Kirk Hanson
kirk@nnrg.org
(360) 316-9317
Why are many forests in the islands so crowded?

**Complex story of:**
- Climate: Low rainfall
- Soil types
- Cultural Factors...
  - Logging history
  - Fire suppression
  - Little active management
Lime Industry
Historic Mean FRI = 7.4 yrs
(How frequent fires were historically)
What is “overstocking” or “overcrowding”? 
Stand Development Stages

Stand development stages → Stand initiation stage → Stem exclusion stage → Canopy transition stage → Gap dynamics stage

Disturbance → Establishment & regeneration phase → Young forest regrowth phase → Mature & canopy transition phase → Old-growth phase

Time since disturbance
Stem Exclusion Phase

**Signs**
- Reduced live crown
- Dense, uniform canopy
- Dead lower branches
- Mortality (self-thinning)
- Lack of understory

**Effects**
- Reduced vigor & disease resistance
- Increased windthrow
- Low diversity
- Reduced growth
1” – 30 years
4” – 70 years
What is pre-commercial thinning?

The selective removal of trees—primarily for improving growth or health of the remaining trees. (No initial financial return)

- Increase long-term value/profits
- Accelerate old-growth characteristics
- Increase resilience (e.g. insects, disease, wind)
- Reduce fire risk
- Increase biodiversity
Pre-Commercial Thinning Strategies

Thinning “from below”

Remove:

1. Smallest diameter
2. Most suppressed
3. Trees with least live crown (<30%)
4. Defective trees (broken tops, wane, forked, etc.)
5. Non-preferred species
6. Spacing
7. “Release” understory trees
• Removed smallest diameter and suppressed trees.
• Also removed defective trees
• Pruned lower limbs
Pre-Commercial Thinning Strategies

When to thin?

- Before overcrowding
- Before trees lose more than 2/3 of their live crown
- *Usually* at 20-25 years
- More often & less intensively = Resistance to windthrow
Risk of Doing Nothing

- Increased risk of fire
- Decrease in productivity
- Slower pace in regaining old-growth characteristics/ large trees
- More susceptible to disease, insects, and drought
Risk of Doing Something

- Increase in light can lead to an increase in undesirable plant species
- Overthinning can increase windthrow potential
- Leaving woody biomass in forest can increase fire risk
Food for Thought

• Historically, forests were much more open
• Thinning can increase
  – Productivity/ growth of trees
  – Structural diversity
  – Health of forest

• Every site is different, understand what you have!

Courtesy: Carson Sprenger, Rainshadow Consulting
## Commercial logging costs for pulp

### 10 acres

<table>
<thead>
<tr>
<th>Activity</th>
<th>Units</th>
<th>$$$/Unit</th>
<th>Total Cost/Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-commercial thin</td>
<td>40 MBF (280 tons)</td>
<td>$37/ton</td>
<td>$10,400</td>
</tr>
<tr>
<td>Hauling</td>
<td>40 MBF (10 trucks)</td>
<td>$700/truck</td>
<td>-$7,000</td>
</tr>
<tr>
<td>Logging costs</td>
<td>10 acres</td>
<td>$1,000/acre</td>
<td>-$10,000</td>
</tr>
<tr>
<td>Consulting</td>
<td>10 acres</td>
<td>$150/acre</td>
<td>-$1,500</td>
</tr>
<tr>
<td><strong>Cost</strong></td>
<td></td>
<td></td>
<td><strong>-$8,100</strong></td>
</tr>
</tbody>
</table>
Pre-commercial Thinning Costs

- Cut and slash - $600/acre
- Cut, pile & burn - $800 - $1,000/acre
- Cut & chip - $1,100 - $1,700/acre
- Mechanical - $1,300/acre
- Work party – beer & brats!
<table>
<thead>
<tr>
<th>Practices</th>
<th>Payment Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest management plan</td>
<td>$1,065 - $1,280 (&lt;20 acres)</td>
</tr>
<tr>
<td>Pre-commercial thinning</td>
<td>$344/acre</td>
</tr>
<tr>
<td>Forest slash treatment</td>
<td>$279/acre</td>
</tr>
<tr>
<td>Downed large wood</td>
<td>$119/each</td>
</tr>
<tr>
<td>Wildlife habitat pile</td>
<td>$163/each</td>
</tr>
<tr>
<td>Pruning</td>
<td>$256/acre</td>
</tr>
<tr>
<td>Fence</td>
<td>$3.49/ft.</td>
</tr>
<tr>
<td>Site prep for planting, light veg.</td>
<td>$209/acre</td>
</tr>
<tr>
<td>Stream crossing, culvert &lt;3’ dia.</td>
<td>$333/ft</td>
</tr>
<tr>
<td>Tree planting with cages</td>
<td>$545/acre</td>
</tr>
<tr>
<td>Bird/bat nest boxes</td>
<td>$32/each</td>
</tr>
</tbody>
</table>
Biomass wood pellet machine

Model: XGJ560
- Power: 90kw
- Capacity: 1-1.5t/h
- Weight: 6.1T
- Dimension: 2.6x1.3x2.3m

Sawdust demand:
- Size: <6mm
- Moisture: 15-20%

Pellet size: Φ6mm, Φ8mm
Next Steps

1. Coalition of the willing
2. Feasibility study grant
3. Current biochar grant
   • NNRG, UW, ARC, SJCFarmers
   • Free site visits
   • One more event