Visual Models for Wildfire Treatment

CNPS CONSERVATION CONFERENCE - OCTOBER 22, 2022
CNPS EAST BAY CHAPTER
JIM HANSON, CONSERVATION COMMITTEE CHAIR
**TAKE HOME:**

Maintaining native plant biodiversity can be an asset to slow fire spread in the WUI.

The visual image is a powerful way to help us get there.
HOW?

1. Learn to see how wildfire treatment planners see

2. Observe and record flora

3. Ask questions, make common sense requests, & more
Elements of the wildfire treatment

- Treatment model
- On-site Best Practices
- Agency Leverage Points
Treatment model  Fuel breaks

Images: with trees

w/o trees  from CalFire Vegetation Treatment Programmatic EIR
**Best Practices**

1. Field protection markers - shrubs
2. Wood chip placement - weeds
3. Mechanical equipment routes
4. Goat Grazing height – 4”- 6”
5. Post treatment weed control
Leverage Points

Agency

- State Funding $
- Agency Plan & EIR
- Implementing Department
- Contract language
- Pre-construction biological survey and marking
- On-site supervision and biological monitoring
- Post-treatment follow up
**Simple Action Model**

Public involvement + Best practices + Agency Leverage points

1. Field Protection Markers
2. Wood chip placement
3. Mechanical equipment routes
4. Goat grazing/equip. mow height
5. Post treatment weed control

- Agency Plan & EIR
- Contract language
- Pre-work survey and marking
- Site supervision and monitoring
- Post-treatment follow up
Developing and creating images

......where native plant biodiversity is an asset to slow wildfire spread in the WUI
BRINGING ENVIRONMENTAL VALUES TO FIRE PREVENTION VEGETATION MANAGEMENT IN MARIN COUNTY

By David Long
Marin Wildfire Protection Authority (MWPA)

- March 2020 ballot initiative
- Joint powers agreement of 17 local fire agencies
- Fire prevention activities including vegetation management using ecologically sound practices
- $20 million/year from 10-year parcel tax
Ecologically Sound Practices Partnership (ESP)

- Broad spectrum of Marin environmental groups convened prior to ballot initiative
- With MWPA, developed best environmental practices for vegetation management and defensible space
- Group too large to respond quickly to project specific issues and not independent of MWPA
Fire and Environmental Resilience Network (FERN)

- Representatives from Marin Chapter CNPS, Marin Audubon and West Marin Environmental Action Committee
- More nimble working group: 5-7 members
- Created shortly after MWPA began
- Met weekly by Zoom in early days; now monthly and as needed
Getting MWPA Up and Running

No staff – Board president with good environmental values

FERN staffing recommendations:
- Environmental expertise
- Natural Resources Manager

FERN CEQA recommendations:
- County-wide programmatic EIR
- Notice and public hearing for all projects

Proposed metrics for success
Defining Best Environmental Practices for Wildfire Prevention Activities

- FERN members worked with ESP Partnership on this document
- Three committees:
  - Vegetation Management and Habitat Protection
  - Defensible Space: Bio-diverse, Fire Smart, Water Wise
  - Carbon Resource Management
- VTP helpful
- MWPA adopted document: *Ecologically Sound Practices for Vegetation Management*
Reviewing MWPA Projects

• Monthly Zoom meetings with MWPA staff and consultants
• Preview of upcoming projects
• Frequent field trips
• Review detailed NOEs -- include rare plant info and mapping from CNDDB
• Provide advice on location of rare plants, mitigations, treatment methods, etc.
• On some projects, submit written and oral comments to MWPA board and committees
Successes

• Adoption of Ecologically Sound Practices for Vegetation Management
• Staff and consultants with high level of environmental expertise
• Notice and hearing of all MWPA projects – even when not required by CEQA
• After objection, adhered to 100’ width CEQA defensible space exemption
• Rare plant surveys before roadside mowing
• No limbing-up common manzanita
• No goats on serpentine
• Creation of ongoing channels of effective communication with MWPA
Failures

- No county-wide programmatic EIR
- Didn’t persuade to avoid monthly testing of LRAD sirens near spotted owl nests
- Didn’t persuade MWPA of our interpretation of Local Coastal Program
Some take-aways

• The obvious: Voter-approved agencies more responsive to voters

• Relationships and mutual respect key

• Visibility ("showing up") important
  • Letters to MWPA
  • Sought meetings with MWPA officials
  • Attend and comment at MWPA board and committee meetings
  • Participate in monthly MWPA stakeholder meetings

• Environmental coalitions important
  • ESP Partnership – broad but unwieldy
  • FERN – smaller, more nimble
What is the CalFire VTP?

A certified Program EIR created by CalFire

Homepage at bof.fire.ca.gov/projects-and-programs/calvtp/calvtp-programmatic-eir/

Program EIR is a CEQA compliance document that covers a related series of multiple projects

Five methods covered: Mechanical, Hand-tools, Herbivory, Prescribed burning, Herbicides

Identifies impacts and required mitigation measures
Why use the VTP?

• Extensive analysis of impacts and mitigations for fire-prevention vegetation removal projects

• Competent

• Considered authoritative by fire agencies, community

• Model for CEQA compliance for agencies

• Source of good ideas/information for promoting beneficial practices

• Use as sword: Argue it is the minimum standard for environmental compliance, agency should want to satisfy CalFire standards
Navigating the VTP?

- [https://bof.fire.ca.gov/projects-and-programs/calvtp/calvtp-program-eir/](https://bof.fire.ca.gov/projects-and-programs/calvtp/calvtp-program-eir/)

- Warning: organization is repetitious, confusing. Need for orientation

- 3 Volumes—
  - Volume 1—Response to Comments
  - Volume 2—The PEIR
  - Volume 3-- Appendices

- Volume 2 covers standard CEQA topics: Air Quality, Archeology, Biological Resources, Geology, Hydrology

- Biological Resources chapter is in 2 parts
Biological Resources Part 1

- Map of "Treatable Landscape"--State Responsibility Areas. See page 3.6-2.
- Organized by "bioregions".
- Useful tables of vegetation types, plant communities
VTP PEIR
Biological Resources
Part 1

- Example of Table showing vegetation and habitat types for Northern California Coast Ecological section. Part 1, pg. 3-6.66

- Asterisk indicates sensitive natural communities with a state rarity rank of S1 (critically imperiled), S2 (imperiled), or S3 (vulnerable). Protections apply
  * EG madrone forest, big leaf maple forest
Biological Resources Part 2: Steps for compliance

• Step 1: Hire qualified biologist. Forester, Botanist

• Qualifications for Botanist:
  
  • knowledge of plant taxonomy, special-status plants and sensitive natural communities of the region
  
  • experience conducting floristic botanical field surveys as described in CDFW “Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities”

  • familiar with the *California Manual of Vegetation and* federal, state, and local statutes and regulations related to plants and plant collecting.
Step 2: Survey site

- Desktop first
- Qualified biologist conducts protocol level (field) survey if desktop review indicates sensitive plant communities present and adverse impacts cannot be avoided.

Step 3: Design project to maintain habitat functions applying criteria for various vegetation types: wetlands, coastal scrub, oak woodlands, etc.

EG Wetlands: "Retain at least 75 percent of the overstory and 50 percent of the understory canopy of native riparian vegetation within the limits of riparian habitat identified and mapped during surveys conducted pursuant to SPR BIO-3. Native riparian vegetation will be retained in a well distributed multi-storied stand composed of a diversity of species similar to that found before the start of treatment activities."
Biological Resources Part 2

• Step 4: Identify impacts of method to be employed on resources present
• Step 5: Identify applicable protective measures
  • Specific Project Requirements (SPR's)
  • Mitigation Measures
• Example: Mitigation Measure 1b for CRPR species
  • Physically avoid the area occupied by the special-status plants by establishing a no-disturbance buffer
  • The appropriate size and shape of the buffer zone will be determined by a qualified RPF or botanist and will depend on plant phenology at the time of treatment (e.g., whether the plants are in a dormant, vegetative, or flowering state), the individual species’ vulnerability to the treatment method being used, and environmental conditions and terrain. Consideration of factors such as site hydrology, changes in light, edge effects, and potential introduction of invasive plants and noxious weeds may inform an appropriate buffer size and shape.
Key Appendices

• Appendix PD-3: Project-Specific Analysis
  • Step 6: Proponent submits Project Specific Analysis (PSA) with checklist
  • Identify resources, impacts
  • Choose from menu of SPRs and MMJs
  • File with CalFire
  • CEQA review is complete,
  • No public input, agencies like this

• Appendix BIO-3 Special-Status Species Tables (PDF)
  • special status plants, including CRPR species
  • special status animals, including amphibians and even insects
Using the VTP for Projects Outside Treatable Landscape

• Addressed in VTP FAQ page from Spring 2021 Training Webinars
  • https://bof.fire.ca.gov/media/dannit4m/calvtp-faqs.pdf

• If project overlaps with SRA, use Addendum to PSA. CEQA Guidelines 15164

• If not, apply CEQA Guidelines 15162, 15163 and 15168 to make case that project is within scope of VTP due to proximity, similar vegetation, methods, impacts

• Or prepare standard CEQA document (e.g. Mitigated Neg Dec); cut and paste impacts, SPRs and MMs from VTP
Wildfire-associated changes on vegetation communities and weeds in Point Reyes National Seashore

Rachel Hendrickson (Point Reyes National Seashore, CA, USA)
Lorraine Parsons (Point Reyes National Seashore, CA, USA)
Changing fire landscape
Factors on the coast and at PORE
Welcome to Point Reyes National Seashore
Diverse response to fire
An uncontained campfire started the Vision Fire on October 3, 1995.
3 Years of invasive control post-burn
Establishment of non-natives
A lightning storm ignited the Woodward fire...
...as well as the rest of California.
How heavy that burned

(super crispy coast)

lightly toasted trees

9%

26%

36%

29%
Two Major Post-Burn Objectives
Monitoring Objectives
3 Variables We Assess

1. Effects on pre-existing vegetation
2. Species composition post-fire
3. Species regeneration post-fire
Primary findings - initial year of monitoring

**Species Richness**
- Douglas Fir Forest: Native: 18, Non-Native: 2
- Hardwood Forest: Native: 16, Non-Native: 4
- Bishop Pine Forest: Native: 14, Non-Native: 6
- Coastal Scrub: Native: 12, Non-Native: 8
- Ceanothus Scrub: Native: 10, Non-Native: 6

**Vegetation Cover**
- Douglas Fir Forest: Native: 60%, Non-Native: 40%
- Hardwood Forest: Native: 50%, Non-Native: 50%
- Bishop Pine Forest: Native: 40%, Non-Native: 60%
- Coastal Scrub: Native: 30%, Non-Native: 70%
- Ceanothus Scrub: Native: 20%, Non-Native: 80%
General Observations (So Far)
Let’s have a look at how some of these key plant communities looked immediately post-fire and 1-2 years on...
A look at the landscape immediately post burn

Douglas Fir
Douglas Fir
Mixed Hardwood
Bishop Pine
Coastal Scrub
Coastal Scrub
Coastal Scrub
Ceanothus Scrub
Future Work – Aerial Imagery Comparisons
Invasives Monitoring and Treatment
A Modified EDRR Program
Surveying Suppressed and Sensitive Sites
## Our target plant list

### RED LIST

<table>
<thead>
<tr>
<th>Plant Name</th>
<th>Common Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aegilops triuncialis</td>
<td>Goatgrass</td>
</tr>
<tr>
<td>Arctotheca caldendula</td>
<td>Cape weed</td>
</tr>
<tr>
<td>Berberis darwinii</td>
<td>Darwin's berberis</td>
</tr>
<tr>
<td>Carduus acanthoides</td>
<td>Spiny plumeless thistle</td>
</tr>
<tr>
<td>Centaurea calcitrapa</td>
<td>Purple star thistle</td>
</tr>
<tr>
<td>Centaurea melitensis</td>
<td>Tocalote</td>
</tr>
<tr>
<td>Centaurea solstitialis</td>
<td>Yellow starthistle</td>
</tr>
<tr>
<td>Cortaderia jubata</td>
<td>Andean pampas grass</td>
</tr>
<tr>
<td>Cortaderia selloana</td>
<td>Pampas grass</td>
</tr>
<tr>
<td>Cytisus scoparius</td>
<td>Scotch broom</td>
</tr>
<tr>
<td>Delairea odorata</td>
<td>Cape ivy</td>
</tr>
<tr>
<td>Ditrichia graveolens</td>
<td>Stinkwort</td>
</tr>
<tr>
<td>Genista monspessulana</td>
<td>French broom</td>
</tr>
<tr>
<td>Linaria vulgaris</td>
<td>Butter and eggs</td>
</tr>
<tr>
<td>Marrubium vulgar</td>
<td>White horehound</td>
</tr>
<tr>
<td>Scabiosa atropurpurea</td>
<td>Pincushions</td>
</tr>
<tr>
<td>Solanum aviculare</td>
<td>New Zealand nightshade</td>
</tr>
<tr>
<td>Ulex europaeus</td>
<td>Gorse</td>
</tr>
</tbody>
</table>

### ORANGE LIST

<table>
<thead>
<tr>
<th>Plant Name</th>
<th>Common Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arctotheca prostrata</td>
<td>Prostrate cape weed</td>
</tr>
<tr>
<td>Eucalyptus globulus</td>
<td>Blue gum</td>
</tr>
<tr>
<td>Euphorbia oblongata</td>
<td>Eggleaf spurge</td>
</tr>
<tr>
<td>Lathyrus latifolius</td>
<td>Sweet pea</td>
</tr>
<tr>
<td>Leucanthemum vulgare</td>
<td>Oxe eye daisy</td>
</tr>
<tr>
<td>Oxalid pes-caprae</td>
<td>Bermuda buttercup</td>
</tr>
<tr>
<td>Pelargonium grossularioides</td>
<td>Gooseberry pelargonium</td>
</tr>
<tr>
<td>Sparaxis tricolor</td>
<td>Harlequin flower</td>
</tr>
</tbody>
</table>

### YELLOW LIST

<table>
<thead>
<tr>
<th>Plant Name</th>
<th>Common Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carduus pycnocephalus</td>
<td>Italian thistle</td>
</tr>
<tr>
<td>Cirsium vulgare</td>
<td>Bullthistle</td>
</tr>
<tr>
<td>Conium maculatum</td>
<td>Poison hemlock</td>
</tr>
<tr>
<td>Crocosmia crocosmiflora</td>
<td>Monbretia</td>
</tr>
<tr>
<td>Ehrharta erecta</td>
<td>Upright veldt grass</td>
</tr>
<tr>
<td>Euphorbia lathyris</td>
<td>Gopher plant</td>
</tr>
<tr>
<td>Hedera helix</td>
<td>English ivy</td>
</tr>
<tr>
<td>Holcus lanatus</td>
<td>Common velvetgrass</td>
</tr>
<tr>
<td>Ilex aquifolium</td>
<td>Holly</td>
</tr>
<tr>
<td>Mentha pulegium</td>
<td>Pennyroyal</td>
</tr>
<tr>
<td>Myosotis discolor</td>
<td>Forget me not</td>
</tr>
<tr>
<td>Romulea rosea</td>
<td>Rosy sandcrocus</td>
</tr>
<tr>
<td>Silybum marianum</td>
<td>Milk thistle</td>
</tr>
</tbody>
</table>

### ADDITIONS

<table>
<thead>
<tr>
<th>Plant Name</th>
<th>Common Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Euphorbia lathyris</td>
<td>Gopher plant</td>
</tr>
<tr>
<td>Cenchrus clandestinus</td>
<td>Kikuyu grass</td>
</tr>
</tbody>
</table>

The biggest time sucks
>8,658 acres surveyed
>125

gross acres
treated
A Vision Fire Invader Lives On...
Rising from the (almost) dead
1,800+ jubata plants treated so far...
Post-fire invasives lessons

1. Take advantage of area closures
2. Survey the interior while it’s accessible
3. Have weeds data ready, keep it current
4. Clearly define your priorities and terms
A Look Ahead

YEAR 0
- Fire suppression & repair

YEAR 1
- BAER weed surveys and treatment

YEAR 2
- BAR weed surveys and treatment
- Plot-based plant community monitoring

YEAR 3
- BAR weed surveys and treatment

YEAR 4
- (funding tbd for years 4-5)

YEAR 5

YEAR 10
- Aerial imagery veg mapping
Thank you firefighters, BAR funders and PORE staff!
Questions?
CNPS
2022 Conference
ROOTING TOGETHER
Effect of prescribed fire and mechanical disturbance on the diversity of soil fungi

Taylor Akers
Fire in California

- Wide range of plant communities

Fire regime

- Patterns defined by:
  - Frequency
  - Severity
- Varies between communities

(Syphard and Keeley, 2020)
Mixed Coniferous Forest

- Pre-1850s
  - Low intensity fires
  - 6-20 years (frequent)
  - Open structure

- Present
  - High intensity fires
  - 30-100+ years (infrequent)
  - Dense structure

(Thompson, UC-ANR, 2022)
(Allen et al., 2011)
Blodgett Forest Research Station
Fire & Fire Surrogate (FFS)

- Long-term study
- 12 experimental sites
  - 4 treatments:
    - Control
    - Fire
    - Mechanical
    - Mechanical with fire
Treatments:

- Control
- Mechanical
Treatments:

- Fire only
- Mechanical with fire
Fire & Fire Surrogate Results

- Understory vegetation
- Forest structure
- Resilience to extreme fire
- Soil properties
- Soil organisms

Change in herbaceous species richness (no./m²)

Treatment: C, F, M, M&F

Graph showing box plots for each treatment, indicating differences in species richness.
Soil fungi

- Saprotrophic
- Mycorrhizal
- Parasitic

Sequester Carbon

Decomposition
Nutrient cycling
Soil formation
Water retention
Seedling development
Plant growth

Structure
Plant communities
Experimental design

- 144 total soil samples
  - 3 plots / site & 4 samples / plot
Methods – Molecular Tools

- Extract DNA from soil
  - Metabarcoding of ITS region
  - Quantify fungal species richness and abundance
Methods - Morphology

- Visually ID root tips colonized by mycorrhizal fungi
  - Presence / absence

*Pinaceae sp.* roots, colonized by 3 mycorrhizal morphotypes
Anticipated Results – Diversity

- Shannon’s Diversity Index ($H'$)
- Mixed model Analysis of Variance (ANOVA)

<table>
<thead>
<tr>
<th>Treatments</th>
<th>C</th>
<th>F</th>
<th>M</th>
<th>M+F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>0.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fire Only</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanical</td>
<td>1.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanical with Fire</td>
<td>2.0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Treatments:
- Control
- Fire Only
- Mechanical
- Mechanical with Fire
Anticipated Results – Community Composition

- Bray-Curtis Dissimilarity
- Ordination (visualization)

Treatments:
- Control
- Fire Only
- Mechanical
- Mechanical with Fire

(Each dot = one plot)
Anticipated Results – Community Composition

- PERMANOVA analysis

Treatments:
- Control
- Fire Only
- Mechanical
- Mechanical with Fire

(Each dot = one plot)
Future Directions

- Destigmatize fire
  - Ecological process & Evolutionary force

- Use fire as a tool
  - Enhance biodiversity & Mitigate extreme fire effects

- Overcome challenges
  - Liability $\rightarrow$ SB 332
  - Trained personnel $\rightarrow$ SB 926
  - Burn variables $\rightarrow$ fire ecology research

Taylor’s future PhD project?
Thank you!

- Linda, Bill & Weta Anderson
- Jim Baxter
- Anji Ballerini
- Kalen & Glenn
- Blodgett forest staff
- CNPS staff
- My family ♡
Resources & Q/A

● Lit References:
  ○ He T. et al., (2019) Fire as a key driver of Earth’s biodiversity

● Organizations:
  ○ TNC - The Nature Conservancy
  ○ PBAs - Prescribed Burn Associations
  ○ UC-CE - UC Cooperative Extension
  ○ GFA – Good Fire Alliance
  ○ FAC – Fire Adapted Communities
  ○ FLN – Fire Learning Network
  ○ TREX – Presc. Fire Training Exchange
  ○ CoRenewal (mycoremediation)
  ○ Fire Forward (Audubon Canyon Ranch)
  ○ FFS - Fire & Fire Surrogate (national)
Saving the Champion Oak from Wildfire and Post-fire Recovery

A Presentation to the California Native Plant Society 2022 Conference, San Jose, California
October 20-22, 2022
By Dr. Timothy Krantz
The Wildlands Conservancy
The Champion Oak

• Canyon live oak, *Quercus chrysolepis*
• Minimum trunk circumference = 12.0m/39.4ft
• Height = 37.8m/124ft
• Avg canopy width = 30m/98ft
• Diameter of roots at base = ~7.5m/25ft
• Age? = centuries
The Largest Oak in the United States?

https://www.americanforests.org/champion-trees/champion-trees-registry/

Trees of the same species are compared using the following calculation:

\[
x = \text{Tree Trunk Circumference (Inches)}; \\
y = \text{Tree Height (Feet)}; \\
z = \text{Tree’s Average Crown Spread (Feet)}; \\
x + y + (z/4) = \text{Total Points}
\]

https://www.americanforests.org/tree/canyon-live-ca/  
Q. chrysolepis  
Total 622 points

https://www.americanforests.org/tree/live-oak-ga/  
Q. virginiana  
558 pts.

https://www.americanforests.org/tree/valley-oak-ca/  
Q. lobata  
526 pts.
Apple Fire

Point of origin

Champion Oak

My house

33,424 acres/52mi² burned
Apple Fire Air Show
The El Dorado Fire...
El Dorado Fire

Champion Oak
Point of origin
My house

22,744ac/36mi²
Post-fire Recovery
Inland Scrub Oak,
*Quercus berberidifolia*
• Bush Interior Live Oak,

• *Quercus wislizenii*
Black Oak, *Quercus kelloggii*
Oracle Oak, Quercus Xmorehus
Red-rayed hulsea, *Hulsea heterochroma*

Showy gilia, *Gilia cana*

Crowned muilla, *Muilla coronata*

Prickly poppy, *Argemone munita*
Chocolate drops, 
*Caulanthus amplexicaulis*

Canterbury bells, *Phacelia minor*

Wallflower, *Erysimum capitatum*

Variegated miner’s lettuce, *Claytonia perfoliata mexicana*

Chia, *Salvia columbariae*

Golden ear-drops, *Ehrendorferia chrysanth*a
Bumblebee penstemon, *Penstemon grinnellii*

Parish’s umbrellawort, *Tauschia parishii*

Chaparral blazingstar, *Mentzelia micrantha*

Short-lobed phacelia, *Phacelia brachyloca*

Fuzzy caterpillars, *Phacelia cicutaria*

Clustered broomrape, *Aphyllon fasciculatum*
Parish's checkerbloom,
Sidalcea hickmanii parishii
Plummer's mariposa lily, *Calochortus plummerae*
(THE) Beginning
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