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RE Rapid site investigation at Reiner Farm buffer

Background

I completed a rapid assessment of biodiversity in the Reiner Farm buffer on May 20-21. My goals were to 1) begin observation of existing vegetation structure and composition, 2) to be able to compare the Tulalip lands to other sites in the valley, and ultimately, 3) to work toward experimental sites where we can support forest restoration with long-term volunteer education and tending efforts.

Future efforts might involve development of alpha (within patch) and beta (between patch) biodiversity, cultivation of absent species, continued suppression of aggressive introduced species including control of knotweed, restoration of shade-tolerant conifer understory, and cultivation of regenerative harvest opportunities, in combination with community development and education, by either the Tulalip Tribes or their guests.

Methods

Following old roads, animal trails, and other natural pathways I completed a haphazard exploration of the site with a focus on the forested river buffer. I collected a list of all vascular plant species observed. Some features were mapped for reference (Figure 1). We noted areas where canopy gaps coincided with dominance of introduced species that may be appropriate for experiments in native riparian agroforestry. We did not explore the Haskell Slough parcels, nor did we complete an extensive survey of farm field verge which included a variety of Eurasian grasses and forbs from pasture.

Results

We observed 65 vascular plant species, including 48 native species, eight trees, fifteen shrubs, and nineteen forbs. A species list, sorted by plant form and frequency is enclosed (Table 1).

I found eight sites, where historical disturbance and dominance by introduced species presented opportunities for site repair and experimentation with native riparian agroforestry.

In general deer browse appears low. Many plants commonly eaten by deer (such as *Indian plum* or *rose*) didn't show widespread browse. Deer droppings were rare and old. We found no signs of Elk.

We observe an active animal travel path between the river and the westernmost gravel pit (Figure 1; marked B). The trail was bare of annuals, suggesting recent use. One *redcedar* stem was killed by beaver but was covered by moss suggesting the damage occurred several years ago. While beaver have been present, the trail could be maintained by river otter.

Figure 1 - Site Map. Red lines indicate approximate property boundaries, white lines are both existing and historical roads. Green polygons are sites within Tulalip ownership with high potential for experiments in native riparian agroforestry, because of a coincidence of canopy gaps and dominance of introduced species. Blue lines indicated modeled river flood overflow pathways.



Discussion

Among all the patches of vegetation, we observed six recurring patterns in vegetation structure and composition that may suggest different management strategies.

River Verge - lower elevation zones near the active channel have distinct species composition and disturbance regime, both flood damage to stems and new sediment deposition. Many species (*willow*, *spirea*, *butterfly bush*) were only located in these zones. We did not complete a thorough investigation of the river verge species, and expect more wind and water borne

introduced species as well as potential for native wetland species that we did not observe in forested areas.

- **Diverse Forest** - Diverse forests were found with a canopy of mature *cottonwood* and *maple* overstory, with shade tolerant conifer recruitment among a complex understory of *vine maple*, *hazelnut*, *snowberry*, and *fringecup*. Lower elevation areas shifted to *salmonberry* as the dominant shrub. These areas could be protected against *Ivy* and *Holly* colonization, and cultivated for production of propagation stock or judicious harvest of berries and craft materials. Canopy gap harvest could generate saw logs while accelerating recruitment of conifers and creating sun patches to increase understory productivity of berries or other desirable species.
- **Degraded Forest** - Degraded forests were primarily *cottonwood* (commonly 5-9" DBH) with an understory of *Himalayan blackberry*, sometimes with patches *Snowberry* present. These forests present opportunities to restore understory and canopy composition and structure without disturbing existing native vegetation. These present potentially high-value design experiments to restore forest understory biodiversity.
- **Weedy Gaps** - Amidst Diverse Forest and Degraded Forest were occasional large canopy gaps dominated by *Himalayan blackberry*, *reed canarygrass*, or *knotweed*. These patches present opportunities for site repair, and development of shrubland patches of underrepresented species to increase beta diversity, and useful species. Some of these patches are large enough to provide full to part sun, with greater opportunities to introduce uncommon species with higher levels of productivity.
- **Closed Conifer Patches** - We observed a number of closed conifer patches of 15-20 year old plantings likely correspond with initial installations associated with the Long Live the Kings Haskell Slough project completed by Dale Reiner. Canopy closure in these conifer patches has resulted in a barren understory with strong weed control, except for in canopy gaps and edges. Understory composition married, but typically low in biodiversity, and dominated by introduced species. Some species selection could support future monospecific root-gardens (for example for production of basket roots of *spruce* or *cedar*). Gaps may better support species associated with Mor humus and lower nitrogen conditions (following Klinka et al. 1989, such as *sala*, low *oregon grape*, *huckleberry*, *deer fern*, *bunchberry* or *lily*.) It would be useful to observe reference sites of mature conifer forest with similar relative elevations and soils to evaluate these potential reference communities.
- **New Conifer Plantings** - Several areas have had recent high-density conifer plantings. The condition observed in Closed Conifer Patches suggests limited value in increasing understory diversity in new high-density plantings. Ensuring conifers are "free to grow" is the obvious objective on these sites, with canopy closure, stem exclusion, and understory suppression expected. Identifying future canopy gaps by watching for seedling mortality could suggest patch plantings to encourage within patch biodiversity as these stands evolve.
- **Southern Edges** - the East-West orientation of the river and buffers creates large lengths of south-facing forest edges along open fields. These areas have high light intensity, and are frequently dominated by *Rubus armeniacus*. These areas provide

important opportunities for replacing aggressive introduced species with higher fruit and nut production (for example *amelanchier*, *oak*, or if desired introduction of *chestnut* or *walnut*, or experiments in woody floral or craft production). Clearing sun pockets into the *cottonwood* stands would not only increase the area of these higher production sites, but generate *cottonwood* coppice for livestock production (or medicinal harvest).

- **Christmas Forests** - some area of overgrown christmas tree plantings (*Abies nobilis*) have similar understory suppression as Closed Conifer Patches, with good weed control, but the species composition doesn't match desirable forest composition. Evergreen boughs and poles may have value, as these sites are converted into native forest production.
- **Gravel Mine Scars** - three ponds have been formed by shallow gravel mining and the exposure of ground water. Edge vegetation is very limited due to the steep slope of the pond edge excavation. Reconstruction of a pond edge would likely increase wetland and emergent species. At these sites, water level fluctuation may match river level and suggest woody rather than herbaceous plantings. In particular the westernmost scar has a large area of *R. armeniacus*, and full southern exposure, and thus could be modified without impact to diverse forest, and could support unique wetland vegetation.

Future effort could delineate and classify vegetation patches, complete a more thorough investigation of potential agroforestry sites, and in collaboration with Tulalip staff, identify appropriate locations for volunteer restoration field stations. Additional field work at reference sites in the valley (for example Al Borlan Park) will allow us to begin identifying patterns of natural vegetation structure and composition, as affected by soils, hydrology, and river disturbance that can inform biodiversity restoration strategies.

Site Inventory									
Site Name		Reiner Farm Buffer - Tulalip Ownership							
Site Description		Tulalip ownership, forest patches (not field edge)							
Community Description		Where intact, cottonwood (bigleaf maple) / snowberry (vine maple/hazelnut)							
Soils		Varied: Pilchuck loamy sand (50%), Sultan silt loam (27%), Puyallup fine sandy loam (12%),							
Site notes		Survey to establish species inventory. Haphazard transects of forest patches, did not complete full inventory of river verge.							
Code	Presence	Notes	Form	Species	Common	Status	Family	WET	#
POPTRI	1. Dominant		Tree	Populus trichocarpa	Black Cottonwood	NATIVE	Salicaceae		1
ACEMAC	2. Co-Dominant		Tree	Acer macrophyllum	Bigleaf Maple	NATIVE	Aceraceae	FACU	1
PICSIT	4. Common	One old individual, rest planted	Tree	Picea sitchensis	Sitka Spruce	NATIVE	Pinaceae	FAC	1
THUPLI	4. Common	Many old individuals, most planted	Tree	Thuja plicata	Western Redcedar	NATIVE	Cupressaceae	FAC	1
TSUHET	4. Common	Most planted	Tree	Tsuga heterophylla	Western Hemlock	NATIVE	Pinaceae	FACU	1
ABIGRA	5. Uncommon	Most planted	Tree	Abies grandis	Grand Fir	NATIVE	Pinaceae	FACU	1
ALNRUB	5. Uncommon		Tree	Alnus rubra	Red Alder	NATIVE	Betulaceae	FAC	1
CRAMON	6. Rare	Along old levee on west edge	Tree	Crataegus monogyna	English Hawthorne	INTRODUCED	Rosaceae	FAC	1
ILEAQU	6. Rare	Occasional in easternmost	Tree	Ilex aquifolium	Holly	NATIVE	Aquifoliaceae		1
OEMCER	3. Ubiquitous		Shrub	Oemleria cerasiformis	Indian Plum	NATIVE	Rosaceae	FACU	2
RUBARM	3. Ubiquitous		Shrub	Rubus armeniacus	Himalayan blackberry	INTRODUCED	Rosaceae	FAC	2
RUBURS	3. Ubiquitous		Shrub	Rubus ursinus	Evergreen Trailing Blackberry	NATIVE	Rosaceae	FACU	2
SYMALB	3. Ubiquitous		Shrub	Symphoricarpos albus	Snowberry	NATIVE	Caprifoliaceae	FACU	2
ACECIR	4. Common		Shrub	Acer circinatum	Vine Maple	NATIVE	Aceraceae	FAC	2
CORCOR	4. Common		Shrub	Corylus cornuta	Beaked Hazelnut	NATIVE	Betulaceae	FACU	2
RUBPAR	4. Common		Shrub	Rubus parviflorus	Western Thimbleberry	NATIVE	Rosaceae	FACU	2
RUBSPE	4. Common	Low lying areas	Shrub	Rubus spectabilis	Salmonberry	NATIVE	Rosaceae	FAC	2
BUDDAV	5. Uncommon	Along river verge only	Shrub	Buddleja davidii	Butterfly bush	INTRODUCED	Scrophulariaceae	FACU	2
CLEVIT	5. Uncommon	x	Shrub	Clematis vitalba	Traveler's joy	INTRODUCED	Ranunculaceae	FAC	2
CORSER	5. Uncommon		Shrub	Cornus sericea	Redosier Dogwood	NATIVE	Cornaceae		2
CYTSCO	5. Uncommon		Shrub	Cytisus scoparius	Scotch broom	INTRODUCED	Fabaceae		2
HEDHEL	5. Uncommon	Along old levee on west edge	Shrub	Hedera helix	English ivy	INTRODUCED	Araliaceae		2
ROSNUT	5. Uncommon		Shrub	Rosa nutkana	Nootka Rose	NATIVE	Rosaceae	FAC	2
SALSIT	5. Uncommon	Along river verge, perhaps SALHOO	Shrub	Salix sitchensis	Sitka Willow	NATIVE	Salicaceae	FACW	2
SPIDOU	5. Uncommon	Along river verge	Shrub	Spirea douglasii	Hardhack	NATIVE	Rosaceae		2
LONINV	6. Rare		Shrub	Lonicera involucrata	Black Twinberry	NATIVE	Caprifoliaceae	FAC	2
PHYCAP	6. Rare		Shrub	Physocarpus capitatus	Ninebark	NATIVE	Rosaceae	FACW	2
SAMRAC	6. Rare		Shrub	Sambucus racemosa	Coast Red Elderberry	NATIVE	Caprifoliaceae	FACU	2
VACPAR	6. Rare	One individual on stump	Shrub	Vaccinium parvifolium	Red Huckleberry	NATIVE	Ericaceae	FACU	2
DICFOR	3. Ubiquitous		Forb	Dicentra formosa	Bleeding Heart	NATIVE	Fumariaceae	FACU	3
GALAPA	3. Ubiquitous		Forb	Galium aparine	Cleavers	NATIVE	Rubiaceae	FACU	3
GERROB	3. Ubiquitous		Forb	Geranium robertianum	herb robert	INTRODUCED	Geraniaceae	FAC	3
LAPCOM	3. Ubiquitous		Forb	Lapsana communis	Nipplewort	NATIVE	Asteraceae		3
RANREP	3. Ubiquitous		Forb	Ranunculus repens	creeping buttercup	INTRODUCED	Ranunculaceae	FAC	3
RORCUR	3. Ubiquitous		Forb	Rorippa curvisiliqua	Curvepod Yellow Cress	NATIVE	Brassicaceae	OBL	3
TELGRA	3. Ubiquitous		Forb	Tellima grandiflora	Fringecup	NATIVE	Saxifragaceae	FACU	3
GERSP	4. Common		Forb	Geranium spp.	Geranium, introduced	INTRODUCED	Geraniaceae		3
GEUMAC	4. Common		Forb	Geum macrophyllum	Large-leaf Avens	NATIVE	Rosaceae	FAC	3
HYDTEN	4. Common		Forb	Hydrophyllum tenuipes	Pacific Waterleaf	NATIVE	Hydrophyllaceae	FAC	3
PLALAN	4. Common		Forb	Plantago lanceolata	Narrow-leaved Plantain	NATIVE	Plantaginaceae	FACU	3
STACHA	4. Common		Forb	Stachys chamissonis var. cooleyae	coastal hedgenettle	NATIVE	Lamiaceae		3
TANVUL	4. Common	Mostly river verge	Forb	Tanacetum vulgare	common tansy	INTRODUCED	Asteraceae	FACU	3
URTDIO	4. Common		Forb	Urtica dioica	Stinging Nettle	NATIVE	Urticaceae	FAC	3
ANAMAR	5. Uncommon	Along river verge	Forb	Anaphalis margaritacea	Pearly Everlasting	NATIVE	Asteraceae	FACU	3
ARCLAP	5. Uncommon		Forb	Arctium lappa	Greater burdock	INTRODUCED	Asteraceae		3
ARUDIO	5. Uncommon		Forb	Aruncus dioicus	Goats Beard	NATIVE	Rosaceae		3
CERARV	5. Uncommon		Forb	Cerastium arvense	field chickweed	NATIVE	Caryophyllaceae	FACU	3
CIRCAN	5. Uncommon		Forb	Cirsium canadensis	Canadian Thistle	NATIVE	Asteraceae		3
CIRVUL	5. Uncommon	Along river verge	Forb	Cirsium vulgare	bull thistle	INTRODUCED	Asteraceae	FACU	3
DIGPUR	5. Uncommon		Forb	Digitalis purpurea	purple foxglove	INTRODUCED	Scrophulariaceae	FACU	3
HERMAX	5. Uncommon		Forb	Heracleum maximum	Cow Parsnip	NATIVE	Apiaceae		3
HYPPER	5. Uncommon	Railroad area only	Forb	Hypericum perforatum	common St. Johnswort	INTRODUCED	Clusiaceae		3
VICAME	5. Uncommon		Forb	Vicia americana	American Vetch	NATIVE	Fabaceae	FAC	3
LUPSPP	6. Rare	Along river verge only	Forb	Lupinus spp.	Lupine	NATIVE	Fabaceae		3
MARORE	6. Rare	Patch SE of railroad	Forb	Marah oreganus	Coastal manroot	NATIVE	Cucurbitaceae		3
PRUVUL	6. Rare	Old north road	Forb	Prunella vulgaris	Self-heal	NATIVE	Lamiaceae		3
ATHFEL	4. Common		Fern Ally	Athyrium filix-femina	Lady Fern	NATIVE	Polypodiaceae		4
POLGLY	4. Common		Fern Ally	Polypodium glycyrrhiza	Licorice Fern	NATIVE	Polypodiaceae		4
POLMUN	4. Common		Fern Ally	Polystichum munitum	Sword Fern	NATIVE	Polypodiaceae	FACU	4
EQUARV	5. Uncommon		Fern Ally	Equisetum arvense	Common Horsetail	NATIVE	Equisetaceae	FAC	4
PTEAQU	5. Uncommon		Fern Ally	Pteridium aquilinum	Bracken Fern	NATIVE	Polypodiaceae		4
DACGLO	4. Common		Grammanoid	Dactylis glomerata	orchardgrass	INTRODUCED	Poaceae	FACU	5
PHAARU	4. Common		Grammanoid	Phalaris arundinacea	reed canarygrass	INTRODUCED	Poaceae	FACW	5
CARDEW	5. Uncommon		Grammanoid	Carex deweyana	Dewey's Sedge	NATIVE	Cyperaceae		5
TYPLAT	5. Uncommon	Slough only (borrow ponds absent)	Grammanoid	Typha latifolia	broadleaf cattail	INTRODUCED	Typhaceae	OBL	5