Eelgrass donor sites: potentially overlooked impacts of restoration in Puget Sound

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Speaker
John Vavrinec, A. B. (Amy B.) Borde, Jeffrey Gaeckle, Valerie Cullinan, Susan Southard, Kate Hall, and Lara Aston
Eelgrass Donor Sites: potentially overlooked impacts of restoration in Puget Sound?

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Jeff Gaeckle (DNR)
Val Cullinan (PNNL)
Sue Southard (PNNL)
Kate Hall (PNNL)
Lara Aston (PNNL)
Eelgrass (Zostera marina)
Mitigation

- No net loss
- Mitigation ratios
Restoration
Donor plants in storage

PNNL Marine Sciences Lab (Sequim)
Donor meadows
Donor harvest best practices

- Choose substantial meadows
- Hand harvest
- No more than 5% of plants
- Spread out effort
Site selection

- Healthy meadows with good density
- Near existing restoration project
- If possible, good depth distribution
- 2 regions
Donor impact experiment

- Randomized block design
- 5 blocks per site
- 5 harvest levels (0, 10, 20, 30, and 50%)
Methodology
Methodology

- Evaluate in 1 & 2 years
Eelgrass Densities (T₁)

Anderson Island

Port Gamble

Density (shoots m⁻²)

T1 a Count (1 3 changed to 1 1 3)
Proportional change in density ($T_1$)

![Proportional change in density](image)

Proportional Difference $T_1$ Count

Anderson Island  Port Gamble
Eelgrass Densities ($T_2$)

Anderson Island Port Gamble

<table>
<thead>
<tr>
<th>Treatment Site</th>
<th>T2 (Count/m2)</th>
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<tbody>
<tr>
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<tr>
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<tr>
<td>30</td>
<td>0</td>
</tr>
<tr>
<td>50</td>
<td>0</td>
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<td>30</td>
<td>0</td>
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<tr>
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Proportional change from harvest ($T_2$)

Anderson Island Port Gamble

Proportional Growth from Harvest Condition

<table>
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<tr>
<th>Treatment Site</th>
<th>AI</th>
<th>PG</th>
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<tbody>
<tr>
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</tr>
<tr>
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</table>

Spring Monsoon PostHarvest Condition
Should we harvest more than 50%?

NO!
We chose sites with higher densities.
Caveats

- We harvested small patches
Post Harvest Densities ($T_0$)

### Site
- **Anderson Island**
- **Port Gamble**

### Treatment
- **PG**
- **AI**

### Data
- **50**: 50%
- **30**: 30%
- **20**: 20%
- **10**: 10%
- **0**: 0%

### Post-harvest Count
- **Anderson Island**
- **Port Gamble**

![Graph showing post-harvest densities at Anderson Island and Port Gamble.](graph.png)
Conclusions

- Donor sites can probably recover quickly at moderate harvest rates
- Should conservatively harvest no more than 15 or 20% in dense areas
- Use best practices:
  - Remove small patches
  - Do not harvest the edges
  - Avoid low density areas
Still needs study

- Other regional/local differences
  - Conditions
  - Donor population
- Impacts on edges and at lower densities
- Impacts of various techniques
- Repeated harvesting of the same meadow
Thanks!

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  - Alli Cutting
  - Mark Wieland