



Biochar as a Tool in Oak-Prairie Habitat Restoration in the Willamette Valley, OR

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USBI Biochar in the Woods Workshop, January 27, 2022

Oregon Watershed Councils

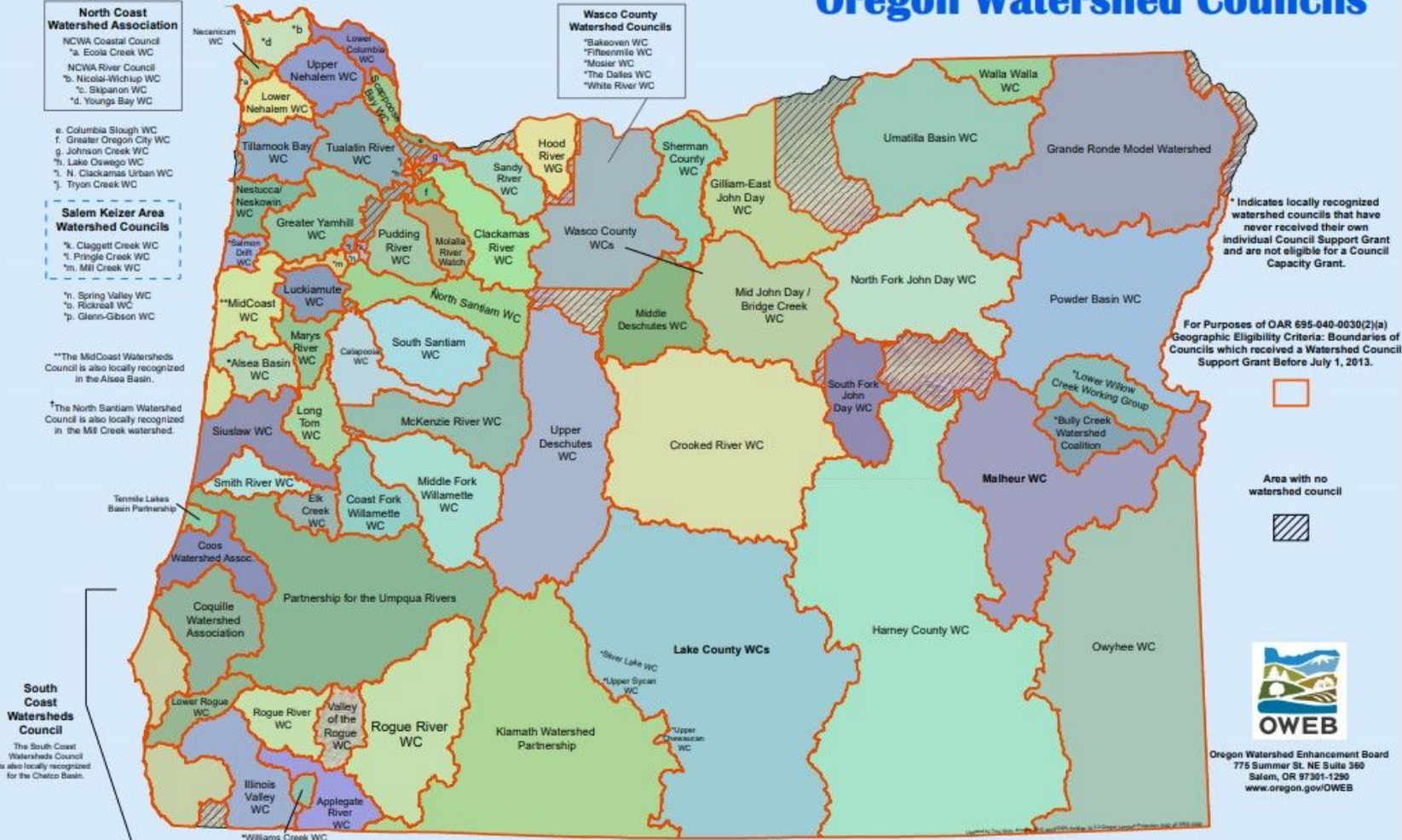
North Coast Watershed Association
 NCWA Coastal Council
 *a. Ecola Creek WC
 NCWA River Council
 *b. Nicolai-Wichap WC
 *c. Skipanon WC
 *d. Youngs Bay WC

Salem Keizer Area Watershed Councils
 *k. Claggett Creek WC
 *l. Pringle Creek WC
 *m. Mill Creek WC
 *n. Spring Valley WC
 *o. Rickreath WC
 *p. Glenn-Gibson WC

**The MidCoast Watersheds Council is also locally recognized in the Aisea Basin.

†The North Santiam Watershed Council is also locally recognized in the Mill Creek watershed.

Wasco County Watershed Councils
 *Bakeoven WC
 *Frisbermie WC
 *Mosier WC
 *The Dalles WC
 *White River WC



* Indicates locally recognized watershed councils that have never received their own individual Council Support Grant and are not eligible for a Council Capacity Grant.

For Purposes of OAR 695-040-0030(2)(a) Geographic Eligibility Criteria: Boundaries of Councils which received a Watershed Council Support Grant Before July 1, 2013.



Area with no watershed council



Oregon Watershed Enhancement Board
 775 Sumner St. NE Suite 368
 Salem, OR 97301-1290
www.oregon.gov/OWEB

What We Do

- **Nonprofit** working to **improve habitat and water quality** for fish, wildlife, and people (for 25 years!)
- We provide opportunities for community members to **learn about local land and water issues**
- We gather **scientific data** that we share widely with the community and partners, and use to inform our work.
- We **implement restoration projects**, usually through grant funding and donations

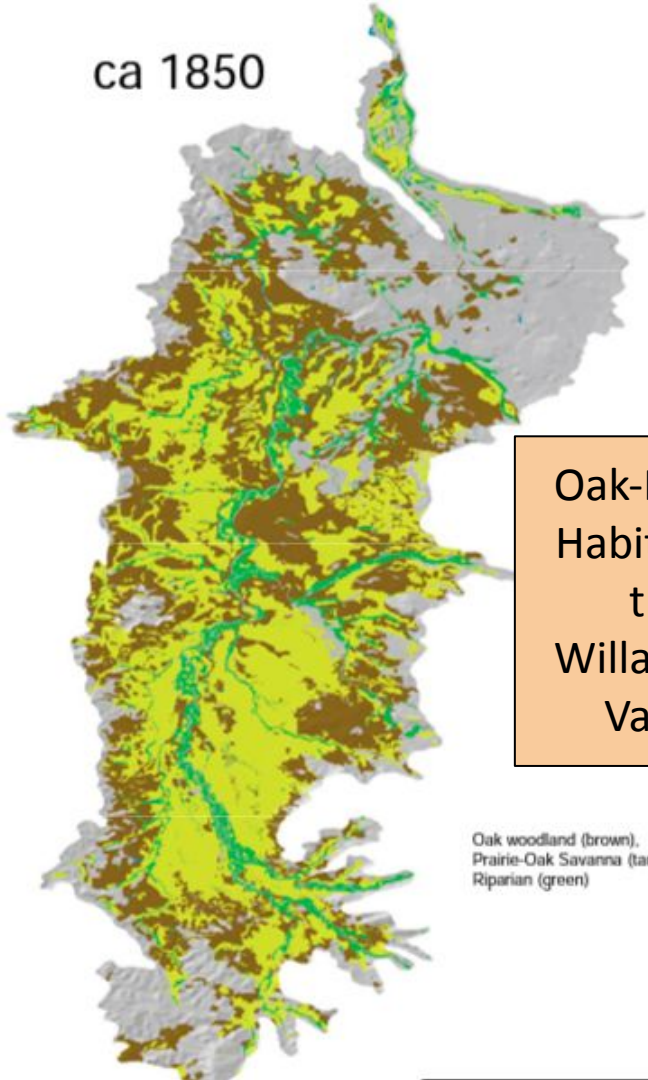
LTWC Restoration Project

Locations

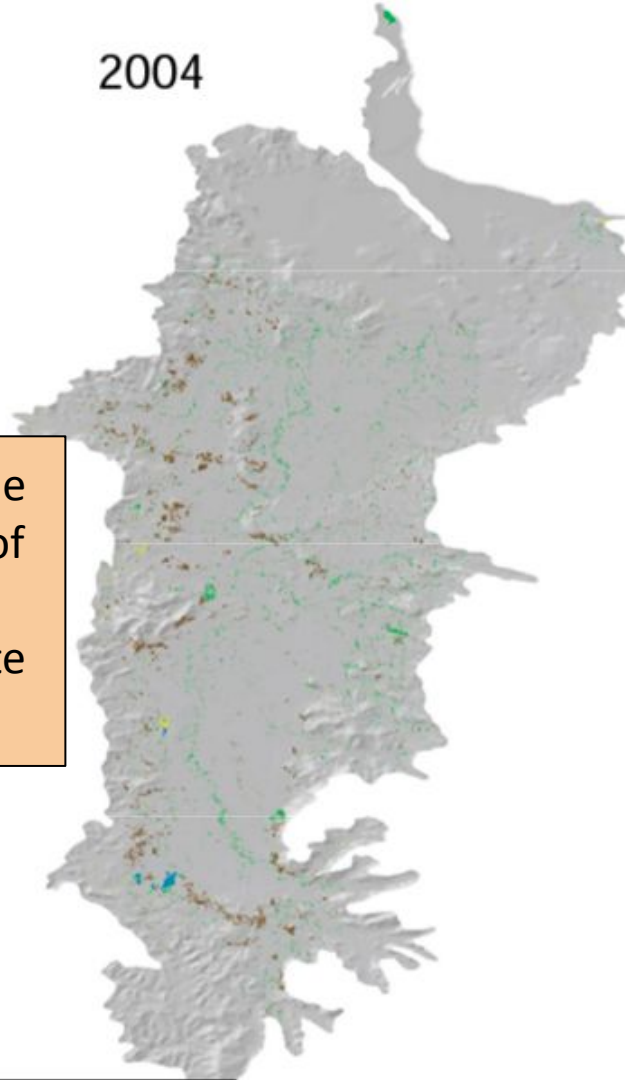




ca 1850



2004



Oak-Prairie
Habitats of
the
Willamette
Valley

Oak woodland (brown),
Prairie-Oak Savanna (tan),
Riparian (green)

Threats to Oak and Prairie Habitats

- Indigenous displacement and European occupation → loss of culture, relationships, and biodiversity
- Conversion to timber, comm. agriculture, urban/residential growth
- Fire suppression → woody plant encroachment, ecol. degradation
- Invasive species
- <2% prairie and oak savanna; <10% oak woodland in the WV (<5% in Long Tom watershed)
- Prairie and oak savanna are now the rarest habitat types (mostly occur on private lands)
- Numerous species in decline, esp. grassland birds and plants



Above: Oregon Vesper Sparrow
(Klamath Blrd Observatory)
Below: Camas



Oak Habitat Biodiversity

62 mammals

80 birds

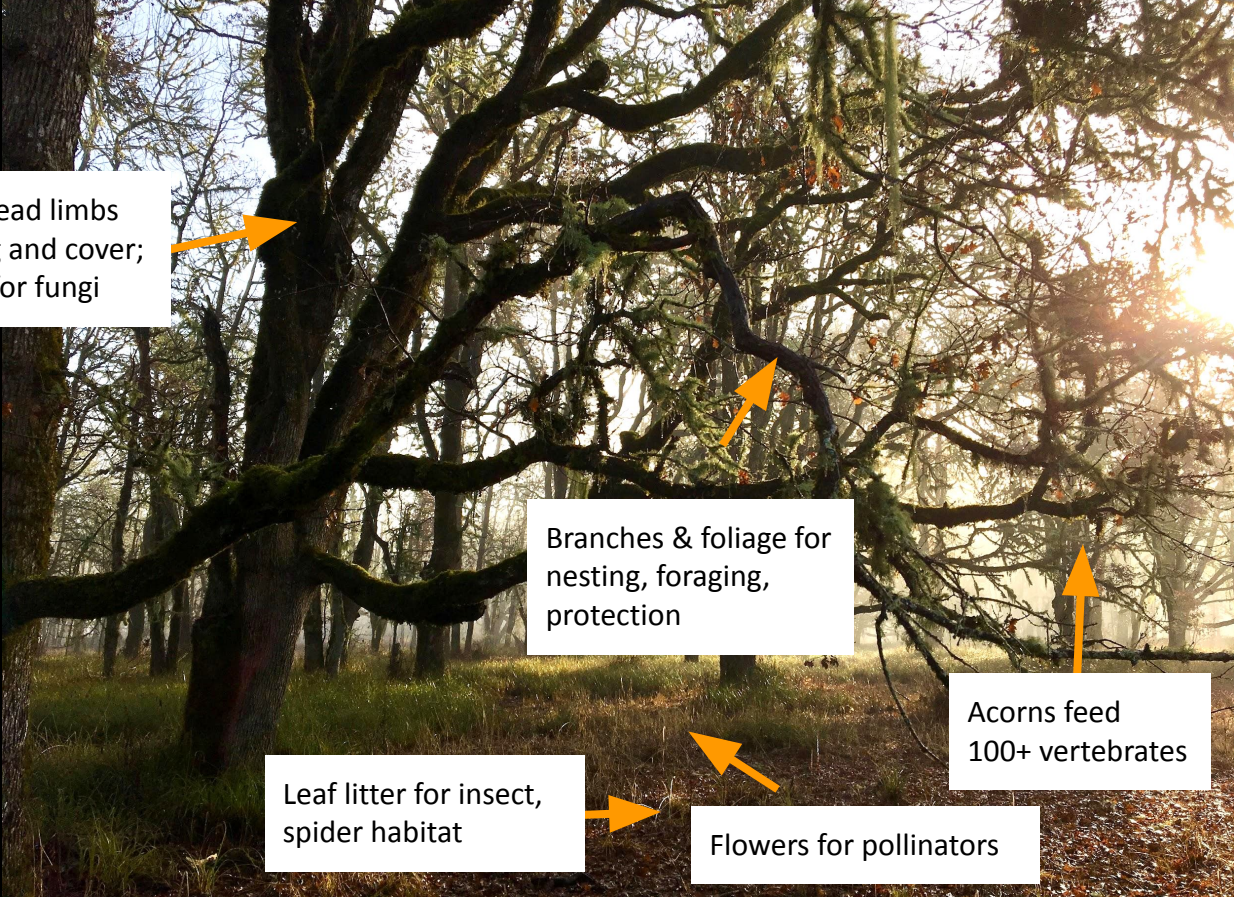
9 amphibians

15 reptiles

714 plants

1100+ arthropods

100+ vertebrates known to
consume acorns



Cavities, dead limbs
for nesting and cover;
substrate for fungi

Branches & foliage for
nesting, foraging,
protection

Acorns feed
100+ vertebrates

Leaf litter for insect,
spider habitat

Flowers for pollinators



Image by Katie MacKendrick at Casares property near Eugene, OR



Evidence suggests biochar or black carbon is a long-time component of prairie soils (Hegarty et al. 2011) as a result of regular burning. Fire suppression has reduced its creation and incorporation into the soil.

Oak Woodland Restoration - Overview

- ❖ Thin stand density, remove encroaching trees from around old large oak trees
- ❖ **Slash treatment**
- ❖ Reduce understory shrubs
- ❖ Remove/reduce invasive species
- ❖ Seed disturbed areas with native forbs and grasses
- ❖ Long-term maintenance, regular disturbance



The Long Tom Watershed Council & Biochar



Nov. 2018 Biochar Demo
with Kelpie Wilson

Organized by Katie
MacKendrick (Ecologist,
LTWC)

Flame-cap kilns ("Oregon
kiln" design)

"Conservation" burn piles

Oak Woodland & Biochar - Motivation

- Improve oak habitat restoration practices
- Reduce carbon emissions, smoke emissions, soil sterilization
- Replenish soil conditions

Make and apply biochar on oak restoration sites from on-site materials

Study to understand impacts of biochar on native plant communities and soil



Oak Woodland & Biochar - Study Design

20'			
A (Control)	B	C	D
20'			

5 Plots on 2 private properties
Within 55 acres previously thinned oak woodland
Remnant prairie plants in grazed understory

Treatments:

- A. Control - no action taken
- B. **Biochar** (60 gal biochar per subplot)
- C. **Woodchips** (60 gal woodchips per subplot)
- D. **Biochar + Woodchips** (30 gal each per subplot)



Oak Woodland & Biochar - Study Design



Vegetation Survey (Releve Plots)

- Species Richness
- % Cover Native, Introduced species
- Year 0 and 5

Soil Samples

- Every year
 - pH
 - Nutrients
- Year 0 and 5
 - Organic Matter content
 - Active carbon respiration
 - Wet Aggregate stability
 - Cation exchange capacity
 - Water holding capacity

Oak Woodland & Biochar - Plot Implementation



Conservation Burn Footprint - Seeding



- Yarrow
- Self Heal
- California Oatgrass
- Blue Wild Rye
- Clarkia
- Oregon Sunshine
- Tarweed
- More...



Aaron Liston, Oregon flora

Lessons So Far

- Biochar takes a lot of time and effort to make!
- Biochar is a fun and engaging education / community engagement tool
- We need more time, and more studies, to find out how biochar impacts native plant communities
- Need regionally specific best practices (soil, precip, airshed...)
- **Biochar cannot replace burning as a management practice in WV uplands but may help restore conditions to make burning more feasible and effective**
- Biochar is one tool in the toolkit

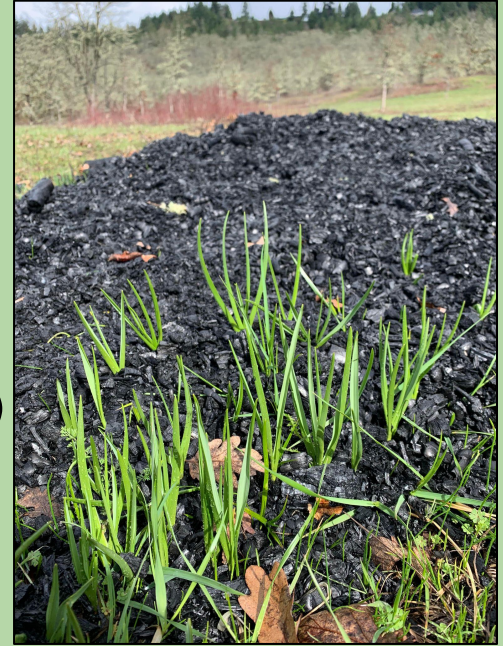


Image: Camas emerging through biochar pile (by Dan Casares)



Restoring the People to
the Place

What's Next?



- Study biochar for stormwater filtration in urban areas
- Continue oak woodland study sites
- Biochar and grazing?
- Biochar and invasive species?
- Biochar and prescribed burning?
- Biochar in prairies and wetlands?

Seeking research collaborators!

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