# Management Strategies for Central Maritime Chaparral

by Tami Nakahara

## Introduction

- The central maritime chaparral community (CMC) in the Elkhorn Slough Watershed, North Monterey County, California is classified by various federal, state, and local agencies as a rare type of native plant community
- Several rare native plant species are located here

## Pajaro Manzanita (*Arctostaphylos pajaroensis*)

Photo by Gary A. Klee

## **Hooker's Manzanita** (*Arctostaphylos hookeri* ssp. *hookeri*)

Photo by Gary A. Klee

## Monterey Ceanothus (*Ceanothus cuneatus* var. *rigidus*)

## Reasons for Protection

- Since these rare species are not currently listed under the Federal Endangered Species Act (ESA), as threatened or endangered, they are not protected under the ESA
- Development in these habitats could push these rare species and entire communities toward extinction if not protected now

## Purpose

- To gather comprehensive scientific and regulatory information on CMC and make recommendations on the types of strategies that could be used to manage the CMC community in North Monterey County
- To examine the current use of CMC conservation easements for residential developments to determine if and what guidelines could be implemented to protect CMC from further decline

## Objective 1

- To conduct an extensive literature review and interview various federal, state, and local agencies and organizations to collect comprehensive information on
  - Ecology of CMC
  - Strategies and recommendations for the management of this rare plant community

## Objective 2

- To examine established conservation easements to determine if there is a correlation between the dimensions of easements and the percent cover of non-native species

## Management Issues in North Monterey County

- Habitat loss and fragmentation
- Fire suppression
  - Succession to oak woodland
  - High fuel load
- Invasion by non-native species
- Hybridization
- Sudden Oak Death Syndrome

## Habitat Loss and Fragmentation

## Fire Suppression Succession to Oak Woodland

Fire Suppression
High Fuel Load

Fire Suppression
High Fuel Load

Jubata grass, pampas grass
(*Cortaderia jubata*)

Photo by Gary A. Klee

Pampas Grass Along Trail

Hottentot fig, iceplant
(*Carpobrotus edulis*)

Iceplant Choking Out Coyote Brush

Blue gum eucalyptus
(*Eucalyptus globulus*)

Low Species Diversity in Eucalyptus Understory

Non-native Grasses

Non-native Grasses in Disturbed Areas

## Management Strategies

- Botanical surveys/baseline studies
- Mitigations
  - *In situ* approches
  - Mitigation agreements
- Monitoring plans/agreements

## Management Strategies

- Easements
  - Local Coastal Program (LCP)
  - Size, shape, spatial arrangement, connectivity
  - Buffer zones
  - Easement contracts
  - Purchase easements/donations

## Management Strategies

- Prescribed burns
  - Maintain shifting mosaic of age classes
  - Crush and burn
  - Multicutting /strategic recycling/chipped biomass
  - Cutting/mowing
    - 3,000 seedlings per acre after burning compared to 29 seedlings per acre after cutting (Harding ESE, Inc. 2002a)

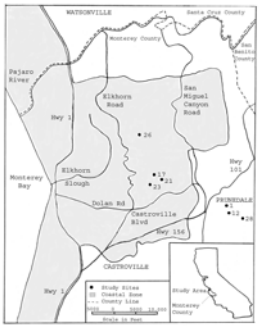
## Management Strategies

- Weed control
  - Bradley method
- Sudden Oak Death Syndrome

## Methods

- Study area
  - Coastal zone and adjacent non-coastal area in Elkhorn Slough Watershed, North Monterey County
  - No large wildfires have occurred in this region in approximately 80 years due to fire suppression

## Map of Study Area

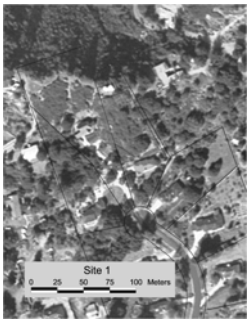



## Data Collection

- Vegetation Surveys
  - Conducted from June to September 2001
  - Identified 40 residential parcels with CMC botanical surveys conducted from 1987 to January 1999
  - Contacted owners of the 33 parcels with conservation easements designated on them
  - Final pool of ten parcels contained a combined total of 13 easements

## Easement 1a

Photo by Eric Van Dyke

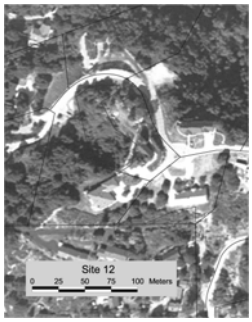


## Easement 1a

## Easement 1a

## Easements 12a and b

Photo by Eric Van Dyke

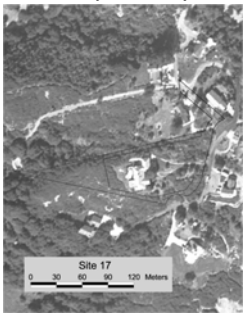



## Easement 12a

## Easement 12b

## Easement 17

Photo by Eric Van Dyke



## Easement 17

## Easements 21a, b, c, d, and e

Photo by Eric Van Dyke

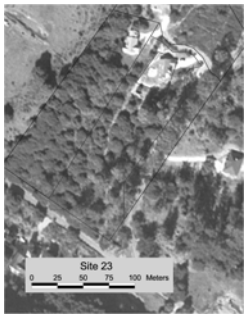

## Easement 21a

## Easement 21d

## Easement 21e

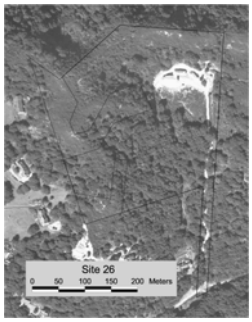
## Easement 23

Photo by Eric Van Dyke



## Easements 26a and b

Photo by Eric Van Dyke




## Easement 26a

## Easement 28

Photo by Eric Van Dyke


## Data Collection

- Percent cover of each species
- Transects
  - Average of 50-meters long
  - Randomly placed
- Quadrats
  - 1 $m^2$ quadrats were placed at 5-meter intervals along each transect
- Tree, shrub, and herb layer measured

## Data Analysis

- For the vegetation surveys, a Product Moment Correlation statistical test was done to determine whether there was a significant correlation between
  - The average percent cover of non-native or native species in an easement and the easement size, shape, and distance to the nearest source of non-natives and CMC

## Data Collection

- Agency interviews
  - Conducted from February to September 2002
  - Interviewed 9 federal, state, and local agencies and organizations
  - Interviewed 1 to 2 people from each agency
  - Each interviewee was asked a standard list of questions regarding their agency's policies, strategies, and recommendations for managing CMC

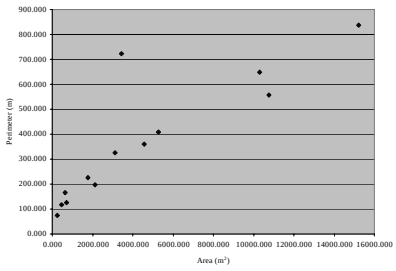
## Data Analysis

- Information from the literature review and the agency interviews was compared to determine
  - What is known about the biological and ecological requirements of CMC
  - Which strategies and policies are currently being used and which are recommended for the conservation of CMC

## Results of Vegetation Surveys

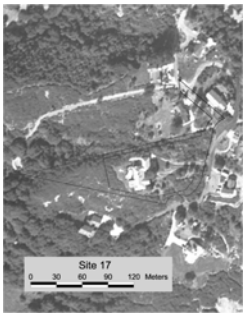
- For non-native and natives
  - No significant correlation between
    - % cover and area
    - % cover and the distance to the nearest sources of non-natives
    - % cover and the distance to the nearest sources of CMC
  - Significant correlation between
    - % cover and edge-to-area ratio
    - $r \geq 0.553$, $\alpha = 0.05$

## Area vs. Perimeter

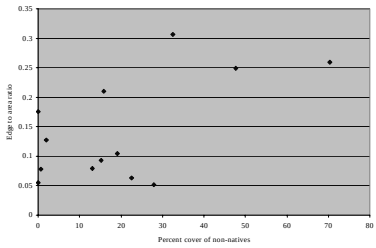



## Easement 17

Photo by Eric Van Dyke




## Relationship Between Non-natives and Edge-to-Area Ratio




## Relationship Between Natives and Edge-to-Area Ratio

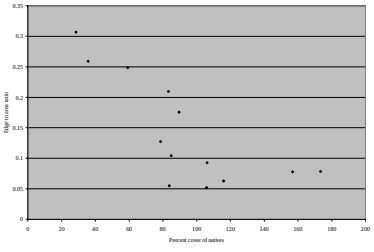



Figure . Correlation between percent cover of natives in quadrats and edge to area ratio of easement.

## Results of Agency Interviews

- Loss of habitat or habitat fragmentation listed as the management concern that has the highest priority for CMC (55%)
- Two other management concerns for CMC listed as having the highest priority: fire suppression and invasive non-native plant species (33% each)

## Summary of Interviews with Agencies and Organizations

| | Do your principal management plans involve any of the following tools?: | | | | |
|---|---|---|---|---|---|
| | Conservation Easements? | Impact restrictions? | Mitigations? | Prescribed burning? | Mowing? |
| California Coastal Commission | Yes. | Yes. | Yes. | No. | No. |
| US Bureau of Land Management Fort Ord | No. | Yes. | Yes. | Yes. | No. |
| US Fish and Wildlife Service | Yes. | Yes. | Yes. | Yes. | No. |
| USDA Natural Resources Conservation Service | No. | Yes. | Yes. | Yes. | No. |
| California Department of Fish and Game | Yes. | Yes. | Yes. | No. | No. |
| County of Monterey Planning and Building Inspection | Yes. | Yes. | Yes. | No. | No. |
| Monterey County Parks | No. | Yes. | No. | No. | No. |
| California Native Plant Society, Monterey Bay Chapter | Yes. | Yes. | Yes. | Yes. | No. |
| Elkhorn Slough Foundation | No. | Yes. | No. | No. | No. |
| Percentage with "yes" responses. | 56% | 100% | 78% | 44% | 0% |

## Summary of Interviews with Agencies and Organizations

| | Do your principal management plans involve any of the following tools?: | | | | |
|---|---|---|---|---|---|
| | Control of invasives? | Restoration? | Monitoring? | Enforcement? | Specific policies for CMC? |
| California Coastal Commission | No. | Yes. | Yes. | Yes. | Yes. |
| US Bureau of Land Management Fort Ord | Yes. | Yes. | Yes. | Yes. | Yes. |
| US Fish and Wildlife Service | Yes. | Yes. | Yes. | Yes. | No. |
| USDA Natural Resources Conservation Service | Yes. | Yes. | Yes. | Yes. | No. |
| California Department of Fish and Game | Yes. | Yes. | Yes. | Yes. | No. |
| County of Monterey Planning and Building Inspection | Yes. | No. | No. | Yes. | Yes. |
| Monterey County Parks | Yes. | No. | No. | No. | No. |
| California Native Plant Society, Monterey Bay Chapter | Yes. | Yes. | Yes. | Yes. | No. |
| Elkhorn Slough Foundation | Yes. | Yes. | Yes. | No. | Yes. |
| Percentage with "yes" responses. | 89% | 78% | 78% | 78% | 44% |

## Results of Agency Interviews

- According to the agencies, the non-natives that are the biggest threats to CMC, in order of importance, are:
  - Pampas grass
  - Eucalyptus
  - Iceplant
  - French broom (*Genista monspessulana*)
  - Non-native grasses

## Other Agency Recommendations

1. Conserve more habitat
   - Conservation easements
   - Mitigation banks
   - Buffer zones

## Conservation Easements

- Monterey County's use of conservation easements in proposed developments is inconsistent
- Lack of maintenance, monitoring, and enforcement
  - County does not enforce Right of Entry provision
- Easement boundaries were not marked on the ground

## Other Agency Recommendations

2. Prescribed burns
   - Burn frequency
     - Fort Ord Habitat Management Plan suggests interval of about 12-15 years
     - 3 agencies stated that the 15-year interval was too short and should be closer to 30 or 35 years

## Other Agency Recommendations

3. Update General Plan
   - Periodic updates
   - Necessary for long-term management and protection

## Study Recommendations

1. Large tracts of interconnected natural habitat should be protected before development occurs
2. Mitigation banks or conservation banks should be established to preserve large tracts of land that will not be developed
3. Easements should be consistently designated across all sensitive habitats such that the edge to area ratio is minimized

## Study Recommendations

4. Monitoring programs should be established for scenic and conservation easements and deed restrictions
   - Combination of aerial/infrared photos with easement and parcel boundaries overlaid and field visits
   - Monitoring intervals should be determined on a case-by-case basis, but generally done annually
5. Monitoring, maintenance, restoration personnel, and researchers should be granted the authority for on-site access to easements and parcels as a condition of the Conservation and Scenic Easement Deed and deed restrictions

## Study Recommendations

6. Easement boundaries must be clearly marked so that they can be easily identified in the field by landowners and monitoring personnel
   - Permanent markers
   - GPS coordinates
   - Aerial photos with easement and parcel boundaries overlaid included with easement deeds
7. Violations of development restrictions for scenic and conservation easements and deed restrictions should be strictly enforced

## Study Recommendations

8. Incentive programs should be established for landowners who establish conservation easements on their properties
9. Buffer zones should be included in subdivision design plans for use between large areas of CMC habitat or preserves and developments
   - Smaller buffer zones of native vegetation between easements and development envelopes

## Study Recommendations

10. Before a development permit is issued, a biological survey of the property should be conducted by a qualified biologist/botanist familiar with CMC habitats and species
    - Done during time of year when species identifiable
    - Identify all plant species
    - Vegetation maps
    - Identify impacts and mitigations
11. Development envelopes should be clustered to preserve as much continuous open space as possible and reduce edge effects
    - Development clusters should be located as far from CMC as possible

## Study Recommendations

12. A program to monitor construction activities and mitigate impacts should be implemented for all proposed developments
    - Mitigation agreements should be required as part of development permit
      - Should contain assurances of implementation, monitoring, and maintenance

## Study Recommendations

13. Prescribed burning should be implemented on preserves at established intervals to create a mosaic of various vegetation age classes
14. Mowing/cutting without burning is not recommended as a way to promote CMC regeneration

## Study Recommendations

15. A program to control and monitor invasive non-native plant species should be implemented on undeveloped and developed parcels
    - Non-chemical methods should be used whenever feasible
    - New invasive non-native species should be monitored and controlled for

## Study Recommendations

16. Landowners should be restricted from planting invasive non-native plants in their landscaping
    - Native, fire-resistant plants should be used whenever possible
17. The removal of CMC species and the construction of paths or trails through CMC should be restricted
    - Public access should be restricted or limited
    - If access allowed, areas should be monitored and controlled for weeds, erosion, and other impacts

## Study Recommendations

18. Mitigation for the removal of sensitive plant species should require impacted species to be replaced on site at a minimum of a 2:1 ratio
    - Ratio should be higher for species that are more rare
19. When creating a restoration program, environmental professionals with specific experience in the restoration of CMC communities should be consulted
    - Restoration activities should include soil preparation, weed control, and erosion control
    - All plant materials should be gathered from the same watershed where restoration is occurring

## Study Recommendations

20. After prescribed burns, any surface erosion control on steep slopes involving reseeding should use deep-rooted native perennial grasses
    - Deep-rooted, dense, woody chaparral vegetation should be restored for permanent slope stability
21. Sudden Oak Death Syndrome should be carefully monitored and controlled for in CMC

## Study Recommendations

22. All native wildlife populations should be protected
    - Predators/prey that become pests should be relocated
    - Poisons should be prohibited
    - Fencing should allow wildlife to cross
    - Curbs should be at low angle of 50 degrees
    - All surface water should be protected and enhanced
23. Public education programs should be implemented to increase awareness of the importance of CMC conservation and encourage community involvement and cooperation in management efforts

## Conclusions

- Biggest threat to CMC in North Monterey County is habitat loss
- Fire suppression is second
- Invasive non-native plant species are third

## Conclusions

- Top management strategy recommended in the literature and by agencies and organizations is more habitat protection
- Conservation easement policies need to be improved in North Monterey County
- Central maritime chaparral is a fire-adapted plant community and prescribed burning is necessary for its continued existence

## Conclusions

- Management strategies need to take an ecosystem approach to conservation
- Public education and community involvement in CMC management are important since the majority of the chaparral is located on private land in this part of the county
- Further research on the needs of this ecosystem and adaptive management will help to improve future management efforts