Thatch Management Using Mowing and Grazing to Benefit the Behren’s Endangered Butterfly (*Speyeria zerene behrensii*), Manchester, California, USA

**NCB 2023**

*Terra Fuller, Senior Environmental Scientist (Specialist), Sonoma-Mendocino Coast District, California State Parks*

Behren’s Silverspot Butterfly  
(*Speyeria zerene behrensii*)

Listed by USFWS as Endangered in 1997

Historic Range- City of Mendocino to South of Salt Point

Current Range- Manchester State Park to Salt Point

Similar silverspot subspecies: Myrtle’s (*Speyeria zerene myrtleae*) and Oregon (*Speyeria zerene Hippolyta*)
Behren’s Silverspot
Life History
• Emerges from pupation early/mid summer,
• Nectar plants important for energy and egg development
• Mate’s immediately
• Ovaries take about a month to mature.
• Eggs laid on early blue violets late summer-September (12 days to hatch)
• Larvae overwinter without feeding
• Larvae go through 6 molts, during the spring feeding on Viola
• In pupal case for 2-3 weeks, eclose from pupa
Viola adunca

- Only larval food for Behren’s, with 200 leaves needed for each caterpillar (Oregon zoo captive rearing procedures 2009); 25 plants/m²
- Perennial herb
- Spreads by woody rhizome and seed
- Locally occupies vernally moist meadows, prairies, stream banks and meadow edges in conifer forests
Manchester State Park

History

- Pre-contact Central Pomo Indians, recognized now as the Manchester Band of Pomo Indians
- Early settlers did cultivation and ranching
- 1930 State Park Commission set aside 295 acres along the coast for recreation
- In 1955 this area became Manchester State Beach
- Hoyt ranch added in 1961 James Biaggi
- 1977 the final pieces added to become a State Park in 1991
Why Restoration??

• Historic agricultural activities, loss of fire, loss of large grazers and introduction of non-native grasses have resulted in ecological changes to the native coastal prairie.
• Invasive perennial grasses compete for resources (space, sunlight and water) and through the dense accumulation of thatch.
• Behren’s Silverspot butterflies are very low to absent at Manchester
• Only two locations at Manchester contain Viola adunca
• Mowing and grazing as tool to help control invasive grasses
• USFWS recovery funding in 2015 with additional funding through Disney Conservation Fund for treatments and monitoring

Sweet Vernal Grass (*Anthoxanthum odoratum*) & Velvet Grass (*Holcus lanatus*)
Question: does grazing or mowing reduce thatch and increase *Viola* numbers?

**2015-2020 Implemented Treatments**

- 20 acres mowed
- 20 acres of high intensity low duration grazing
- 10 acres of control
- Mowed and grazed during the spring-summer or fall-winter
Monitoring

Pre-Project
Project Implementation
Controls vs. Treatments

Daily Procedures - Conducted each day throughout the first grazing period:

1. Map the area to be fenced.
2. Erect electric fencing
3. Take scales and photographs of paddock before moving sheep in
4. Herd sheep into the new paddock.
5. Take scales and photos of previous day’s paddock after sheep have moved out.
6. Move sheep around their new paddock with herding dog to increase the trampling impact on standing and trampled organic matter. This is done early while there is still dew on the grass.
7. Feed allfa (typically 3-4 bales) on top of areas of significant hatch.
8. Provide water to the sheep with portable water trough.
9. Repeat steps 3 and 6 one or two more times throughout the day.
10. Scare off righteone predators with a spotlight

Robel Pole

Established transects since 2007

Viola Counts

Robel pole techniques outlined by Smith 2008

Butterfly Surveys
Control Mowing
After Fall Mowing
Control Grazing
After Fall Grazing
### Viola Counts

Absolute Change ($V_2 - V_1$).

Relative Percent Change ($\frac{V_2 - V_1}{V_1} \times 100$)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Grazing</td>
<td>Relative</td>
<td>77%</td>
<td>56%</td>
<td>47%</td>
<td>39%</td>
<td>55%</td>
</tr>
<tr>
<td></td>
<td>Absolute</td>
<td>95</td>
<td>123</td>
<td>159</td>
<td>197</td>
<td>144</td>
</tr>
<tr>
<td>Grazing</td>
<td>Relative</td>
<td>86%</td>
<td>144%</td>
<td>123%</td>
<td>2%</td>
<td>89%</td>
</tr>
<tr>
<td></td>
<td>Absolute</td>
<td>170</td>
<td>530</td>
<td>1102</td>
<td>47</td>
<td>462</td>
</tr>
<tr>
<td>Control Mowing</td>
<td>Relative</td>
<td>116%</td>
<td>110%</td>
<td>-16%</td>
<td>43%</td>
<td>63%</td>
</tr>
<tr>
<td></td>
<td>Absolute</td>
<td>36</td>
<td>74</td>
<td>-23</td>
<td>51</td>
<td>35</td>
</tr>
<tr>
<td>Mowing</td>
<td>Relative</td>
<td>864%</td>
<td>194%</td>
<td>65%</td>
<td>28%</td>
<td>289%</td>
</tr>
<tr>
<td></td>
<td>Absolute</td>
<td>95</td>
<td>206</td>
<td>203</td>
<td>146</td>
<td>163</td>
</tr>
</tbody>
</table>
Optical Density Monitoring

(cm) corresponding to treatment season and years 2016-2020, Manchester State Park. Darkened cells illustrate a considerable reduction in optical grass density.

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Year</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average Optical Density Pre-project (cm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fall Mow and Fall and Spring Grazing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Grazing Fall and Spring Mow</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fall Mow and Summer Grazing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fall Mow and Fall Grazing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year</td>
<td>2016</td>
<td>2017</td>
<td>2018</td>
<td>2019</td>
<td>2020</td>
<td></td>
</tr>
<tr>
<td>Mowing</td>
<td>15</td>
<td>18</td>
<td>8</td>
<td>22</td>
<td>23</td>
<td></td>
</tr>
<tr>
<td>Grazing</td>
<td>24</td>
<td>11</td>
<td>24</td>
<td>13</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>18</td>
<td>25</td>
<td>20</td>
<td>21</td>
<td>23</td>
<td></td>
</tr>
<tr>
<td>Grazing-Transect 4</td>
<td>Fall &amp; Spring</td>
<td>Fall only</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------</td>
<td>--------------</td>
<td>-----------</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mowing-Transect 6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control- Transect 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Monitoring Conclusions:

• Viola numbers increased with both grazing and mowing. Dead hatch was removed with annual treatments.
• Only spring/summer treatments reduce the density of grass during the Behren’s flight season using the Robel pole method; however, observationally there appeared to be a carryover effect from repeated years with fall treatments.
Observations:

• Fall winter treatments reduced grass thatch through the spring and early summer and lasted *Viola* blooming season
• Native forbs and grasses showed a flowering response to treatments where the seed bank was present.
• Wet years and wet areas had more flowering native forbs than drier areas after treatment.
• Manchester native seed bank is low (tilling); thus, treatments alone will not increase diversity.
• Purple velvet grass appeared to be reduced by mowing and grazing; however bent grasses (*Agrostis stolonifera or capillaris*) did not and will be a long-term challenge.
Recommendations:

• Grazing and mowing are thatch reduction treatments and can improve the flowering of natives.
• For perennial grasslands, fall treatments will last until the spring/early summer blooming season. Fall treatments avoid the bird nesting season, don’t impact spring forbs.
• Farmed/tilled grasslands will likely require the removal of non-native grasses. Active planting or seeding of forbs and native grasses may be needed to restore coastal prairie.
Thank You!

Acknowledgments

USFWS: John Hunter, Clint Pogue, Susie Tharratt,
Florida University and the Disney Conservation Fund.
Our State Park team: Alison Cebula, Taylor Groves, Chris Heintzelman, Robert Kunicki, Brendan O’Neil, Leigia Nunez, Renee Pasquinelli, Louis Reynolds.
State Park heavy equipment operators: Mike Drake and Michael Willis.
Consulting botanist: Peter Warner.