Assessing non-target vegetation response in the wake of perennial pepperweed (Lepidium latifolium) eradication at the Cosumnes River Preserve

Rachel A. Hutchinson
Joshua H. Viers
James F. Quinn
The Information Center for the Environment, Dept. of Environmental Science and Policy, UC Davis

rahutchinson@ucdavis.edu
Determine an effective eradication method while monitoring the effect of experimental treatments on existing plant communities.

**Treatment success:**
Mow/broadcast spray herbicide application
(Rodeo® and Telar®)

**Non-target vegetation surveys:**
Riparian Communities: Rodeo®
Grassland Communities: Telar®

**Seed bank experiment:**
*L. latifolium* remained in the seed bank post-eradication
Lepidium latifolium at the Cosumnes River Preserve

Number of Pepperweed Patches

![Graph showing the number of pepperweed patches from 2002 to 2006. The graph indicates a peak in 2004 followed by a decline in subsequent years.]

![Map of the Cosumnes River Preserve with pepperweed patches marked in red. The map shows clusters of patches in different areas of the preserve.]
<table>
<thead>
<tr>
<th>Perennial Pepperweed Plot Treatments</th>
<th># of Plots</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Controls</strong></td>
<td></td>
</tr>
<tr>
<td>-28 Pepperweed-Control</td>
<td>84</td>
</tr>
<tr>
<td>-24 No Pepperweed-Control</td>
<td></td>
</tr>
<tr>
<td>-16 Mow-Control</td>
<td></td>
</tr>
<tr>
<td>-16 Cut-Stem-Control</td>
<td></td>
</tr>
<tr>
<td><strong>Mow/Broadcast</strong></td>
<td>32</td>
</tr>
<tr>
<td>-16 Mow+Broadcast Telar®</td>
<td></td>
</tr>
<tr>
<td>-16 Mow+Broadcast Rodeo®</td>
<td></td>
</tr>
<tr>
<td><strong>Cut-Stem</strong></td>
<td>48</td>
</tr>
<tr>
<td>-16 Telar® (low concentration treatments only)</td>
<td></td>
</tr>
<tr>
<td>-32 Rodeo® (low and high concentration treatments)</td>
<td></td>
</tr>
<tr>
<td><strong>Tarp sites</strong></td>
<td>24</td>
</tr>
<tr>
<td>-12 mow+tarp</td>
<td></td>
</tr>
<tr>
<td>-12 mow+rototill+tarp</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>188</td>
</tr>
</tbody>
</table>
Both mow/broadcast spray treatments significantly reduced perennial pepperweed populations in all treated experimental plots.
191 Species
100 Native
91 NonNative
(Five on Cal-IPC High Impact list)

98 Annual
73 Perennial
9 Tree/Shrub
3 Vine
**Alpha Diversity**

**Grassland:**
- Species richness increased in 2006 after initial eradication in grassland communities
- Species richness also increased in mow/control plots

**Riparian:**
- Species richness increased in 2006 after initial treatment, and continued to increase after two treatment cycles
- Species richness also increased in control plots!!
Grassland

% Cover in Mow Treatment Plots

Mean % Cover

<table>
<thead>
<tr>
<th>Year</th>
<th>Thatch</th>
<th>Soil</th>
<th>NonNative</th>
<th>Native</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>2007</td>
<td></td>
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</tr>
</tbody>
</table>
• Native cover does not change significantly in Mow/Telar® plots.

• Native cover decreases (p=0.06) in plots treated with Rodeo® after two years of treatment.

• Non native cover decreases in both Mow/Rodeo® and Mow/Telar® plots between 2006 and 2007.
Riparian

% Cover in Mow Treatment Plots

Mean % Cover

0% 20% 40% 60% 80% 100%

2005 2006 2007

- Thatch
- Soil
- NonNative
- Native
Native Cover significantly decreased in Mow/Telar® plots in both 2006 and 2007.

Native Cover significantly decreased in Mow/Rodeo® plots after two years of consecutive herbicide application.

Non Native cover increased in Mow/Rodeo® plots from 2006 to 2007.

Non native cover decreased in Mow/Telar® plots post-treatment.
Soil samples were collected in late summer 2006 from experimental treatment plots.

Samples were potted and germinants were identified, counted and removed from pots in a lath house for one year.
Pepperweed in the Seed Bank

![Graph showing the percentage of Pepperweed eradicated and germinants across different treatment plots.](image-url)
Seed Bank Results

**Grassland:**
A significant proportion of germinants were non-native annual species.

**Riparian:**
Significantly more native, perennial species germinated in riparian seed bank pots.

* p < 0.05
Conclusions

**Treatment success:**
Mow/broadcast spray treatments
Cut-stem treatments?

**Non-target vegetation surveys:**
Rodeo® may be a better herbicide to use in riparian communities
Telar® may be a better herbicide to use in grassland communities

**Seed bank experiment:**
Pepperweed seeds viable in plots where it was “eradicated”
The **Future** of Pepperweed at The Cosumnes River Preserve

Large scale treatment at the preserve to stop spread while reducing *Lepidium* impact

Tarping Results: **June 2008**

Restoration?
Acknowledgements

CALFED Bay Delta ERP-02D-P66
The Cosumnes River Preserve

http://baydelta.ucdavis.edu/pepperweed/
(under construction)

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Questions?
rahutchinson@ucdavis.edu

😊 *Ludwigia* growing over tarp installed for pepperweed eradication ☹️