A tale of two invaders: the dynamic history of pampas grass and jubata grass in California

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Goals for invasion ecology

- Predict identity of worst invaders
- Predict spread rates
- Predict extent and magnitude of impact
- Assess risk
Frustrating difficulties

- Humans significantly influence spread and patterns of propagule supply
- Humans alter native habitat
- These factors interact and can change over space and time
Particularly with ornamentals along the wild land-urban interface
Invasive *Cortaderia* in California

*C. jubata*
- apomictic asexual

*C. selloana*
- sexual, dioecious
Expansion rate (areal extent) has been greater for *C. selloana*
Spread of ornamentals is due as much to marketing and distribution as innate biology.
Cortaderia specimens first reach Europe in the 1830’s

Kew Gardens, London

Benedict Roezl
Rose Parade, 1896
Joseph Sexton
pampas grass pioneer

*C. Selloana* quickly dominated the plume and horticulture trade.
Plume industry of CA

Joseph Sexton
Goleta

Max Nebelung
Anaheim

J. M Stewart
Los Angeles

W.C Hollman
Downey

Harriet Strong
Whittier

Unknown producers
Sutter Co.
Cortaderia selloana

- Expanded from the two urban foci of Los Angeles and San Francisco.
- Expansion has taken place inland as well as along the coast.
- Highest density of infestation in So. Cal.
Cortaderia jubata

- Expansion appears to have occurred in jumps.
- But limited almost entirely to a narrow coastal band.
- Highest density of infestation in No. Cal.
Los Angeles, 1887
Los Angeles, 1889
Santa Clara, 1880’s
Wild lands resist *Cortaderia* invasion

![Graph showing density and mortality from herbivory vs. distance from edge](image-url)
Vandenberg AFB

But humans can compromise this resistance

Courtesy CSTARS, UC Davis
Disturbance

% Germination

- Disturbed
- Undisturbed

Between Shrubs  Under Shrubs
Other processes common on the W-U interface

- Fragmentation, edge formation, and corridor development
- Resource enrichment (nutrients, water)
- Increased stress (e.g. dust, ozone)
- Invasive propagule production
Propagule pressure

Seed Density (seeds/m²)

- AUG
- SEP
- OCT
- NOV
- DEC
- JAN

- 0
- 1 X 10⁷
- 2 X 10⁷
- 3 X 10⁷
- 4 X 10⁷
- 5 X 10⁷
Interacts with habitat modification

![Graph showing density (seeds/m²) across different habitats: EDGE, GAP, SHRUB. The EDGE habitat has the highest density, followed by GAP, and then SHRUB.](image-url)
There is a slow loss of shrublands on VAFB
Invasiveness of *C. selloana* has increased over time
Management practices need to be as dynamic as the processes influencing the spread of ornamentals across the W-U interface
How to manage this dynamism?

- More emphasis on processes rather than static traits
- Better intelligence (e.g. monitoring, surveys), including better information on impact
- A framework to compile, collate, and synthesize information….Cal-I-PC!
Griffith Park, 1940’s