Ten years of Challenges and Successes Managing a Highly Invasive Weed in Carlsbad, San Diego County, CA



Sarah Godfrey

Preserve Manager- Center for Natural Lands Management Cal-IPC Symposium October 17, 2019

#### Family Brassicaceae

- Small, pale yellow flowers
- Heart-shaped cotelydon
- Beak-shaped pod











- First known occurrence in North America found in 1979 in Monterey, CA (Extirpated)
- Carlsbad occurrence found in 2007
- Additional occurrence at Camp Pendleton in Australian military exchange housing



#### Weed Alert!

#### Carrichtera annua (Ward's weed) found in San Diego County

Inter Vinte, Preserve Manager, Center for Natural Lands Management

Plone by Planick Me-

Carrichness annua was recently found wing in an open space preserve located in Carlidrad, CA, C. arrows is an arrowal member of the mustard (Brancaware) family. This species was not perviously known in San Diego and has only been documental is occurring in California in Monacrey in 1979. Otherwise, it is a new species to North America (Andrew Sanders, UCR, pers.

In Carlebud, this plant was located on

southern-facing slope growing among open Diegon coassal rage scrub dominated by California rage Arteminia cultiferencial Associates included coast sunflower (Encella california) buckwheat (Eriogonum favrewlature.

lemonade bony (Rhw invegrifolish).

and tocaloue (Contaions melitensis). C. annua was growing on open clay lenses in the countil sage scrub and underneath the shrubs. Thousands of plants were found. and they were in most cases out-competing the rocalore. The inferration was about a half acre in size and is located adjacent to a fallow agricultural field.

C avesse can be easily distinguished from other members of the mustard family by its fruits and leaves. The fruits are proximally globose with a distal falcase oblong process on the dinal portion and the opposite leaves are bipinately compound. The flower penals are pale yellowish and the sepah are hairy and lavender in color before the flower opens. The plant ranges in size from a few inches up to 1.5 feer in height and is few-usmany branched.

Studies performed in Ameralia, where this wend is a widepread problem in semiarid areas, seem to indicate that it profess calcarcous soils and that it can produce up to 30,000 weds per square meur per year (Ecological Society of Australia). This species also has two distinct send. bunks-one in the soil, and one on the plant, since sends remain in the pod on the plant without dropping onto the ground (Ecological Society of Australia). Wanf's

word, as it is called in Ameralia, additionally is considered a highly flammable species (Friends of the Whyalla Conservation Park) and has a very dense sover in the Carbbad location. It is also



threat in Australia to one or more vegetaria formations (The Nature Conservancy).

Be on the lookout for this species and if you locate it, please report it to Cal-IPC. your country Word Management Asea, and your county agricultural commissioner.

Connect the author at jung-Renhung.

#### For more information:

The Eurlogical Society of Asserable Incorporated, stopcodes on an William Steem Male Proposition Add Control No. poll

Frigods of the Whyalla Commission Plate, www.fings. arginarugoffacifica bres

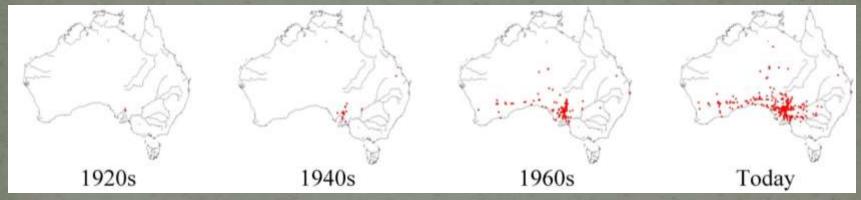
The Nature Consumuscy Global Invasive Species Team dep fraction and and a stopped allowed below head

# La Costa Greens Wards Weed, Carlsbad, CA 2007 Occurrence Ward's weed 1 acre Original Discovery April 23, 2607 Rancho La Costa Habitat Conservation Area Carlebed, CA

## Ecology of the landscape

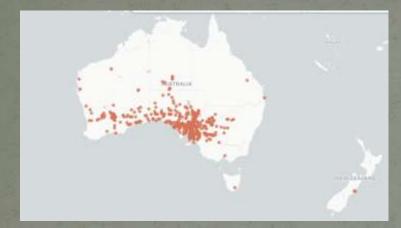
- Highly urbanized landscape
  - Carlsbad HMP, San Diego MHCP/MSCP
- Native coastal sage scrub habitat
  - Artemisia californica, Encelia californica
- MSCP- Protected Species
  - CA Gnatcatcher
- Opportunity for eradication?

In Australia, research into herbaria, historic correspondence and published distribution information suggests that a single introduction in 1915 at a single location eventually spread throughout the continent (Cooke et al 2011).

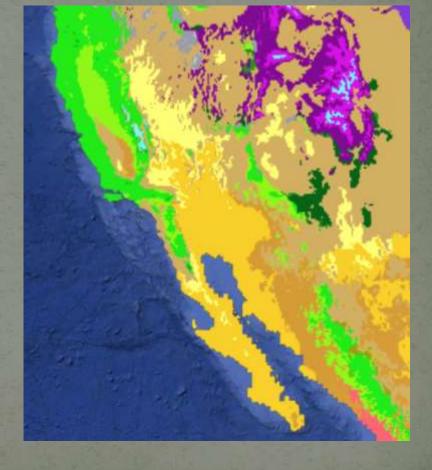


Source: (Cooke et al 2011).

## The climate of S. Australia matches SW US

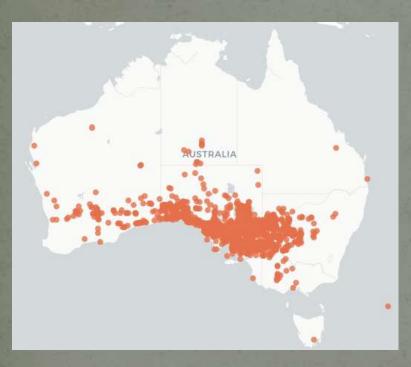


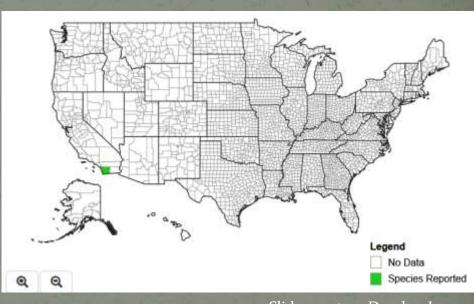




Slide Courtesy of Chris McDonald, UCCE

## Current Australian Distribution and Location in United States





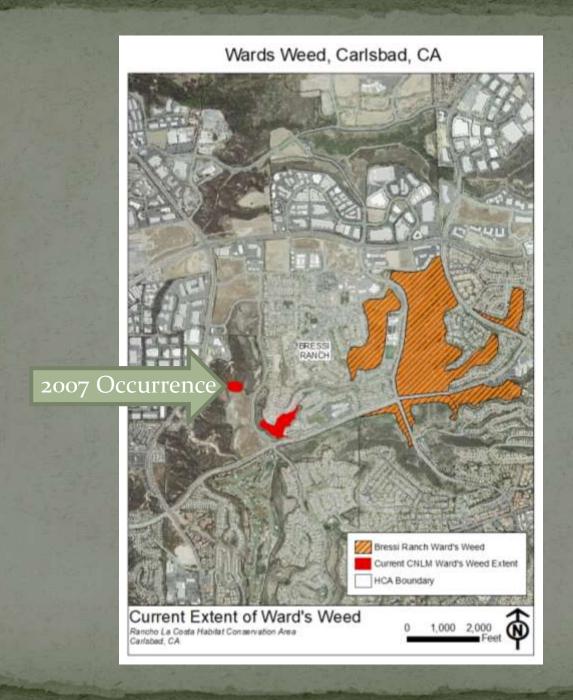
Slide courtesy Dendra, Inc

# La Costa Greens Wards Weed, Carlsbad, CA 2007 Occurrence Ward's weed 1 acre Original Discovery April 23, 2607 Rancho La Costa Habitat Conservation Area Carlebed, CA

La Costa Greens Wards Weed, Carlsbad, CA







Challenges: Spreading throughout Carlsbad and into other parts of SD County



Source: Dendra, Inc 2019

### Challenges: Plant physiology

- Extremely high seed count (up to 30,000 seeds/sq. m)
- Germinates throughout year (November ??!!)
- Two seed banks allowing it to spread throughout the year
  - Seeds are dormant in the soil waiting a few years to germinate
  - The parent plant holds onto fruits for up to a year keeping seeds safe from predators and diseases

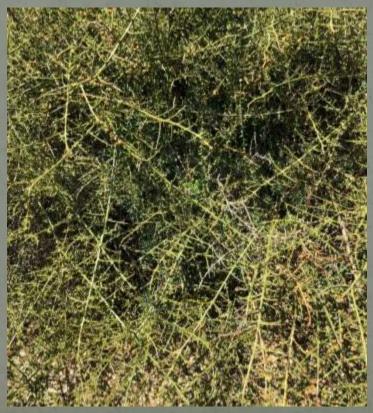
## Challenge: Up to 30,000 seeds per square meter





## Challenges: Shapeshifter!

- California Adolphia Adolphia californica
- CNPS Rare Plant Rank 2B.1



## Challenges: Herbicide Application with Backpacks

Telar (chlorsulfuron): post and pre-emergent, spot treatments

• broad-spectrum, effective on mustards, controls annuals/seedlings

Glyphosate: post emergent, spot treatments

broad spectrum

Hand pulling: post emergent



## Challenges: Hand Bagging

- Time consuming
- Repeat entries
- Creates soil disturbance
  - Stimulate seedbank
  - Opportunity for seed transport





## Challenges: Irrigated Landscapes





## Challenges: Secondary Invasions

- Eliminating native shrub cover allows for more invasive species competition and introduction
- Repeat site visits and soil disturbance





## Success: An Herbicide That You Can Spray Over Native Shrubs

- Irvine Ranch Conservancy Research 2016-17
- Dow (Corteva)
- University of California Cooperative Extension

#### Gallery (Isoxaben):

- Pre-emergent
- Very good broadleaf control
- Does not have deleterious impacts to shrubs

## Successes: Herbicide with Power Sprayer





## Successes: Herbicide as a Tool

- Gallery (Isoxoban) prevents seed emergence
- Maintains structure and diversity of native shrubs
  - Grasses and geophytes thrive



### Successes: Fuel Zone Clearance



March 2018

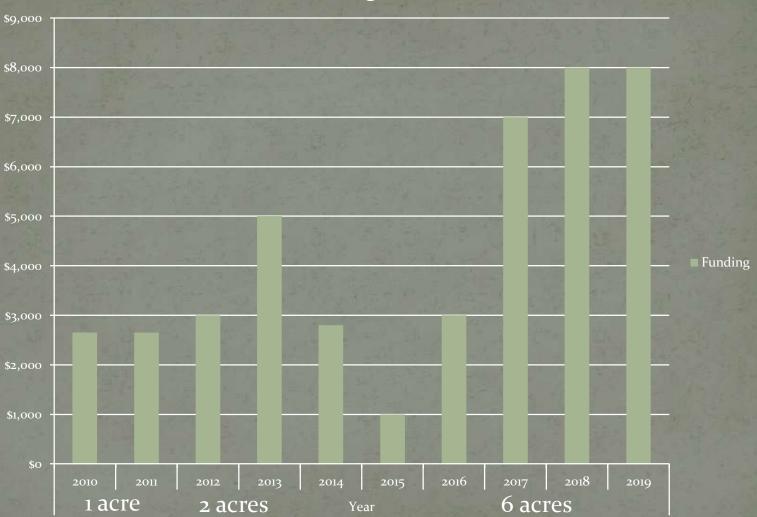


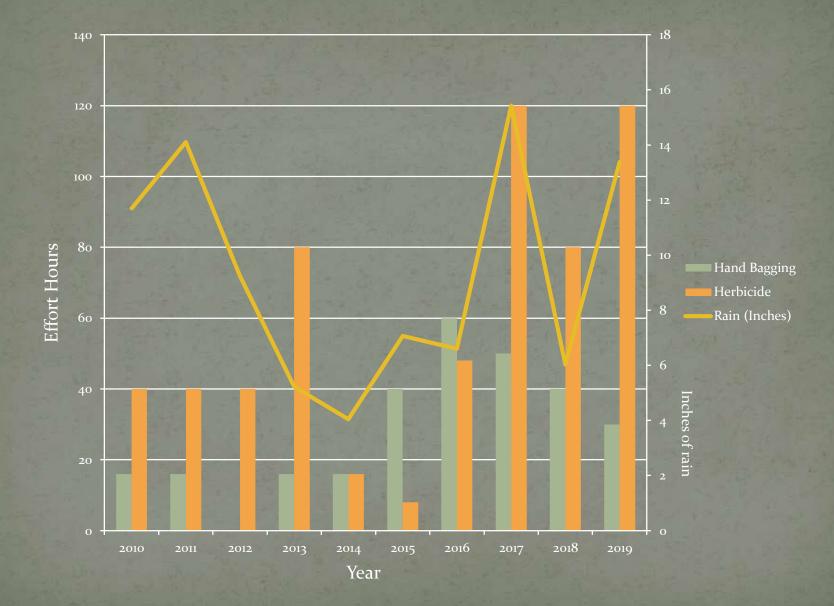
November 2018



August 2019

#### **Funding Per Year**





Successes: Knowledge is Power

- Literature review
- Outreach
- Collaborative funding
- Action!

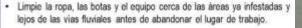
#### ALERTA DE ESPECIES INVASIVAS

Ward's Weed • Carrichtera annua



#### Mejores prácticas de gestión

- Use ropa, botas y equipo que no retenga la tierra y el material vegetal (lona, nylon v cuero).
- Minimice las visitas al sitio en áreas infestadas (especialmente. cuando el suelo está húmedo)



Deje los materiales vegetales en el sitio para evitar la propagación durante la eliminación fuera del sitio

Evite cortar para limitar la propagación de semillas



#### Invasive Species Alert

Common name: Ward's weed

Scientific name: Carrichtera annua (L.) DC.

Asia (native), investive in Australia

#### Identifying Factors:

- Small briefly-baired plant, 5-40 cm es: < 30 cm and deeply divided into
- Plowers: pale sellow, 4 petals, 8-8 mm with purple vetes.
- Fruit, 6-6 mm in drooping position topped with spoon shaped petals.









Sends dispersed via foraging unimals and arts over short distances

Long distance dispersal or vehicles, clothing, large animals, and agriculture

Looks Like:











## Success: Partnerships

Dendra, Inc









Thank you!





Sarah Godfrey- sgodfrey@cnlm.org, 760-300-3187