Measuring performance of invasive plant management efforts

Pete Holloran
Environmental Studies Department
University of California at Santa Cruz

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California Invasive Plant Council
Rohnert Park, California

source: DPR 2004

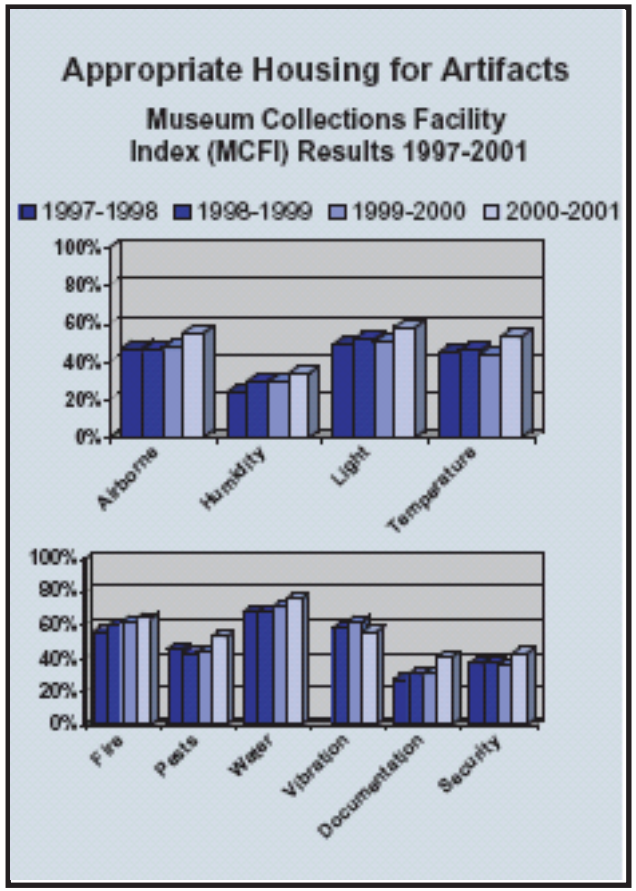
California Department of Parks and Recreation
(DPR)

early adopter of performance measurement in state government

won an award for "Best in Class" from California Council for Quality and Service

key DPR staff member Denzil Verardo, now retired, very active in California Performance Review

Key attributes of an effective performance measure



source: DPR 2004

quantitative

measured annually

suitable for display as a figure or map

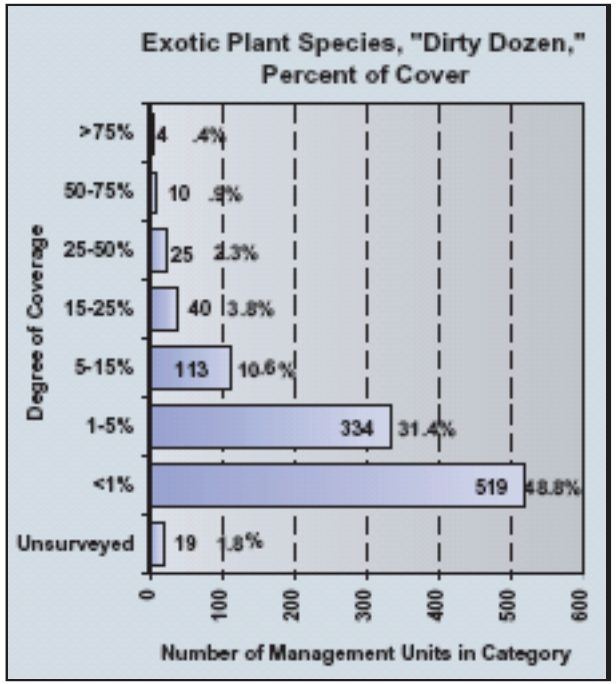
non-statistical

inexpensive

straightforward

capable of aggregation across scale
("rolled up" from park to district)

Key attributes of an ineffective performance measure



source: DPR 2004

not measured annually

figure full of chart-junk

expensive

confusing

not directly linked to management objectives

Key management objectives

Eradication

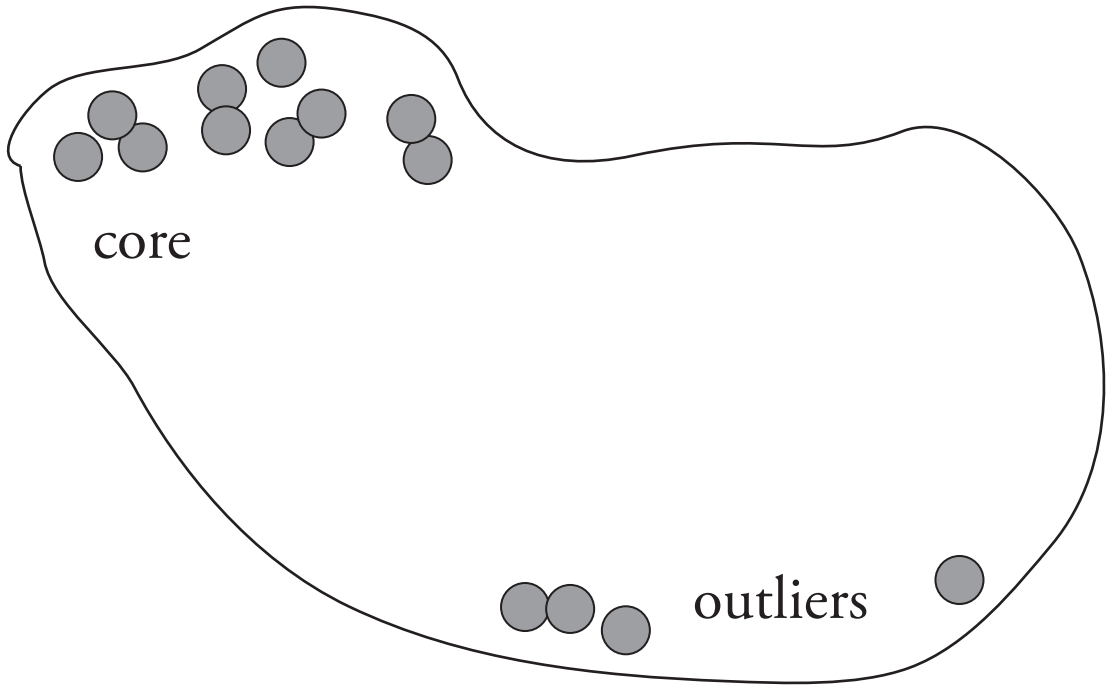
Eliminate all sites
(no reinvasion)

Elimination

Eliminate all sites
(reinvasion possible)

Containment

Eliminate all outliers
(reinvasion possible)



Site elimination

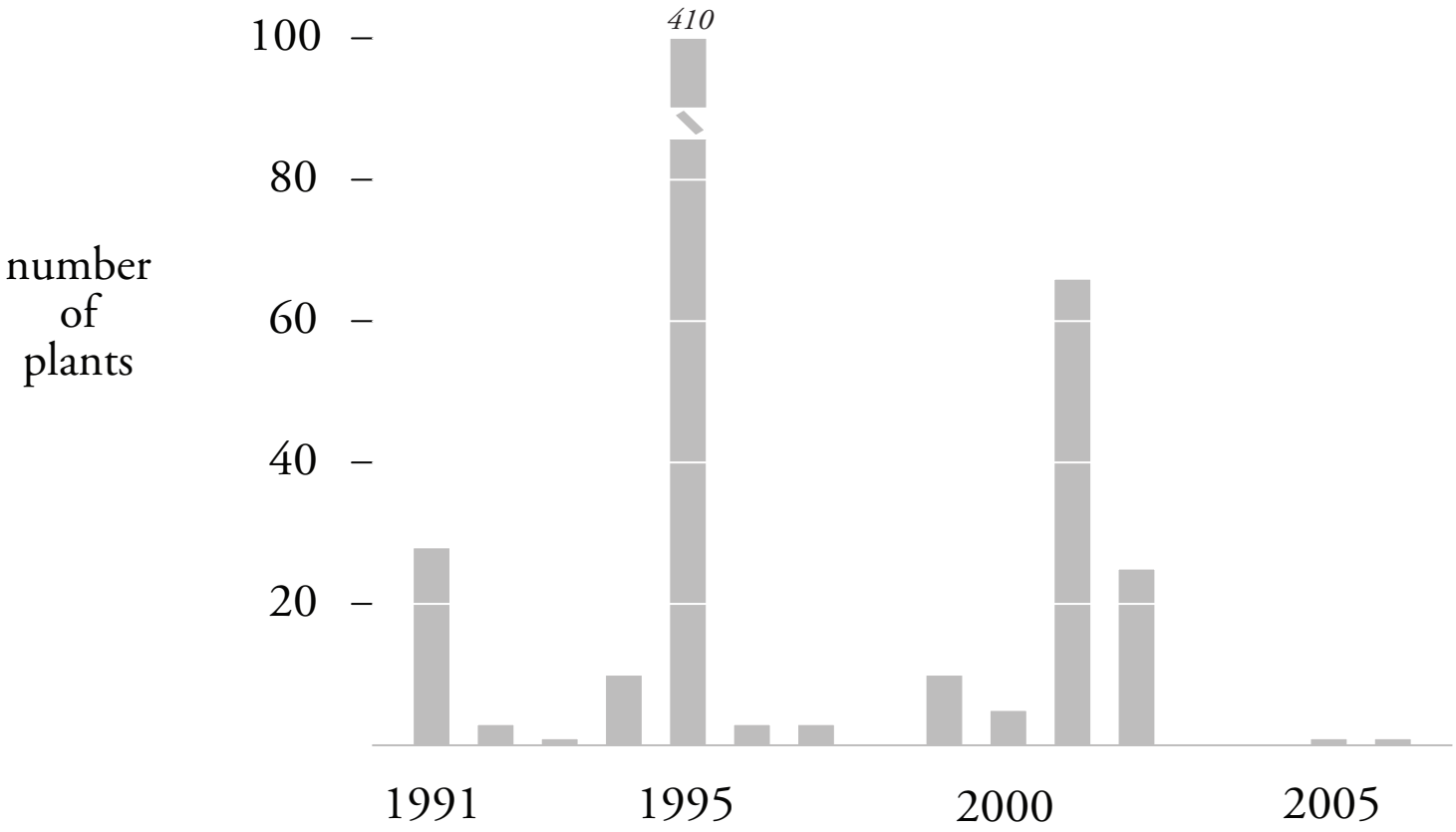
Local extinction of a species
(no above-ground plants
emerging from a seed bank)

Key insight

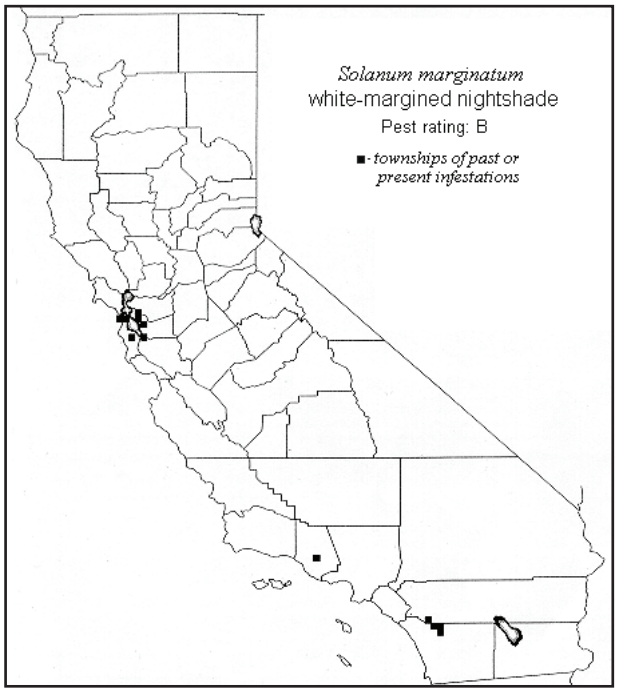
Elimination of some sites
often precedes elimination
of all sites

A key obstacle to elimination: The seed bank

Plants removed, white-edged nightshade
(*Solanum marginatum*), Matakana Island, Bay of Plenty, NZ



source: Auckland Regional Council



source: CDFA

Coincya monensis

star mustard, Isle of Man cabbage

photo by Andrea Pickart

detected in Humboldt County in early 1997

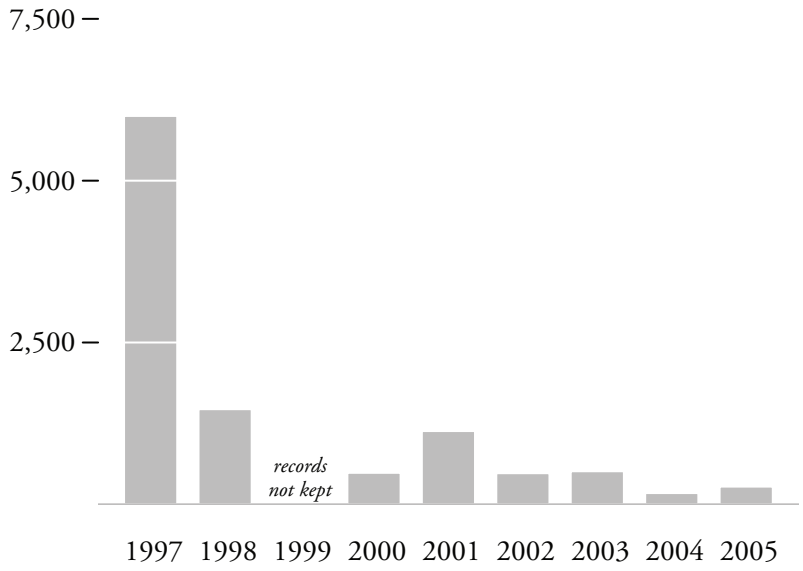
only known location in California

invasive in Pennsylvania and elsewhere

eradication effort initiated in early 1997

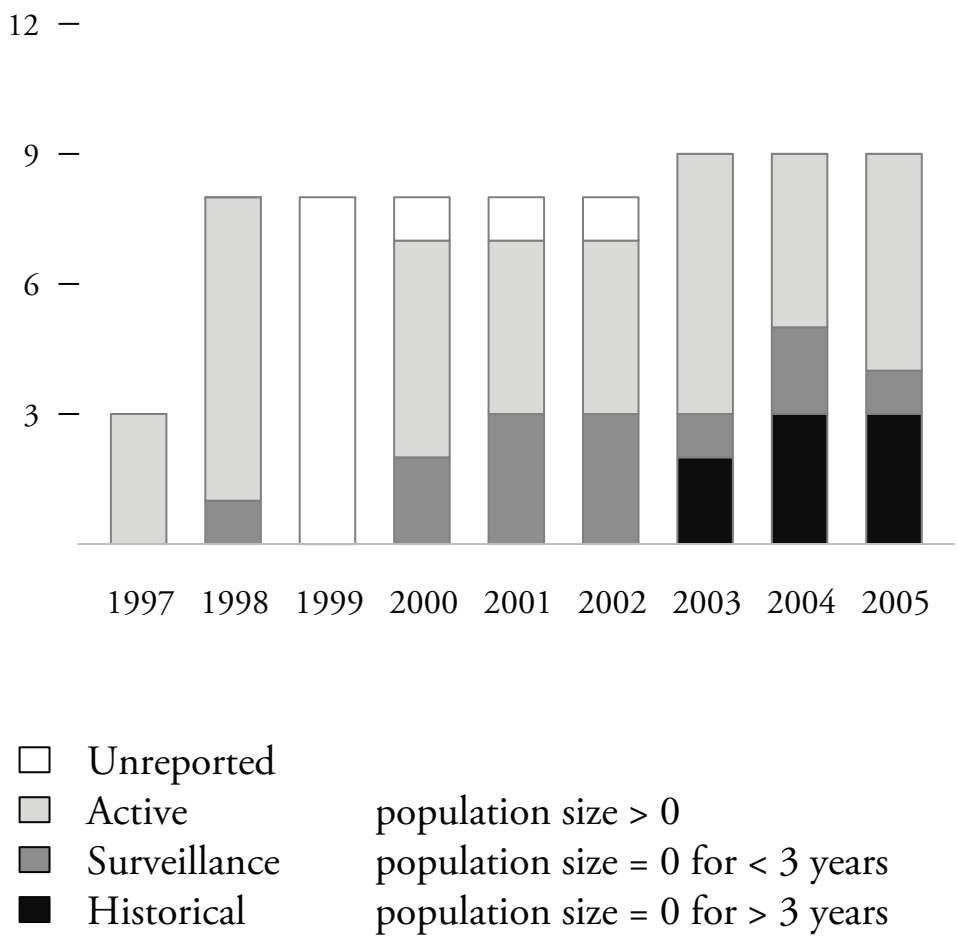
The data: 4 columns in a spreadsheet

Species	Site	Year	Pop. size
C. monensis	Site A	1997	6,000
C. monensis	Site A	1998	1,470
C. monensis	Site A	1999	n.a.
C. monensis	Site A	2000	487
C. monensis	Site A	2001	1,132
C. monensis	Site A	2002	481
C. monensis	Site A	2003	511
C. monensis	Site A	2004	174
C. monensis	Site A	2005	274



Site Status: an effective performance measure

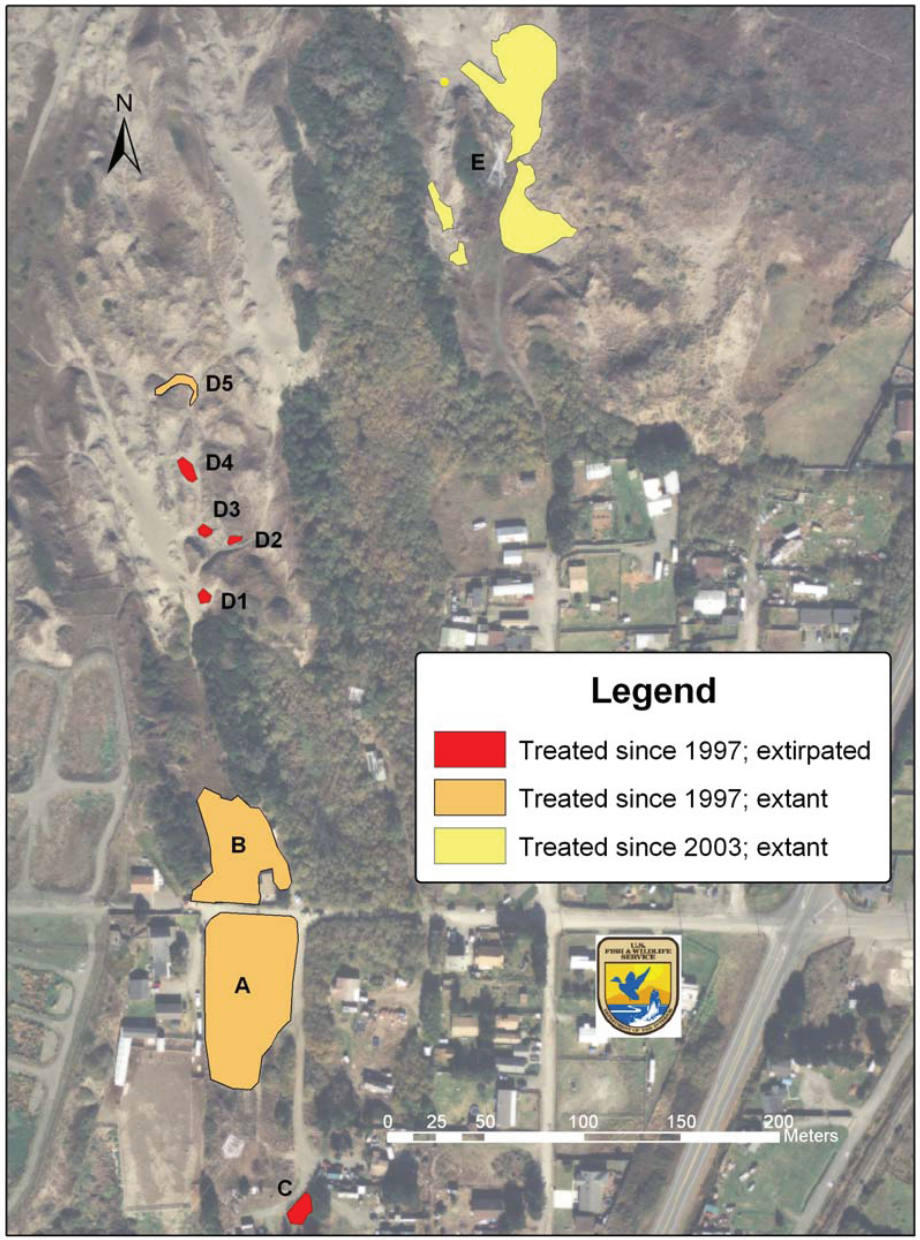
Site Status, *Coincya monensis*, Humboldt Co.



- √ quantitative
- √ measured annually
- √ suitable for display as a figure or map
- √ non-statistical
- √ inexpensive
- √ straightforward
- √ capable of aggregation across scale ("rolled up" from park to district)

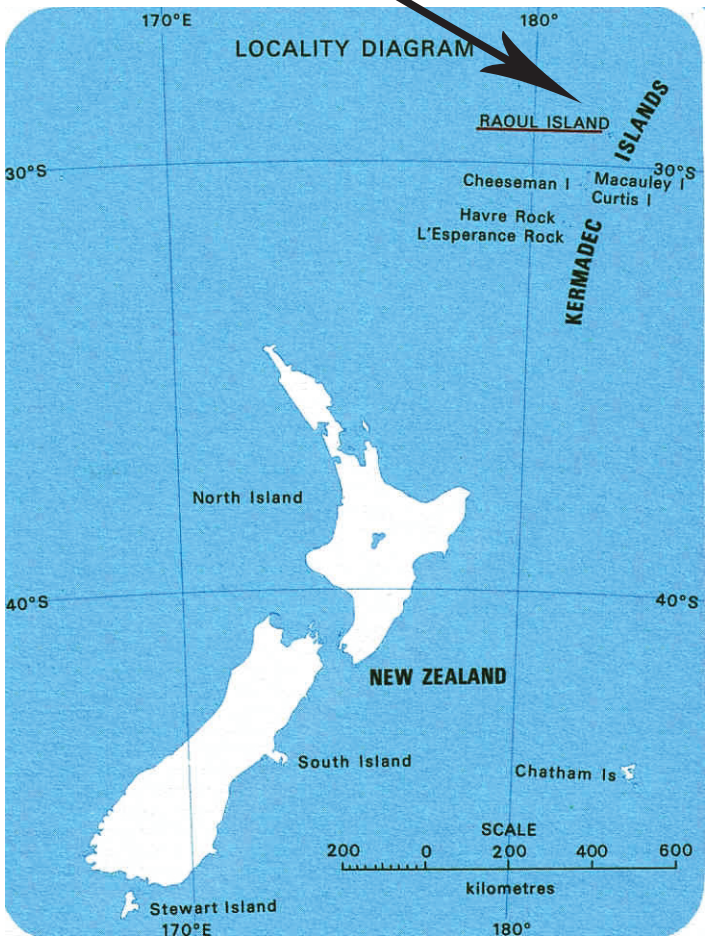
Coincya monensis Invasion and Control

Vicinity of Lupine Ave, Manila



Compiled by A. Pickart USFWS Sept. 2004. Source USFWS 2004

Raoul Island, New Zealand



source: LINZ

Seven plant species targeted for eradication:

Mysore thorn (*Caesalpinia decapetala*)

African olive (*Olea europaea*)

black passionfruit (*Passiflora edulis*)

peach (*Prunus persica*)

purple guava (*Psidium cattleianum*)

yellow guava (*Psidium guajava*)

Brazillian buttercup (*Senna septemtrionalis*)

F. & K. Starr

G. D. Carr

F. & K. Starr

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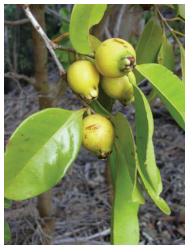


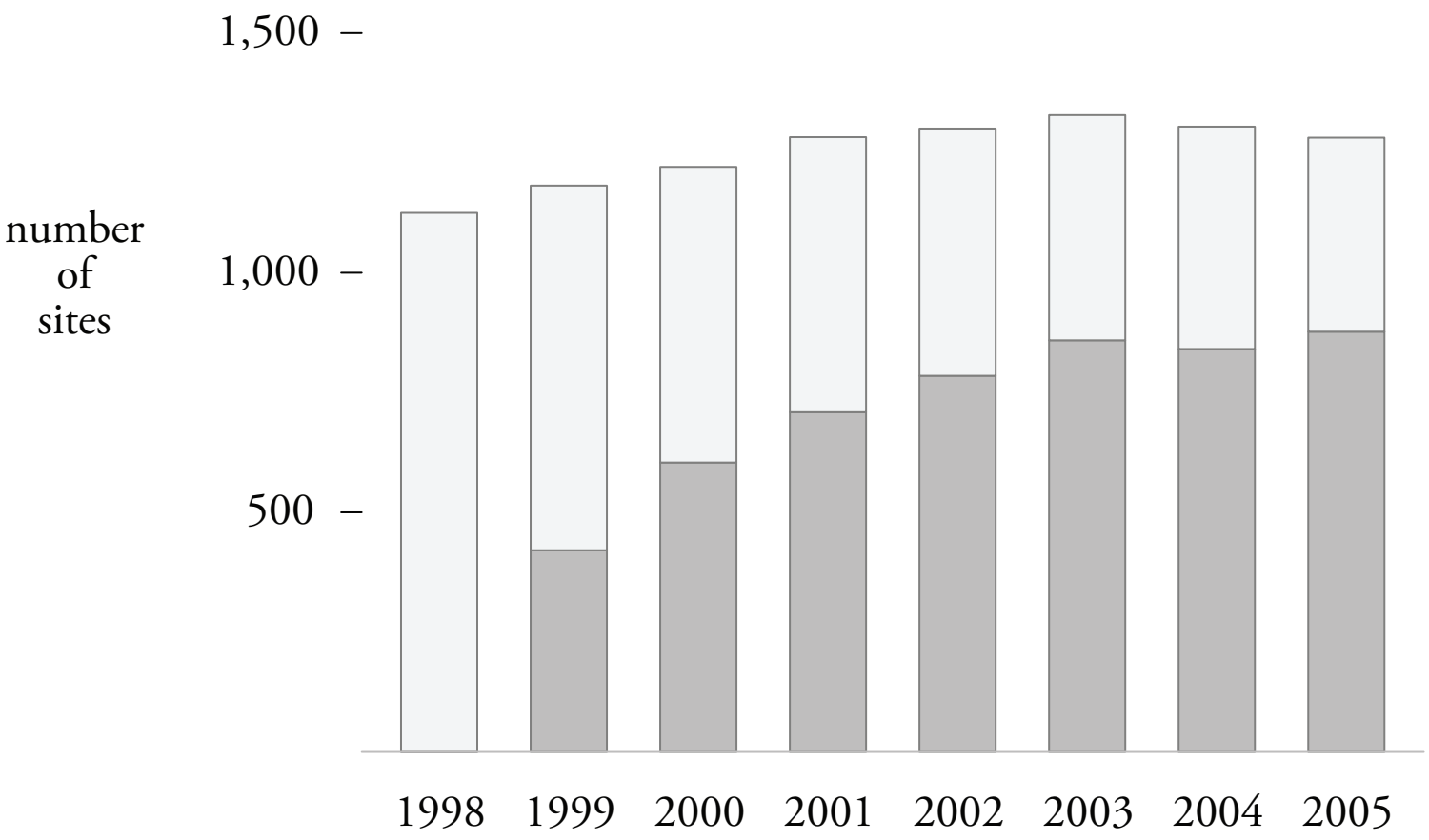
F. & K. Starr

F. & K. Starr

ANBG

Site status, Raoul Island

Brazilian buttercup (*Senna septemtrionalis*)



Active (pop. size > 0)

Surveillance (pop. size = 0)

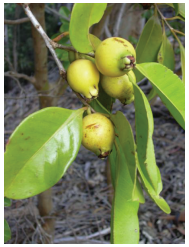
Raoul Island

Percentage of all sites that are eliminated

	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004	% change over last year
Caesalpinia decapetala	40	51	59	66	70	71	1
Olea europaea	70	85	84	85	86	89	3
Passiflora edulis	25	53	57	61	69	71	3
Prunus persica	18	40	44	46	45	43	-4
Psidium cattleianum	64	89	77	76	77	80	4
Psidium guajava	54	77	85	79	71	81	14
Senna septemtrionalis	36	49	55	60	65	64	-2
Raoul Island mean	**44**	**63**	**66**	**68**	**69**	**71**	**3**







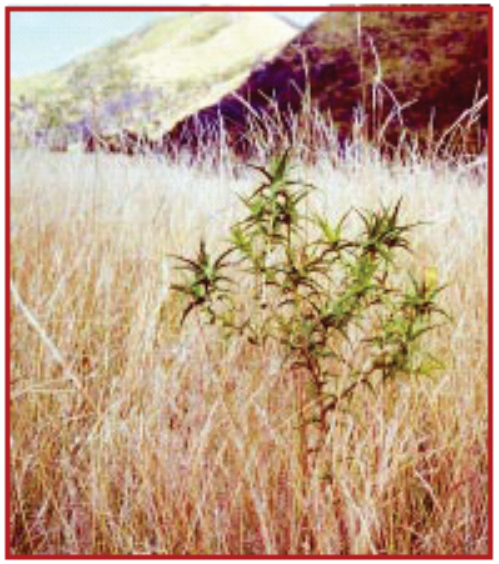
Performance measures that include some measure of effort

Example from Marlborough District Council, New Zealand

Weed Alert!

Saffron Thistle
(Carthamus lanatus)

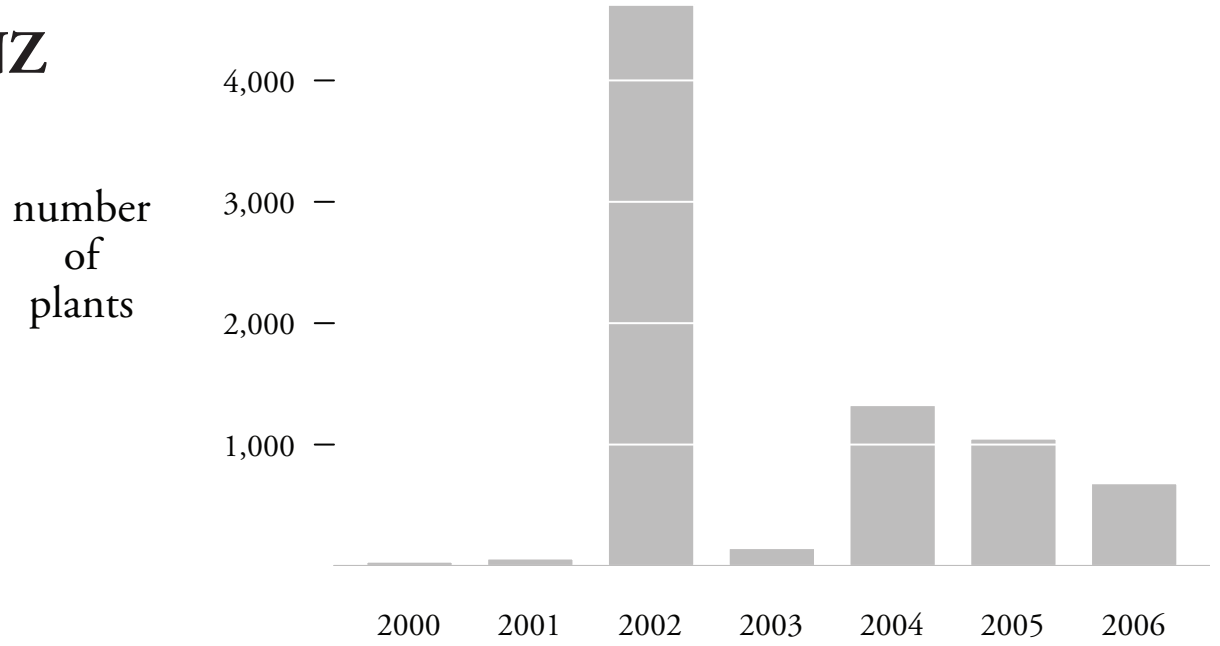
Saffron thistle is a total control plant pest in the Marlborough District Council's Regional Pest Management Strategy. Land occupiers that suspect they have Saffron thistle on their property should notify the Marlborough District Council. Council will carry out the control of Saffron thistle before the plants produce seed, with the aim of eventual eradication of this plant from the Marlborough region.

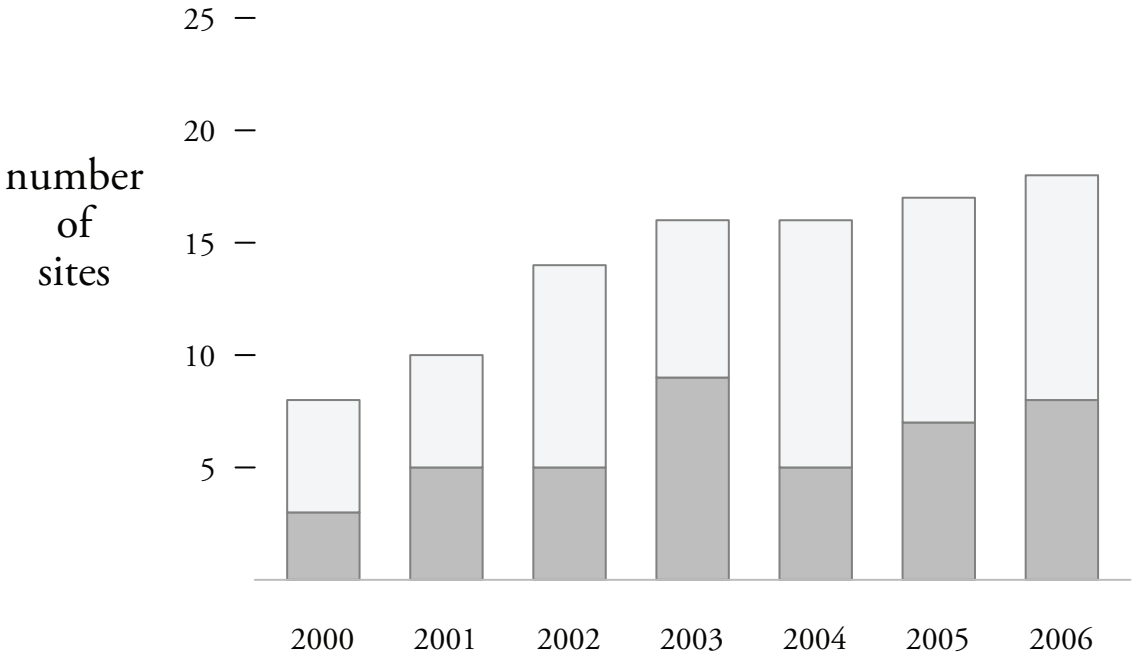


An accidental introduction

This plant is the most widespread weed in New South Wales in Australia, and was accidentally introduced into New Zealand as a contaminant of wheat imported from there. It was first discovered in New Zealand in 1931 and has become established in drier sites throughout the country since then.

Pop. size, Marlborough, NZ
woolly distaff thistle
(*Carthamus lanatus*)





Site status, Marlborough, NZ
woolly distaff thistle
(*Carthamus lanatus*)

- Active (pop. size > 0)
- Surveillance (pop. size = 0)

Status and effort, Marlborough, NZ
woolly distaff thistle
(*Carthamus lanatus*)

Species	Perf. measure	2000	2001	2002	2003	2004	2005	2006
Carthamus lanatus	sites	8	10	14	16	16	17	18
	% sites eliminated	63	50	64	44	69	59	56
	person-hours	31	31	146	173	172	132	106
	person-hours/site	3.9	3.1	10.4	10.8	10.8	7.8	5.9

Sample data for *Carthamus lanatus*, Marlborough District Council, New Zealand

8 Mar 2004	170	Active	70 plants	6 person-hours
7 Jan 2005	170	Surveillance	0 plants	2 person-hours
4 Jan 2006	170	Surveillance	0 plants	1 person-hour

Bridging the research-management divide

"[Our management plans] list achievable goals and annual targets. [Monitoring] doesn't happen in practice, though. It's a resource issue. You get phone calls, and things compound, so you never get around to it. . . . If you don't show progress, people will lose faith in eradication and they won't support it any more. We need to come up with meaningful measures that show progress towards eradication in this zone [the realm of the final inch]."

——regional council biosecurity officer, New Zealand

"The general emphasis on monitoring [eradication] of small, recently established infestations is not surprising as it offers the greatest chance of success, for the smallest cost. Because such monitoring is associated with the destruction of plants at the site, it involves very simple measurements. However, such measurements do not involve any rigorous scientific testing, and merely record success of the control measure."

——ecologists providing monitoring advice to managers, New Zealand

Acknowledgments

Data
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Dedicated to:

Raoul Island weed workers, particularly Mark Kearney, who was killed during the volcanic eruption on 18 March 2006

M. Ambrose