invasive is based on expert opinion, not formal analysis. The project will conduct a formal weed risk assessment, using published protocols, for each of the 300 non-native species within the SMMNRA, to determine whether any need to be added to the list of concern
- 2) Using the existing weed map, determine, for each of the nineteen mapped species, the stage in the invasion process (introduction, colonization, naturalization)
- 3) Identify possible vectors for each species of concern (species identified in 1)?

Management Objectives:

- 4) Identify effective methods for control of each species of ecological concern, given its current distribution and abundance within the SMMNRA. This will address both strategic (e.g., eradication, containment, slowing spread) and tactical (e.g., herbicides, fire management, hand weeding) issues.
- 5) Identify weed-free areas within the SMMNRA that should be the focus of monitoring and management to maintain their status.
- 6) Using information on possible rates of spread, ecological impacts, and current distribution, determine which populations and/or species should have priority for eradication or control.

Project Significance

Non-native invasive species represent a significant threat to the natural resources of the Santa Monica Mountains. If left unchecked, these species will radically reduce the biological diversity of this area, which is one of the few remaining examples of Mediterranean ecosystems in the world. Considering the size and scope of the invasive species problem, a well-considered approach is required to ensure that progress is actually made. Information generated and synthesized by this project, as well as management recommendations, will inform the land management practices of public land owners in the Santa Monica Mountains, including the National Park Service, California State Parks, Mountains Restoration Trust, and Mountains Recreation and Conservation Authority.

Background Information

This project will focus on the Santa Monica Mountains National Recreation Area. The SMMNRA is a unit of the national park system and contains 150,000 acres within its boundaries. Of these 150,000 acres, 65,000 are public lands, with 22,000 owned and managed by NPS and 43,000 owned and managed by State Parks. Sixty-seven cooperating government agencies are located within the SMMNRA. 500,000 people visit the park yearly. Over 1000 native plant species and over 450 vertebrates live in the Santa Monica Mountains including mountain lions, bobcats, and the federally endangered pygmy aster.

The National Park Service and California State Parks currently manage invasive species on their lands through a combination of eradication and ecological restoration. To date, projects have focused on high quality areas with relatively small invasive species infestations. NPS is looking for a more comprehensive approach to invasive species management including monitoring, limiting spread, active eradication where possible, development of best management practices to prevent spread, early detection and rapid response protocols. In addition, a more cooperative management approach may be more effective in utilizing the resources of all land management agencies.

Stakeholders

Numerous land management groups are involved with invasive species management in the Santa Monica Mountains. Local water districts, state parks, national parks, and local land trusts would all benefit from a comprehensive analysis of the non-native species in

our area and identification of control strategies. Direct beneficiaries of this project include: Mountains Restoration Trust, Santa Monica Mountains Conservancy, California State Parks, Conejo Open Space Conservation Authority, Los Angeles and San Gabriel Rivers Watershed Council and the Los Angeles Weed Management Area.

Possible Approach and Available Data

Most of the work will involve synthesizing literature information and existing data. Several datasets that are likely to be particularly useful include:

- A weed map with 19 invasive species mapped on all public lands within the SMMRNA
- A vegetation map showing basic vegetation community types within the SMMNRA
- A soils layer for the Santa Monica Mountains
- Roads and trails layers
- Several extensive on-line databases on invasive species including TNC's invasive species page, and U.S. Forest Service fire effects information system

In addition, depending on the students' interests and skills, there may be opportunity to collect additional field data in collaboration with Dr. Brigham.

Deliverables

The project will deliver a report containing conclusions and recommendations that address the six project objectives outlined above, together with descriptions of the information and analyses used to draw those conclusions. In addition, the project will deliver a spreadsheet or database with the elements of the weed risk assessment for the 300 species, with source information for the data in the spreadsheet.

References:

Czech B. and P.R. Krausman. 1997. Distribution and causation of species endangerment in the United States. *Science* 277:1116-1117.

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Anticipated Financial Needs and Sources of Support

We anticipate a budget of approximately \$4000 will likely be available for student support for work on this project. Additional funds may become available through other small grants from the National Park Service.