Bioenergy that Supports Ecological Restoration

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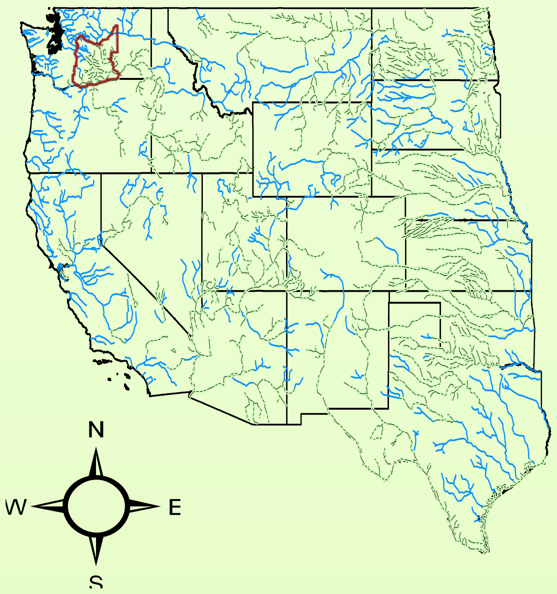
Can invasive tree wood become part of a sustainable bioenergy portfolio?

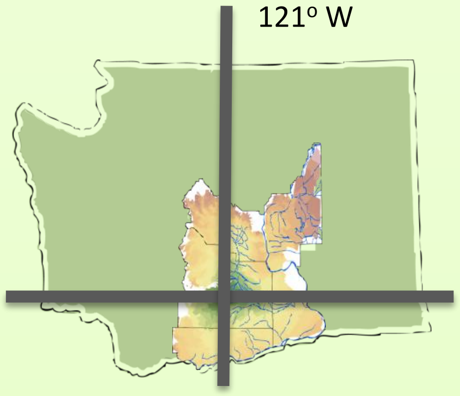
Our project assessed the feasibility of developing a sustainable bioenergy program, for the Confederated Tribes and Bands of the Yakama nation, based on woody residues from invasive tree restoration.

Large supply:

widespread invasive tree distribution



Rivers invaded either by salt cedar or Russian olive
Outline of study region



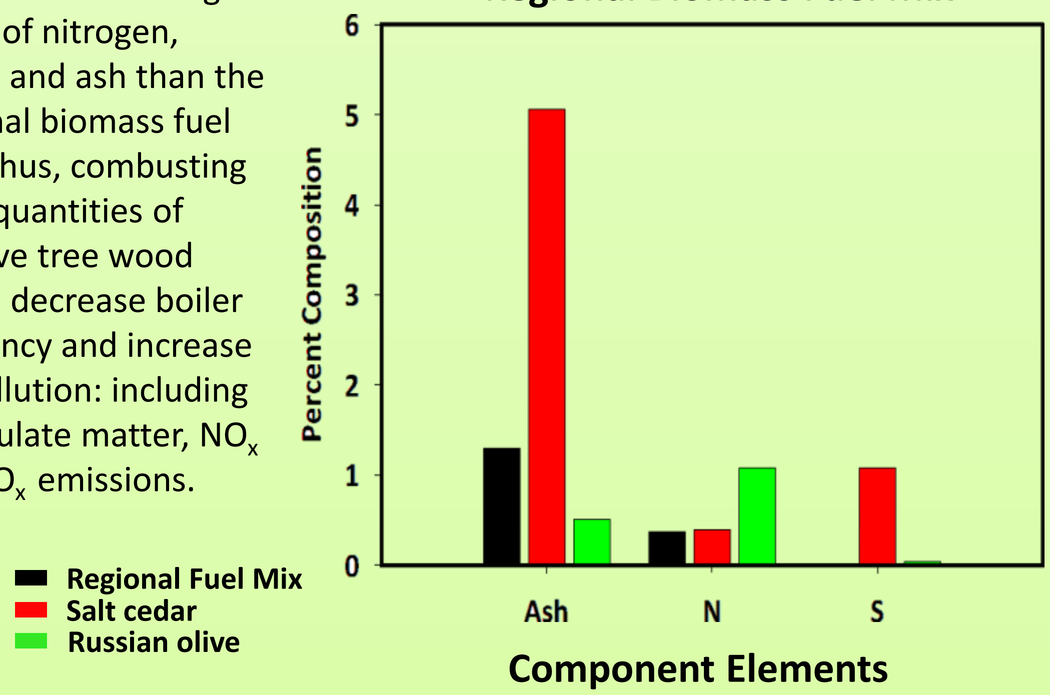
Russian olive (*Eleagnus angustifolia*) and salt cedar (*Tamarisk spp.*) are the most widespread woody invasive plants in the western United States. Russian olive is the predominate invasive tree species in our eastern Washington study region.

Constraints on demand:

invasive tree chemical properties differ from the regional biomass fuel mix

Russian olive and salt cedar have much higher levels of nitrogen, sulfur, and ash than the regional biomass fuel mix. Thus, combusting large quantities of invasive tree wood would decrease boiler efficiency and increase air pollution: including particulate matter, NO_x and SO_x emissions.

Invasive Tree Wood Properties Compared with the Regional Biomass Fuel Mix

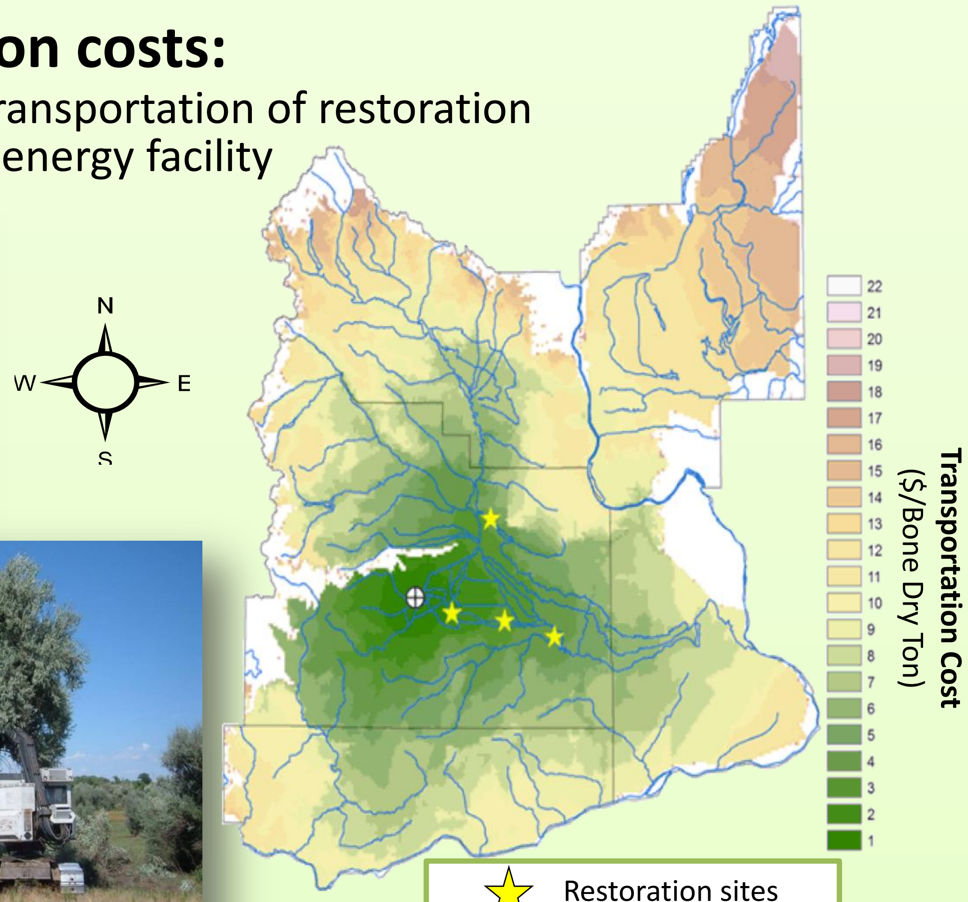


Low transportation costs:

Inexpensive regional transportation of restoration wood-waste to the bioenergy facility

Invaded Stream

Mechanical Removal



The map (above right) illustrates the costs associated with transporting wood from a restoration site (stars) to the bioenergy facility (crossed circle). Costs were parameterized by time ($29/hr) and distance ($1.20/mile) for a 30.9 ton chip van. Images show a stream invaded by Russian olive trees and also the mechanical removal of Russian olive trees.

Bioenergy revenues can fund regional restoration

Restoration and delivery costs:

- Avg. Restoration Costs **$400/acre**
- Avg. Transportation Costs **<$8/BDT**

+

Potential earning:

- Market Price (US DOE, 2011) **$35/BDT**
- Avg. Biomass Removed **15 BDT/acre**

=

Net Gain >$5/acre

Restoration wood waste and bioenergy:

potential to provide regional benefits for social ecological and economic communities

Social benefits would be provided by developing a regionally governed, renewable energy source; ecological benefits would be provided through restoration of riparian habitats funded by the biomass market; and economic benefits would be derived from commodity sales into the biomass market as well as regional job creation. Even though demand for Russian olive wood may be low, as a result of aberrant fuel wood properties, positive impacts can still be substantial.

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