Columbia Land Trust

CONSERVING THE NATURE YOU LOVE

Designing Effective Revegetation Strategies for Restoration Projects on the Lower Columbia River

Strategies and notes from the field

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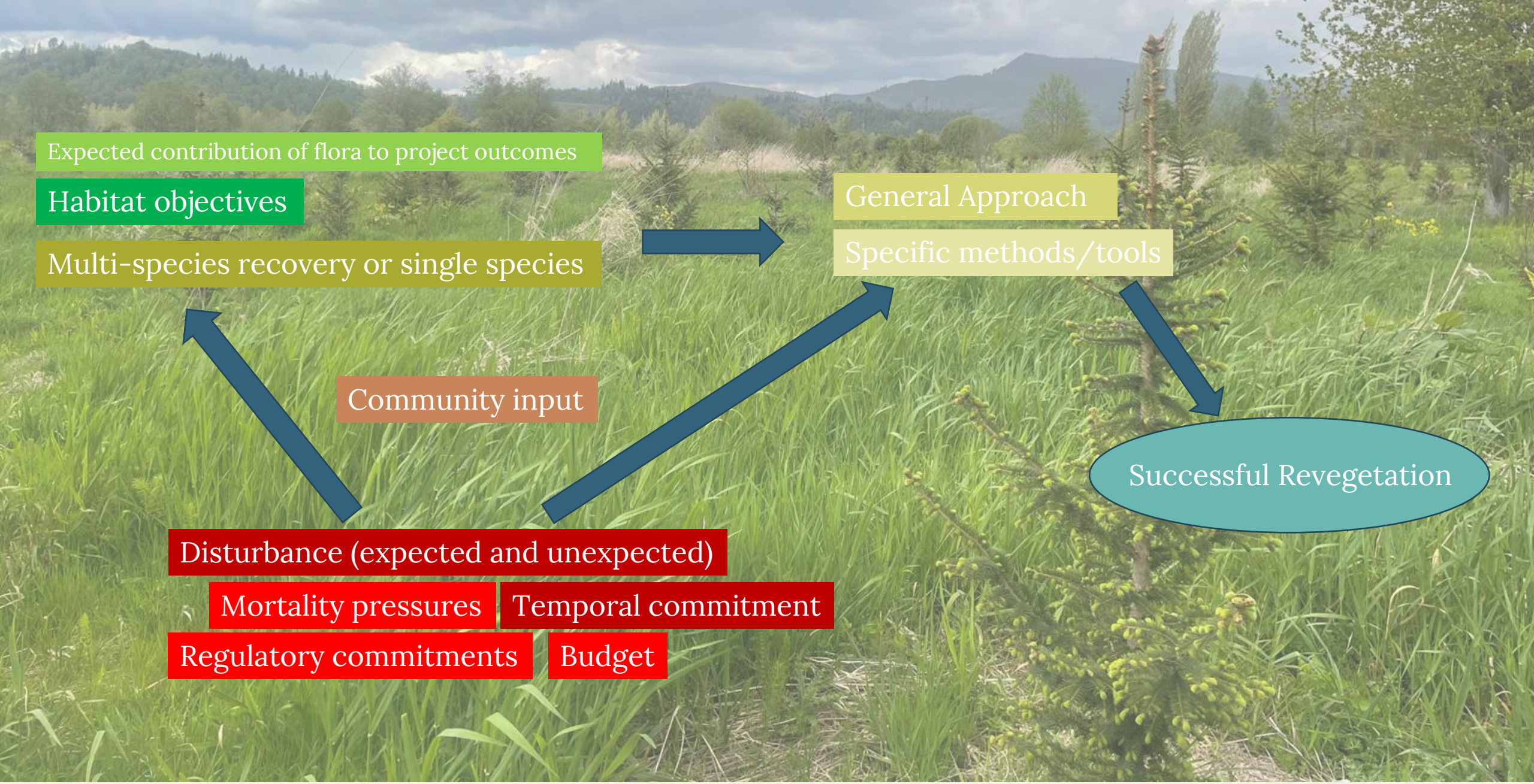
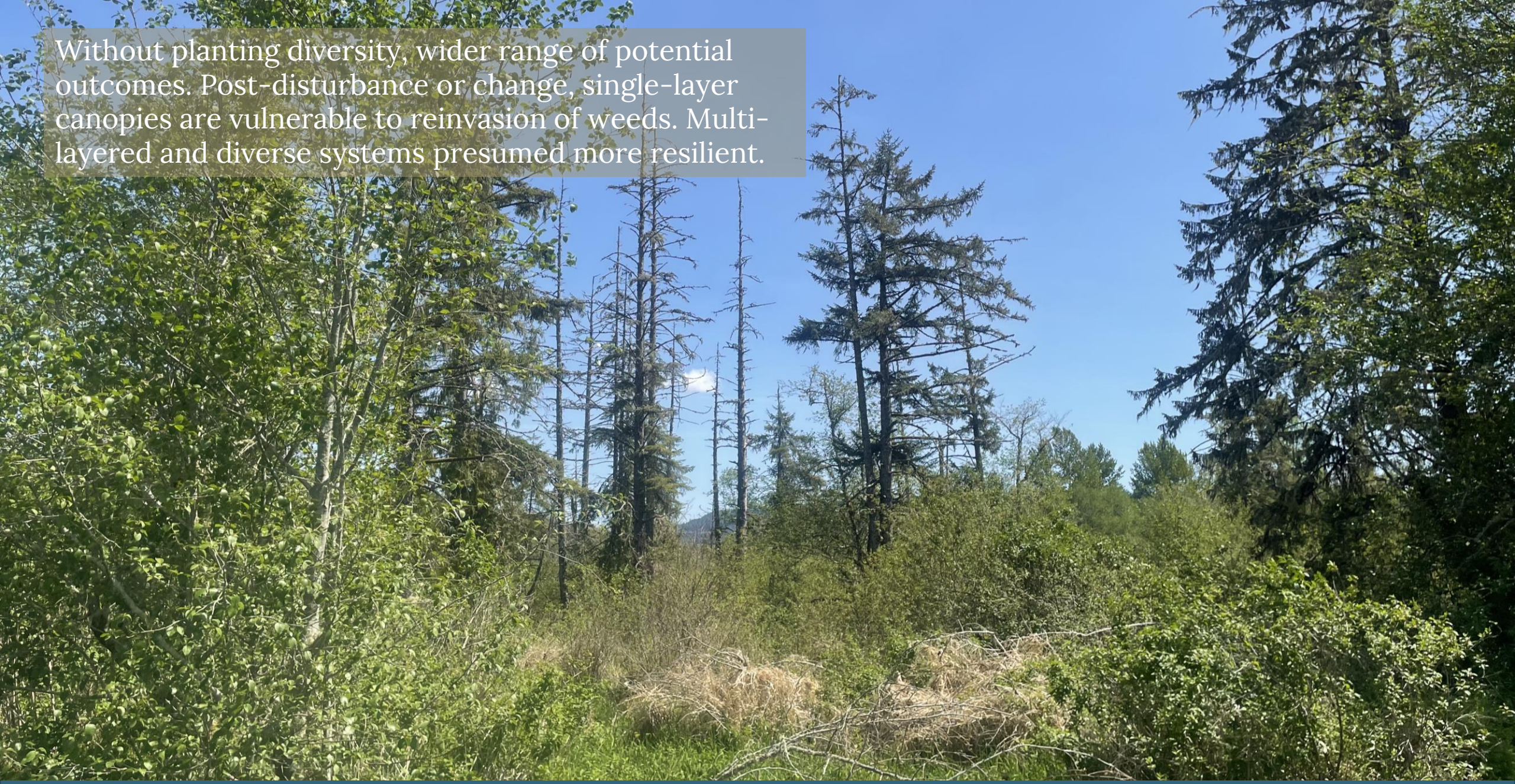
Reforestation Basics

- What are we restoring when we say “forested” or woody ecosystems?
- Woody systems on the Lower Columbia comprise numerous ecotypes: willow scrub-shrub, hardwood forest (ash or alder), conifer (Sitka spruce) wetland, and others along an elevation and river mile gradient (Johnson, 2010)
- Wide range of climatic and hydrologic conditions. Vancouver receives 42” of rainfall annually, Grays River 100”+.


Expected contribution of flora to project outcomes
Habitat objectives
Multi-species recovery or single species
General Approach
Specific methods/tools
Community input
Successful Revegetation
Disturbance (expected and unexpected)
Mortality pressures
Temporal commitment
Regulatory commitments
Budget


Without planting diversity, wider range of potential outcomes. Post-disturbance or change, single-layer canopies are vulnerable to reinvasion of weeds. Multi-layered and diverse systems presumed more resilient.

Overstory Establishment vs Comprehensive Approach: Two projects

- Overstory establishment: focusing efforts on lower number of individual plantings of limited species diversity.
- Modified from commercial forestry or landscaping practices.
- Shade and log recruitment over channels is priority, cheaper.
- Add diversity later.

- Seeks to add diversity and successional stages to revegetation projects
- Careful attention to elevations and reference conditions
- Based on “Rapid Riparian Revegetation (R3) Approach (Guillozet et al)

Project A: Lower Elochoman II

- High natural riverbank transitioning to heavily inundated tidal/fluvial wetlands
- Overstory restoration approach: Sitka spruce, limited shrubs and hardwoods.
- ~One year of site prep
- ~ $2,500 - $3,500 per acre
- Planned future diversity planting adds additional cost of ~$1,000 per acre

Project B: Lower Elochoman III

- Fluvial floodplains/riparian riverbanks with seasonally inundated wetlands around tidal channels
- Comprehensive planting – all species at once
- Two years of site prep
- ~$4,000-$6,000 per acre

Lower Elochoman II: Four years post-planting

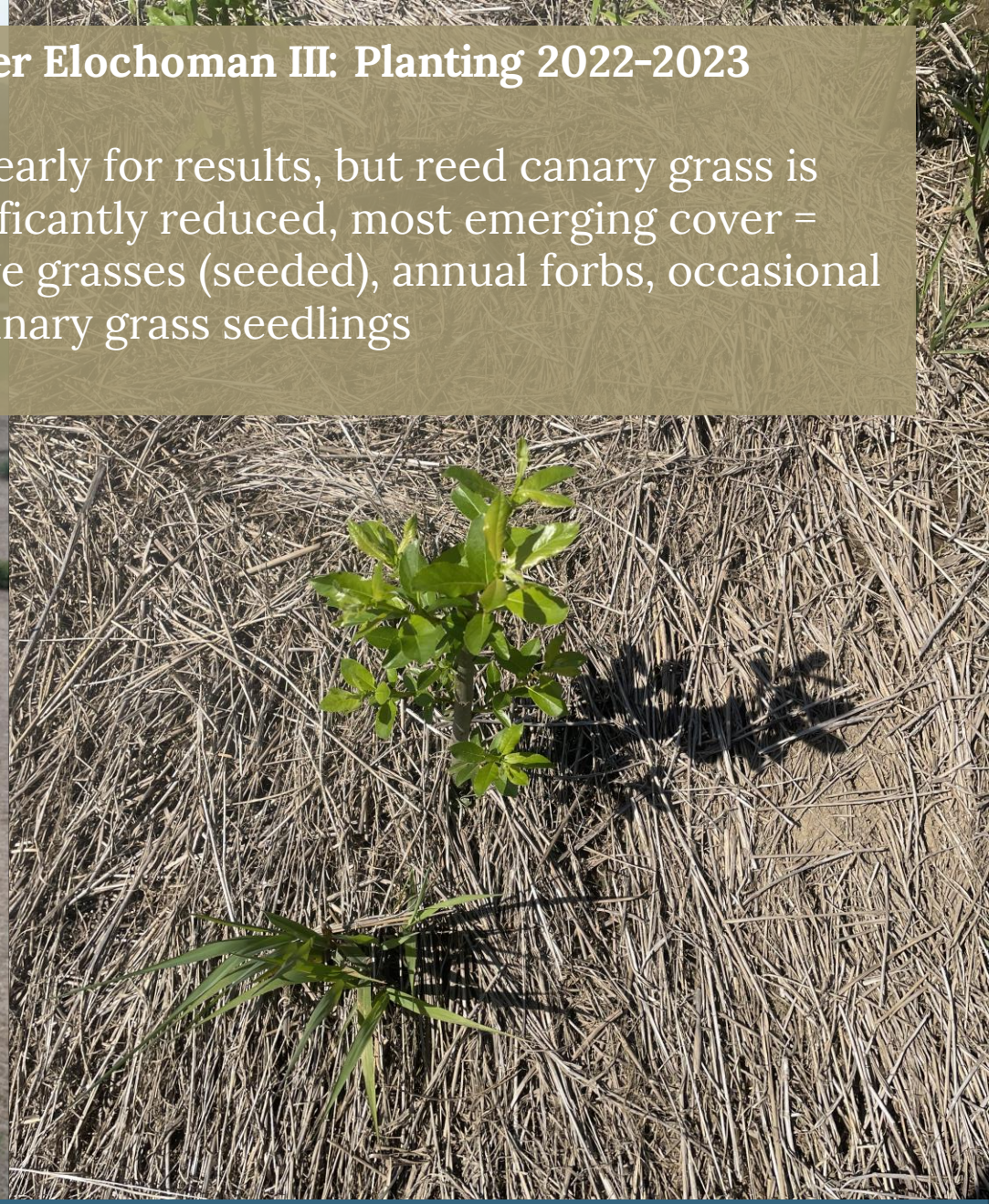
- Surviving trees escaping competition
- Maintenance now minimal or not needed except on infill plantings.

But…

- Large areas of die-off with no native cover, especially in wet areas
- Several years of infill plantings complicates maintenance needs

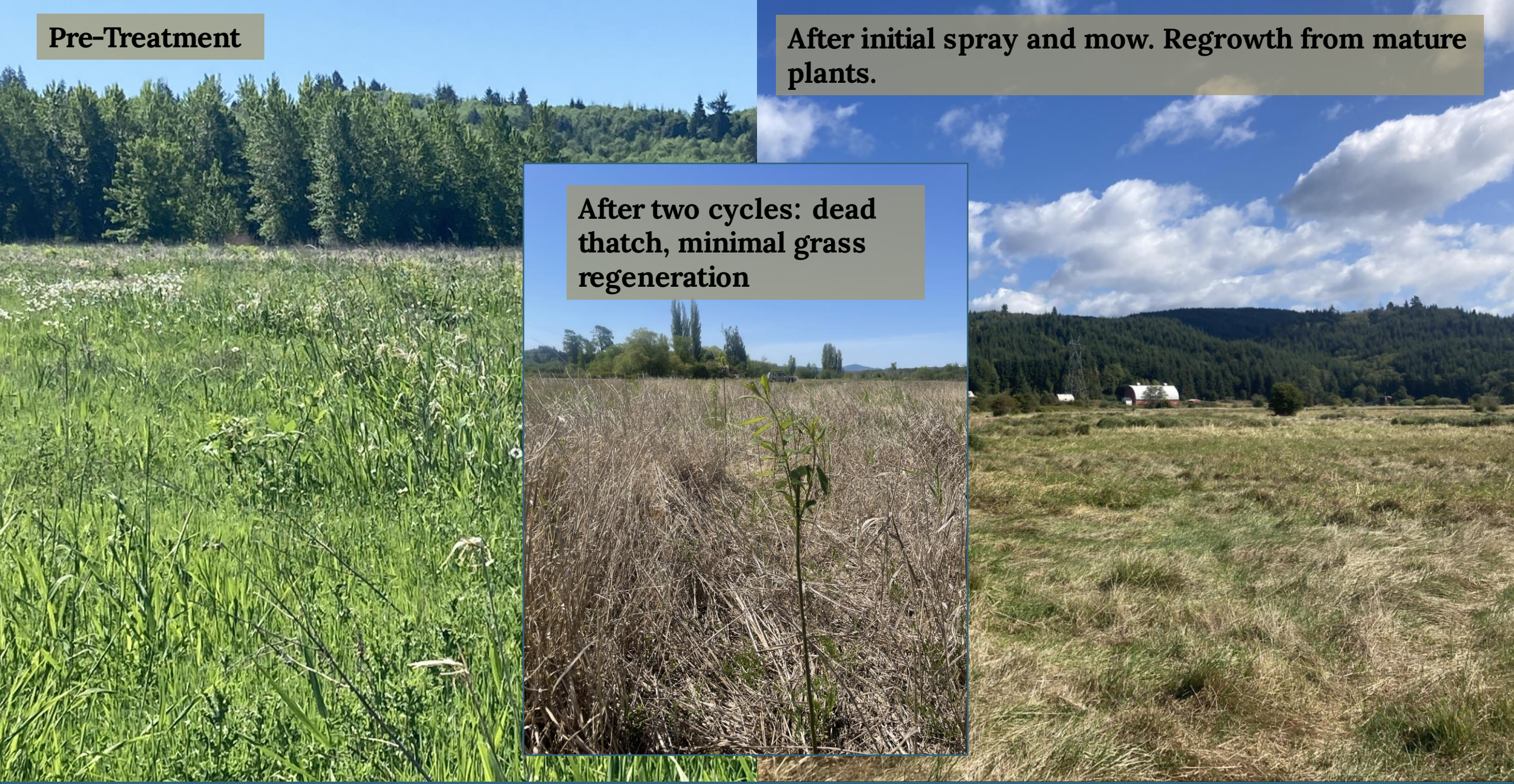
Lower Elochoman III: Planting 2022-2023

Too early for results, but reed canary grass is significantly reduced, most emerging cover = native grasses (seeded), annual forbs, occasional Y1 canary grass seedlings



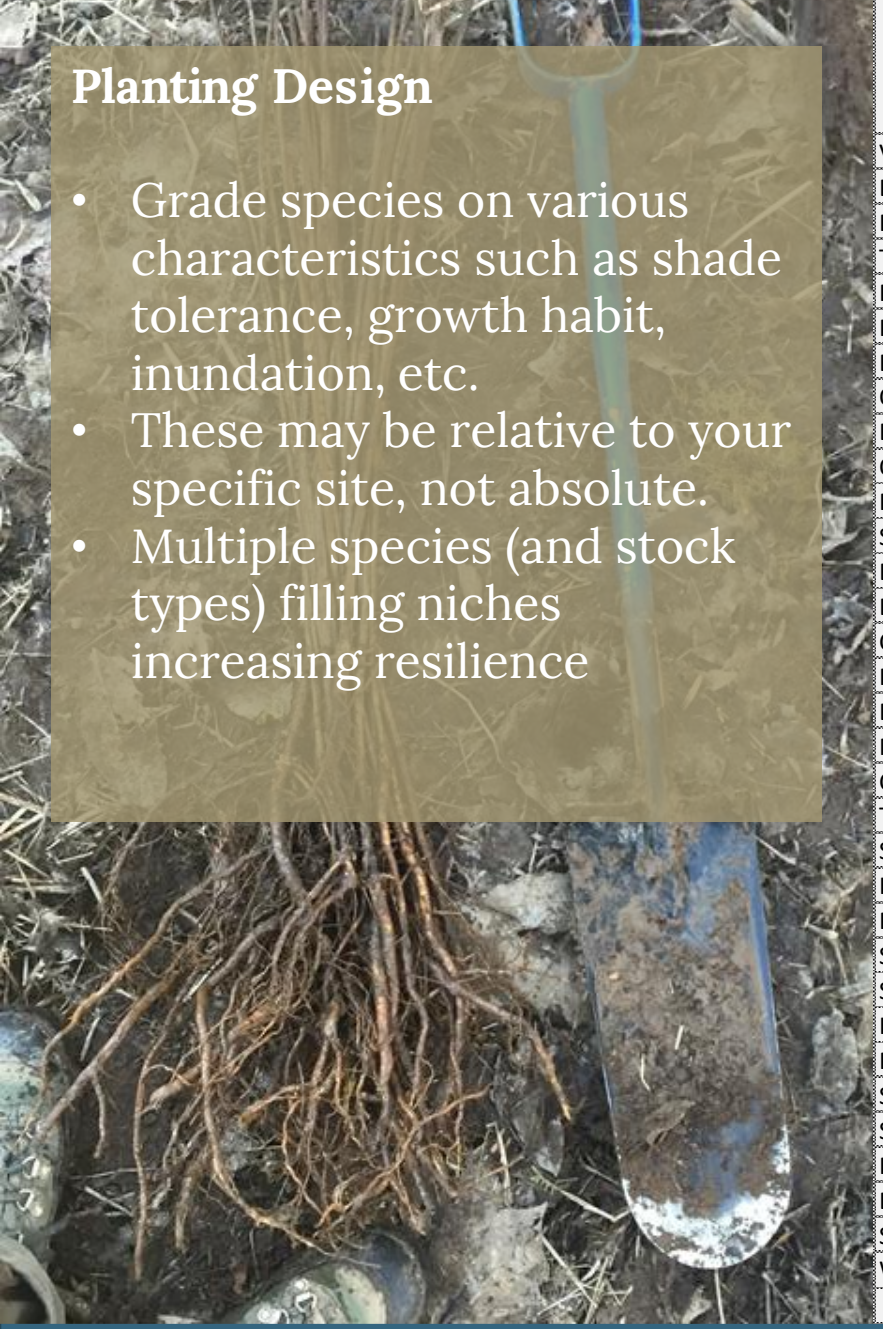
Site preparation for large-scale, modified floodplains and freshwater intertidal zones.

- Reed canary grass control: start early, be adaptive with timing. Some areas experience summer dormancy, others year-round growth.
- Alternate mowing and spraying, give site time to flush seedlings. Chemical fallow.
- Biomass and thatch layer can suppress germination.
- **Economies of scale**. Mechanize where possible. Sites requiring hand work can balloon in cost for limited benefit.
- Choose appropriate herbicides.
- Weeds are **always** easier to control prior to planting.
- Control around remnant native stands can promote vegetative and seedling recruitment – of both herbaceous (e.g., *C. Obnupta*) and woody species


Pre-Treatment
After initial spray and mow. Regrowth from mature plants.
After two cycles: dead thatch, minimal grass regeneration

Seeding

- Native covers can be useful with properly prepared site
- Extensive thatch and flooding can make application timing difficult, especially in intertidal areas.
- Native grasses still compete for moisture and may need to be controlled on some sites for woody planting success.
- Intermediate step – understory forbs and
- Generally not species that will persist in understory
- Once shaded, understory development often occurs naturally, but can be aided by seeding or underplanting.



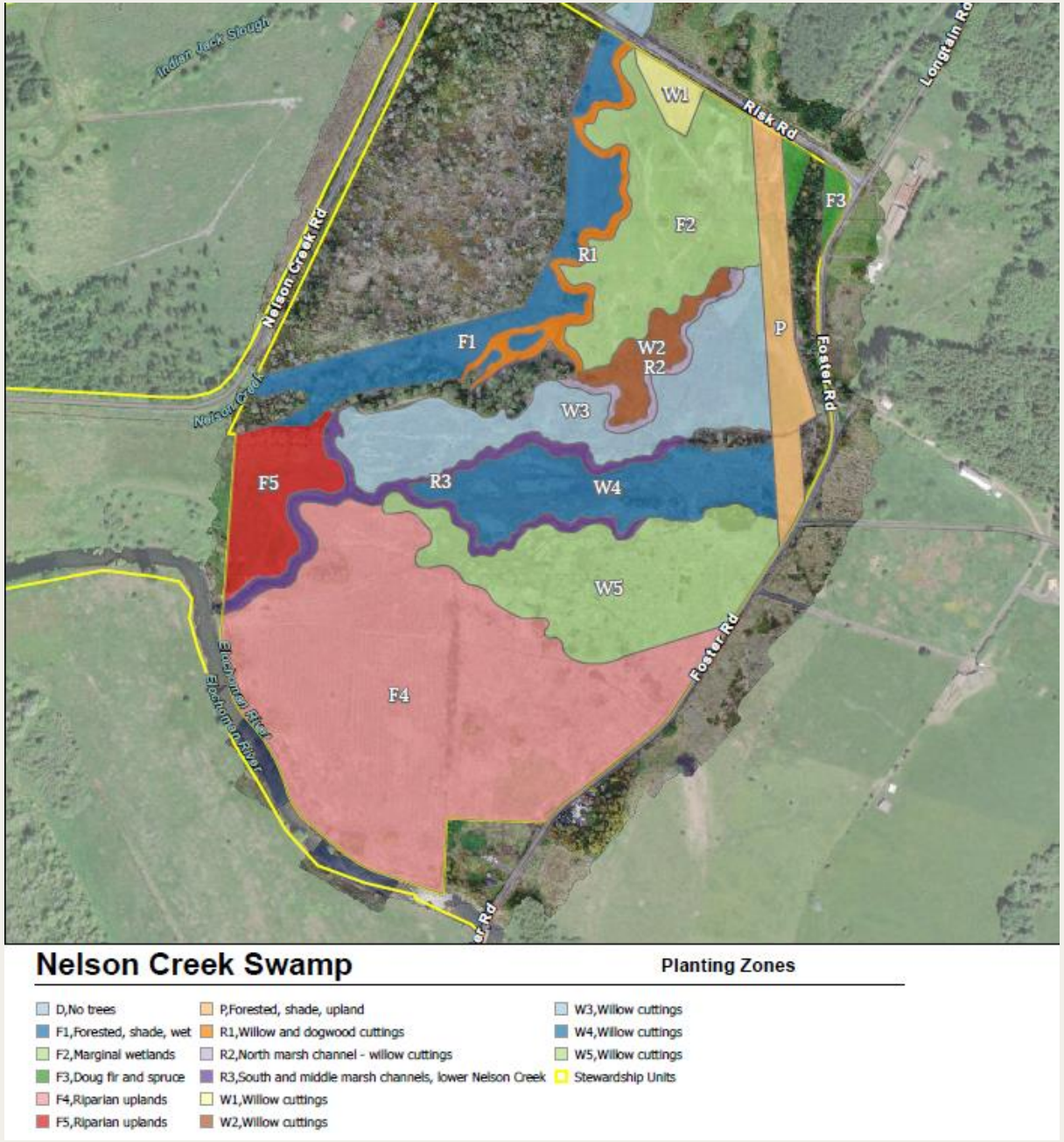
Planting Design

- Grade species on various characteristics such as shade tolerance, growth habit, inundation, etc.
- These may be relative to your specific site, not absolute.
- Multiple species (and stock types) filling niches increasing resilience

	Species	Type	Material	Total (Elochoman II and III)	Shade Tolerance 0-2	Dry to Wet 0-2	Stature (T, ST, S)
Vine Maple	*Acer circinatum*	Tree	BR 12"+	600	2	0	ST
Bigleaf Maple	*Acer macrophyluum*	Tree	BR 12"+	150	1	0	T
Red Alder	*Alnus Rubra*	Tree	BR 12"+	4750	0	1	T
Tall Oregongrape	*Berberis aquifolium*	Shrub	BR 12"+	4800	1	0	ST
Red-osier Dogwood	*Cornus sericea*	Shrub	BR 12"+	4000	2	2	ST
Red-osier Dogwood	*Cornus sericea*	Shrub	Cutting	5200	2	2	ST
Black Hawthorn	*Crataegus douglasii*	Tree	BR 12"+	3100	1	1	ST
Oceanspray	*Holodiscus discolor*	Shrub	BR 12"+	1750	1	0	ST
Black twinberry	*Lonicera involucrata*	Shrub	BR 12"+	6775	0	2	ST
Osoberry	*Oemleria cerasiformis*	Shrub	BR 12"+	3950	2	0	ST
Pacific Ninebark	*Physocarpus capitatus*	Shrub	BR 12"+	10200	2	2	ST
Sitka Spruce	*Picea Sitchensis*	Tree	BR 12"+	20835	2	1	T
Black Cottonwood	*Populus Trichocarpa*	Tree	3'-4' Cutting	5000	0	1	T
Bitter Cherry	*Prunus emarginata*	Tree	BR 12"+	850	1	0	ST
Cascara	*Rhamnus frangula*	Tree	BR 12"+	1700	1	0	ST
Red Flowering Currant	*Ribes sanguineum*	Shrub	BR 12"+	3650	1	0	ST
Baldhip Rose	*Rosa gymnocarpa*	Shrub	BR 12"+	2750	2	1	ST
Nootka Rose	*Rosa nutkana*	Shrub	BR 12"+	6850	0	2	ST
Clustered Rose	*Rosa pisocarpa*	Shrub	BR 12"+	4450	0	2	ST
Thimbleberry	*Rubus parviflorus*	Shrub	BR 12"+	3400	2	0	ST
Salmonberry	*Rubus spectibilis*	Shrub	BR 12"+	5700	2	1	ST
Hooker Willow	*Salix hookeriana*	Large Shrub	c-1 BR	7530	0	2	S
Pacific Willow	*Salix lucida var lasiandra*	Large Shrub	c-1 BR	3895	0	2	ST
Scouler's Willow	*Salix scouleriana*	Large Shrub	c-1 BR	7650	0	2	ST
Sitka Willow	*Salix sitchensis*	Large Shrub	c-1 BR	8550	0	2	S
Hooker Willow	*Salix hookeriana*	Large Shrub	3' Cutting	10150	0	2	S
Pacific Willow	*Salix lucida var lasiandra*	Large Shrub	3' Cutting	15000	0	2	ST
Scouler's Willow	*Salix scouleriana*	Large Shrub	3' Cutting	15600	0	2	ST
Sitka Willow	*Salix sitchensis*	Large Shrub	3' Cutting	21200	0	2	S
Red Elderberry	*Sambucus racemosa*	Shrub	BR 12"+	4950	2	1	S
Douglas Spiraea	*Spiraea douglasii*	Shrub	BR 12"+	17300	0	2	S
Snowberry	*Symphoricarpos albus*	Shrub	BR 12"+	5500	2	1	S
Western Red Cedar	*Thuja Plicata*	Tree	BR 12"+	6750	2	1	T
			TOTAL	**224535**			

Planting Design

- Break large planting areas into smaller zones based on DFC, species selection, target densities, etc.
- Gradually taper species between zones to account for site changes and misestimations of conditions.
- Stock types: bare root generally preferred, but cuttings have a wider range of viable planting times – useful on flooded sites!
- Make maintenance easier – plant in rows, mechanize where possible.
- “Defensible space” – minimizing edge habitat



Maintenance and prevention

- Know your site pressures: beaver, deer, elk, flood, drought. All have different responses.
- Anticipate difficulties in advance. Plan site prep, planting, and maintenance accordingly
- Choose your battles

Beaver predation

- "Bundle" cuttings
- Mix of palatable and unpalatable species

Persistent inundation

- Maintenance will be difficult, plant densely

Dry summers

- Competition release sprays in early growing season. Grass is a moisture hog.

Residual chemical

- Wait before planting
- Imazapyr can be a concern

Elk browse

- Fencing if feasible
- Multi-leader species

Ten years post-planting

- Canarygrass is largely suppressed under fast-growing hardwoods
- Native forbs recruiting
- Longer lived overstory trees continuing to grow in mixed shade
- Conifer-only stands no understory, patches of robust weeds in openings

mosaic ECOLOGY

U.S. FISH & WILDLIFE SERVICE
DEPARTMENT OF THE INTERIOR

CHAMPOEG NURSERY
Native plants of the Inland and Pacific NW

Bonneville POWER ADMINISTRATION

Washington Association of Conservation Districts
Plant Materials Center