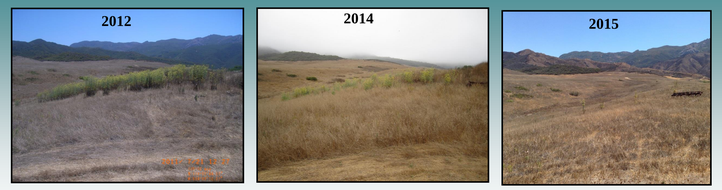
After all this time and money, are the weeds getting better or worse?



Foeniculum vulgare at Rancho Sierra Vista.

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National Park Service - Santa Monica Mountains National Recreation Area

Introduction

We evaluated the effectiveness of weed control efforts within the Santa Monica Mountains National Recreation Area over a 7-year period. We included analyses of the dataset as a whole which can provide confusing results. This comes from having more work than can feasibly be accomplished causing trade-offs, prioritizing resource protection over detailed data collection. There are two ways this negatively affects our ability to communicate the reductions we observe: 1) by recording the distribution of larger infestations in a coarser manner (fewer detailed polygons), and 2) new areas are lumped into the gross infested area making it appear that the infestations are getting worse. We have examples that clear this confusion when we analyze individual projects that have been "revisited" with detailed data collection.

Methods

We analyzed the weed dataset as a whole (Fig. 1, Table 1.) selecting the first record of each infestation by fiscal year to produce the gross area and net percent cover. Additionally, we analyzed infestations that were revisited over multiple years. Efforts included net percent cover, staff hours and chemical amounts.

Fig. 1. Park site locations where weed infestations are treated.

Site	Species	Site	Species	Site	Species
Arroyo Sequit	*Cynara cardunculus*	Paramount Ranch	*Carduus pycnocephalus*	Saddle Peak	*Cynara cardunculus*
	Foeniculum vulgare		*Centaurea solstitialis*		*Foeniculum vulgare*
	Lepidium latifolium		*Cirsium vulgare*		*Spartium junceum*
	Marrubium vulgare		*Conium maculatum*		*Stipa miliacea*
Backbone Trail	*Brassica nigra*		*Lepidium draba*	Shea Open Space	*Ailanthus altissima*
	Carduus pycnocephalus		*Lepidium latifolium*	Solstice Canyon	*Bidens pilosa*
	Centaurea melitensis		*Parthenocissus vitacea*		*Conium maculatum*
	Elymus caput-medusae		*Phalaris aquatica*		*Cyperus involucratus*
	Eucalyptus cladocalyx		*Salsola australis*		*Euphorbia terracina*
	Euphorbia terracina	Peter Strauss Ranch	*Centaurea solstitialis*		*Foeniculum vulgare*
	Foeniculum vulgare		*Eucalyptus camaldulensis*		*Silybum marianum*
	Genista monspessulana		*Euphorbia terracina*		*Tropaeolum majus*
	Nicotiana glauca		*Lepidium latifolium*		*Vinca major*
	Phalaris aquatica		*Salsola australis*	Trancas Canyon	*Euphorbia terracina*
	Salsola tragus	Rocky Oaks	*Carduus pycnocephalus*	Triunfo Canyon	*Centaurea solstitialis*
	Spartium junceum		*Centaurea solstitialis*	Upper Trancas Canyon	*Arundo donax*
	Stipa miliacea		*Malva parviflora*		*Eucalyptus globulus*
Cheeseboro Canyon	*Ailanthus altissima*		*Phalaris aquatica*	Yellow Hill	*Asphodelus fistulosus*
	Carduus pycnocephalus	Rancho Sierra Vista	*Acroptilon repens*	Zuma Canyon	*Carduus pycnocephalus*
	Centaurea melitensis		*Aegilops cylindrica*		*Conium maculatum*
	Centaurea solstitialis		*Avena barbata*		*Euphorbia lathyris*
	Lepidium latifolium		*Brassica nigra*		*Euphorbia terracina*
	Salsola australis		*Carduus pycnocephalus*		*Foeniculum vulgare*
	Silybum marianum		*Centaurea melitensis*		*Malva parviflora*
Circle X Ranch	*Pennisetum clandestinum*		*Conium maculatum*		*Marrubium vulgare*
	Spartium junceum		*Cynara cardunculus*		*Nicotiana glauca*
Deer Creek	*Foeniculum vulgare*		*Foeniculum vulgare*		*Phalaris aquatica*
Diamond X Ranch	*Salsola australis*		*Marrubium vulgare*		*Ricinus communis*
Franklin Canyon	*Genista linifolia*		*Nicotiana glauca*		*Silybum marianum*
Gillette Ranch	*Ailanthus altissima*		*Pennisetum clandestinum*		*Spartium junceum*
	Carduus pycnocephalus		*Phalaris aquatica*		
	Euphorbia terracina		*Raphanus sativus*		
	Nicotiana glauca		*Salsola australis*		
	Salsola australis		*Salsola tragus*		
			Vinca major		

Table 1. Santa Monica Mountain NPS sites and associated invasive plant species from the database.

Results

Analysis of the entire dataset showed reductions in net cover over a 7 year period.

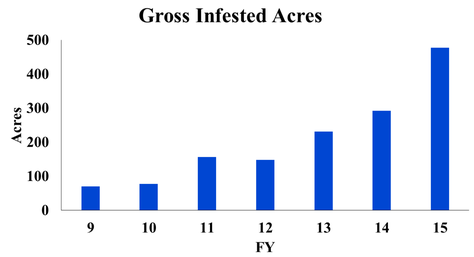

Fig. 2. Gross acres of all records in the weed dataset by fiscal year.

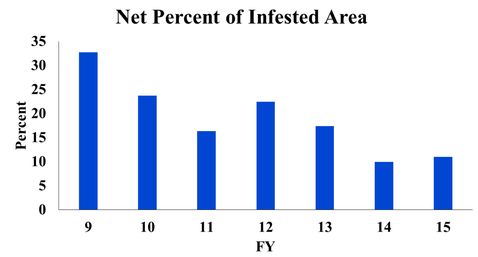

Fig. 3. Net percent cover of all records in the weed dataset by fiscal year.

Analysis of revisited infestations showed reductions in percent cover, herbicide use and staff hours.

Table 1. Describes the reductions in percent cover, herbicide use, and staff hours for 3 different weed control projects.

Site	Weed	# of Infestations	Years of Treatment	Reductions		
				Percent Cover	Herbicide	Staff Hours
Paramount	*Lepidium latifolium*	8	3	-93%	-66%	-49%
Rocky Oaks	*Phalaris aquatica*	6	3	-95%	-82%	-49%
Rancho Sierra Vista	*Foeniculum vulgare*	16	4	-88%	-93%	-94%

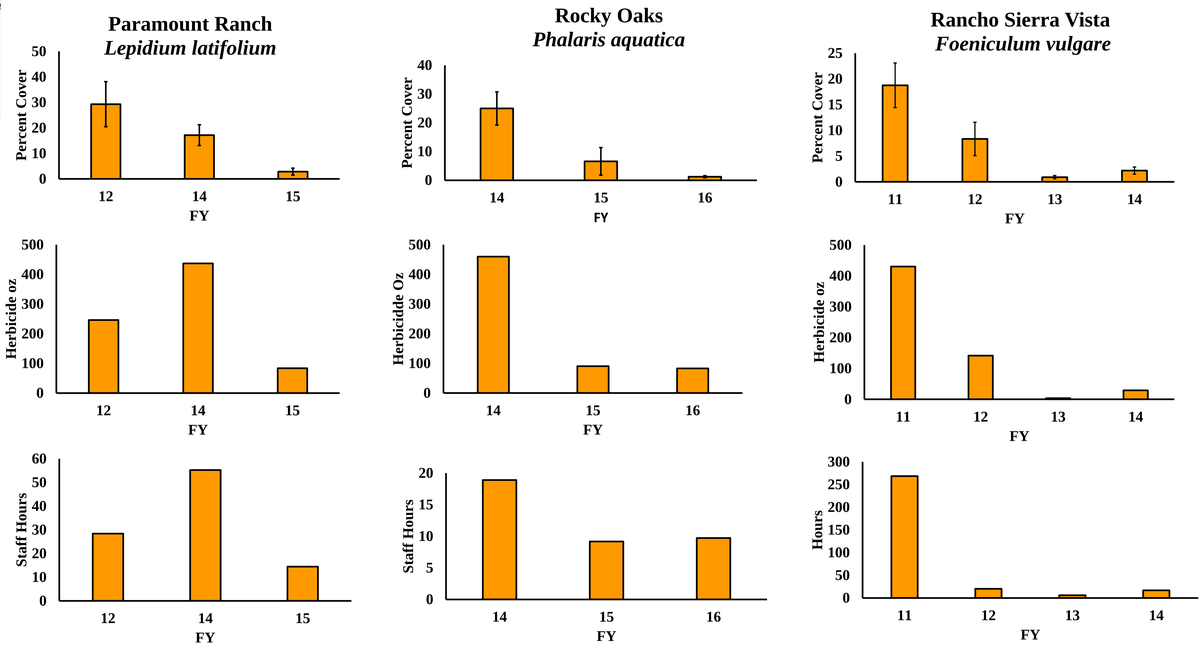

Fig. 5. Percent cover, herbicide use and staff hours describing weed control efforts on 16 infestations of *Foeniculum vulgare* over 4 years at Rancho Sierra Vista, 6 infestations of *Phalaris aquatica* at Rocky Oaks and 16 infestations of *Foeniculum vulgare* at Rancho Sierra Vista.

Discussion

- Gross infested area is increasing due to the addition of new infestations and coarser data recording.
- Net percent cover of the whole dataset is declining.
- Revisited infestations show declines in percent cover, herbicide use and staff hours.
- Lack of staffing has lead to trade offs, prioritizing resource management over detailed data collection.
- This can create challenges when analyzing the data and communicating the effectiveness of our treatments to management and the public.
- We can resolve these challenges by committing student interns to monitor all infestations on a regular basis.

Conclusions

The decline in cover and labor effort of revisited infestations illustrates the importance of prioritizing data collection to show these trends for all treatments. We have arranged for a detailed data collection of all infestations in the dataset for this coming year which will allow for comparisons on percent cover, herbicide use and staff hours between the first visit of these infestations and their status in FY17.

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