Biological Control as a Tool for Ecosystem Management

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Objectives

- Define biological control in support of ecosystem management

- Delimit biological control for mutual compatibility with ecosystem/environmental conservation

Conservation/B.C. Goals

- Biological control can be used only for recovery and restoration = cannot protect
- Target-specific for populations
- Good for large acreage/low-value land (ecosystems)
- Ecosystems passively regenerate

What is being managed/conserved?

- Historically
  - Individual spp.: whales, pandas, etc.
- Currently: Ecosystems & their constituents
  - biological reserves
  - protected areas
  - undeveloped lands
  - wetlands/watersheds
  - critical habitat

To what state?

- Are we going for a return to the “native” condition?
- Too much change to understand what is “native”

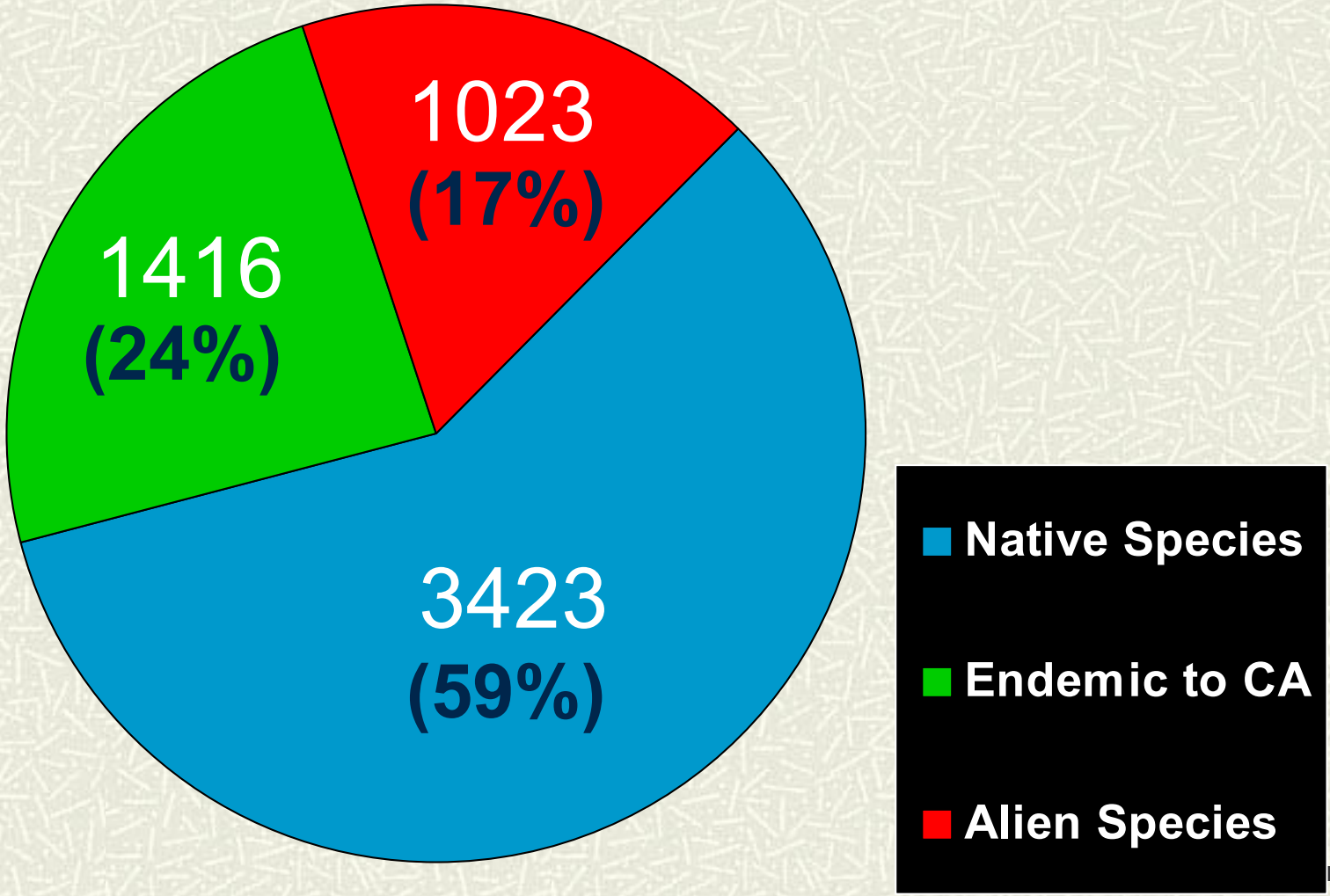
Native Flora

- CA: 17% of flora is introduced
- FL: 27% of flora is introduced
- UT: 23% of flora is introduced

- In Canada: of the 107 noxious weeds recorded, 78 are introduced species

- 3-66% of flora in National Parks introduced

Plant Species in California (Jepson Manual)



Since 1993…

- 315 species discovered new to California = 1 every 12 days

- Of these, 18 are considered naturalized or aggressive weeds

Why do natural areas have problems?

- Susceptibility to effects of adventive species
  - Habitat fragmentation
  - Changes in species composition
  - Loss of diversity

Adventive Species

- Insects:
  - Habitat fragmentation - Rare
  - Changes in species composition - Rare
  - Loss of diversity - Rare

Adventive Species

- Vertebrates:
  - Habitat fragmentation - Common
  - Changes in species composition - Common
  - Loss of diversity - Common

Adventive Species

- Man's influence:
  - Changes in topography
  - Changes in constituent species
  - Sphere of influence
    - acid rain, erosion, atmospheric changes

Adventive Species

- Weeds:
  - Habitat fragmentation - Common
  - Changes in species composition - Common
  - Loss of diversity - Common

Context for Biological Control:

- Insects - limited need
- Vertebrates - limited application
- Weeds - useful option

Biological Control of Weeds

- Theoretical Concepts

"Local animal species diversity is related to the number of predators in the system and their efficiency in preventing single species from monopolizing some important, limiting requisite"

- R. T. Paine 1966

Ecological Risks

- Replacement by other weed spp.
- *Cactoblastus* – movement away from point source to areas never intended for release
- *Rhinocyllus*:

Ecological Risks

- Asynchrony with native thistles led to little or no impact on overall seed production
- Interspecific interactions with flowerhead guild members inconsequential

Ecological Benefits

- Restore and protect a diverse habitat
- Ecosystems have regenerative power given the opportunity (reduce invasive species competitive advantage)
- Large-scale control economically feasible
- Continues to be a “fallback” plan

Fiscal Considerations

- Cost/benefit analysis
  - Non-economically driven **
  - Cost of other control methods
  - Able to quantify “control” costs, but not “damage”

Fiscal Considerations

- Funding sources
  - Commodity sources

    Historically providing long-term support to bridge program objectives
  - National or regional sources