

DRAFT FOR DISCUSSION

MEMO 3 February 2023

FROM Paul Cereghino (NOAA Restoration Center)

TO Brett Shattuck, Natasha Coumou, Matt Pouley (Tulalip Tribes)

CC Carrier Brausieck (Snohomish Conservation District)

RE Contribution to Reiner Farm Riparian Stewardship – 2023 Proposal

Background

This memo follows field assessment work in the summer and fall of 2022 (Cereghino, 2022). Using a volunteer framework developed with the Snohomish Conservation District, we aim to bring recurring groups of volunteers to multi-day events on the Reiner Farm riparian zone to test “native riparian agroforestry” practices. These “biocultural restoration field stations” provide an opportunity to do more work, gain a deeper understanding of the Reiner Farm ecosystem, and begin to develop a demonstration site for riparian stewardship.

The purpose of this memo is to define how field station teams, as guests of the Tulalip Tribes, remain transparent and accountable, so their efforts supports tribal interests. Our hope is to establish a “programmatic” approach so we can define in advance the locations and kinds of work we are proposing, and report on progress. This purpose does not reflect a bid for long term access, and we presume that the Tribe has ultimate authority over site management and use, and only ask that tribal staff help guide our activities so that our efforts are not in conflict with their goals.

Methods

I combined walking observations, aerial photographs, and digital elevation models and delineated a preliminary set of stewardship zones along the riparian buffer. Future tribal lands along Haskell Slough were not investigated, except at the Haskell levee. This delineation serves as a “draft for discussion” and to support short term coordination of work on the site (Figure 2).

Vegetation boundaries were sketched along the edges of roads, to capture *de facto* stewardship areas, and polygons thus do not represent actual parcel boundaries. We also delineated untended vegetation in adjacent areas that we expect will remain in Farmland Trust ownership (Figure 2, labeled FT in purple).

Our objective is to increasingly divide the site into “patches”—units of land, appropriately sized for stewardship with hand tools, which have similar conditions based on: 1) soils, 2) solar exposure, 3) canopy structure, 4) flood regime, and 5) dominant ground vegetation. In our draft in figure 2, each patch is labeled with a unique letter and number code. The letter suggests a preliminary classification of patches. The number indicates the specific unit within the class (for example “F3” is forest unit number three). We anticipate that as site assessment continues, a

more refined classification of vegetation patches would be developed—this proposal is thus intended as a “draft for discussion.”

Results

I identified 51 zones covering 104 acres. Of these 75 acres are likely within future Tulalip ownership. Approximately 4.3 acres are under active management, and we have identified 12.9 acres of patches that are either severely degraded woodland or canopy gaps dominated by introduced non-native species—a focus for initial work. This work is preliminary, and continued investigation and delineation of patches will continue to clarify forest conditions. The remaining areas include around 5.6 acres associated with flooded gravel pits and adjacent moist edges and relic or constructed channels. In addition a 2.4 acre river verge has a strong growth of native willow mixed with introduced species. Zones can be viewed in Figure 2. Table 1 describes acreage by patch class, Table 2 provides a discussion of each class relative to stewardship strategy, and Table 3 provides the area of each zone defined in Figure 2.

Discussion

The purpose of this work is to begin to establish a “Riparian Stewardship Plan” that describes proposed management of vegetation, so we can be efficient about doing work on site as volunteer labor becomes available, while remaining accountable to tribal interests and documenting all our work for future stewards. This proposal has three components to support this programmatic approach:

- 1) **Site Assessment** – where we continue to assess and define pieces of the riparian landscape, while providing light touch stewardship.
- 2) **Patch Strategies** – where we present assessments, and define goals and activities for patches of forest to organize field station activities.
- 3) **Treatments** – where we define best practices and experimental practices that can be referenced efficiently as part of patch strategies.

Old Reiner Farm Riparian Stewardship Plan

(version 02/03/2023)

Site Assessment

We anticipate that patch delineation and assessment will continue based on observation of soils, ground vegetation, flood impacts, forest canopy and topography. We will develop, test, and complete patch scale vegetation survey methods, both to inventory vegetation, and to efficiently track change over time.

We anticipate developing standard patch assessment methods by investigating F1-2, and W1-2, a 12.9 acres of degraded and intact forest surrounding Railroad Camp (ST3). Within this area we will define narrow access paths, and begin spot control of blackberry and knotweed. In general, we anticipate observation



Figure 1 - Focus area for ongoing assessment in the vicinity of Railroad Camp (ST3)

Patch Strategies

A patch strategy is a document that provides an assessment synthesis and stewardship vision for each patch, and serves as “cover page” to the field station log associated with each patch (the field station log is a published database being developed to support documentation of field station activities).

ST3 - Railroad Camp (0.9 acres)

Site Assessment – This patch extends from the old railroad trestle on the east, to the forest edge on the west. An existing driveway runs from the farm road, drops down and then gradually rises to a compacted clearing at the river edge, with access to a sandy beach. Pilchuck soils have been confirmed at this site with approximately 18" of soil development over a parent material of medium sand. A layer of 1-3" crushed rock has been found in areas around the railroad trestle, and may define areas historically used for equipment storage, and increases planting effort. There is a heavy presence of knotweed next to and under the railroad trestle with additional patches along the forest edge to west. An old farm road extends downstream providing easy access into adjoining forest and to the gravel pit (GP1).



Figure 2 - Railroad Camp zone (ST3)

Objectives/Treatments – Our goal is to develop this site as a location for staging field station activity, with easy parking off the farm road, a location for a port-potty. We would define and constrain the footprint of the camp to the existing disturbed areas, while controlling invasive species on the forest edge, and increasing the abundance of useful species. We propose the following activities.

1. Identify parking slips along entrance road to provide tree protection.
2. Begin **mow-and-mulch strips** along the entrance road to begin knotweed control.
3. Develop a long-range stewardship plan along the entrance road.

P1 – The Mother Garden (1.13 acres)

This area is a large open canopy patch of blackberry and knotweed adjacent to Railroad Camp (ST3). Some snowberry is present. Pilchuck sandy loam soil has been confirmed. The site is above all but the highest flood elevations, adjacent forest typically supports hazelnut/snowberry understory. Initial effort in fall of 2022 resulted in the beginning of a **mow-and-mulch strip** treatment. Some areas have a thin layer of old coarse crushed rock (likely from historical equipment staging). The site has enough sun to support a patch of shade-intolerant species.



Figure 3 - Mother Garden (P1), located upstream of Railroad Camp (ST3)

Objectives/Treatments

1. Continue **mow-and-mulch strips** within invasive areas, and test killing knotweed roots by desiccation. Aim to eradicate knotweed and blackberry using mow-and-mulch, shading and root starvation.
2. Design and install **diverse strip plantings**, focused on seed, cutting and division production, an alder thicket for mushroom logs, and native forest vegetables for forage.

3. Define a narrow access path and discrete sleeping locations for field station crews staged at Railroad Camp.
4. Design and install **biodiversity islands** into non-native vegetation and gaps along the forest edge to diversity forage opportunities for cuttings, food and materials.

S2 – The Backwater Swale (0.66 ac)

Assessment – This patch follows a low-lying area between the gravel pit (GP1) and the river. Pilchuck soils are presumed, but the gravel pit may indicate an old river bed. The site backwatered with a 17.3 foot flood (Gold Bar gauge). Portions of the site have a dense spruce planting, likely from 200-2003 plantings by Dale Reiner. There are patches of red-twig dogwood, often competing with blackberry for sun. Ground vegetation is generally impoverished, under dense young spruce.

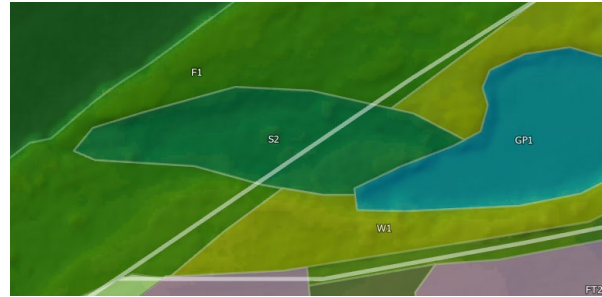


Figure 4 - The Backwater Swale: a low elevation zone between the Gravel Pit (GP1) and a backwater connection to the river.

Objectives/Treatments

1. Limb up spruce to increase light penetration and use boughs to mulch **biodiversity islands** to install suitable understory species (develop a species list through observation of reference sites).
2. Identify areas suitable for sustainable spruce root harvest.
3. Control blackberry, beginning within and around dogwood thickets
4. Develop **shrub cutting beds** to expand and increase density of dogwood stands.

A2 - Old Broom Patch (0.74 acres)

Assessment – this site was cleared of blackberry and scot's broom and received a dense conifer planting in the 2021-22 planting season. Expected mortality may have created canopy gaps. Instead of replanting conifers this creates an opportunity to increase diversity of the planting. The combination of Pilchuck soils and a south facing onto an agricultural field makes this site hot and dry. This may create a good opportunity for establishment of a south forest edge stand of Oregon white oak—acorn production has ethnobotanical value, and unique wildlife values. Located on the trailing edge of a river bend, this site is unlikely to experience bank erosion, and so maximizing conifer bole production for instream logs may not have the highest value.



Figure 5 - The Old Broom Patch, an area recently planted with conifers after control of broom and blackberry.

Objectives/Treatments

1. Assess mortality causing future canopy gaps, and develop planting plan to increase biodiversity using biodiversity islands, likely focused on hot forest edge species, like white oak and Oregon Grape, with planting in the 2023-24 season
2. Design and test temporary irrigation for planting aftercare in the 2024 dry season.

Treatments

To facilitate accountability and transparency we define Treatments that can then be referenced in Patch Strategies using bold text.

Mow-and-Mulch Strips

This strategy is proposed for conversion of pasture or invasive species to native plantings over time. A European scythe with a brush blade can rapidly clear a swath, depositing material into a windrow, but works inefficiently in a dense random planting. Over time, scythe-based management can result in a mowed strip (favoring herbaceous species) and a mulch strip, built and replenished by mowed material; this effect not duplicable using a line trimmer, but can be mimicked with tractor implements at larger scales. This approach results in a roughly 80% reduction of the area under management by spot treatment, and competitive biomass is used to produce a mulched strip. Compared to strips, random planting limits the kind of mowing tools that can be used to control competing vegetation during aftercare. New biomass can be placed on top of the mulch, removing soil contact and ensuring desiccation, supporting onsite disposal of invasive species. The mulch strip increases survival, reduces competition, and further decreases the need for treatment of competing vegetation. Similar methods are discussed as the NRCS Practice of “Alley Cropping” and are central to Syntropic Agroforestry practices developed in Brazil. Strips become natural locations for **diverse strip plantings** and **temporary irrigation**.

Biodiversity Islands

This approach is proposed for introduction one or more species into existing vegetation gaps. Islands are obvious and easy to locate installations simplifying aftercare. Compared to diverse strip plantings, biodiversity islands insert a clump of diverse species into a vegetation gap, either created or found. Organic matter may be collected and processed on site for mulch. Onsite disposal of material may be placed in the location of future biodiversity islands. Species are suited to elevation, soils, and canopy. Islands aim to increase the distribution of species of tribal cultural interest defined in the cultural species list on the Snohomish Salmon Recovery Plan that are absent on the site. Plants installed experimenting with a minimum propagule approach (what is the most cost-effective propagule necessary to achieve reliable establishment: seed, cuttings, bareroot, potted?) Installations are in patches that around marked and easy to relocate. Site preparation may include an off-contour shallow swale to support **temporary irrigation** during aftercare.

Temporary Irrigation

This strategy is used to increase planting survival or allow use of smaller propagation stock. Due to southern exposure and well-drained sand-bedded soils, high planting mortality may occur depending on late spring and summer rains. Given the availability of water, a least-cost one-year irrigation system could dramatically increase survival, increasing efficiency. Deploying such a system would be easier under the episodic visits of the field station model, compared to deployment of contract crews. This system would need to be durable, mobile, and legal. The system would likely be charged with a mobile solar pump and a floating suction line fitted with a fish exclusion cage. Alternately a slower solar pump to a mobile elevated storage could be considered (e.g. IBC tank). A flexible hose would provide distribution through either with [1/2" poly pipe with in-line pressure regulating emitters](#) in standard lengths connected using [1/2" easy loc fittings](#) or to points that support flood irrigation using an off-contour swale (to support **biodiversity island** plantings). A mobile spool would be used to layout and retrieve lines. A system composed of a supply line and emitter runs would be laid out during planting, and retrieved before the following flood season. We would obtain a temporary water withdrawal permit for restoration or utilize existing water rights (TBD).

Shrub Cutting Beds

This strategy is used to enhance and increase the utility of clumps of native shrubs for restoration or cultural use. Many floodplain shrubs easily form roots from stems, and when stems are cut they rapidly re-sprout new stems (willow is the classic example). Long young stems are idea for field propagation using unrooted cuttings. In addition many of these shrubs are valuable for craft purposes, and re-sprouting stems are ideal for basketry. Fire has been used by many tribes to initiate re-sprouting of craft materials at large scales (Anderson 2013). Two methods can be used to initiate re-sprouting: coppice and pollarding. Coppice initiates re-sprouting at the root crown by cutting the shrub approximately 6" from the ground. Pollarding makes heading cuts to stems above ruminant head height, to reduce browse. As part of shrub cutting bed development, cuttings or layering is used to increase the density of root crowns, to increase cutting bed density. Indigenous science likely provides deeper insight into these practices. ([Learn more...](#))

Rhizome/Stolon Division Cultivation

This strategy is used to develop a patch of rhizomatous shrubs for sustained harvest of divisions to support restoration. A variety of species naturally self-propagate using rhizomes (below ground roots) and stolons (above ground trailing stems) (for example: fireweed, salmonberry, thimbleberry, and snowberry). Cutting rhizomes with a sharp spade may increase ramet density (the above ground shoots from an underground rhizome). These shoots can be excavated during dormancy, resulting in a shoot and root fragment that can be out-planted immediately, or used as nursery production stock.

Diverse Strip Plantings

This strategy is used to maximize production and planting diversity within an easily managed installation. Inspired by methods like syntropic agroforestry, diverse strip plantings aim to rapidly develop soils, vegetative cover, and short term harvest in an agroforestry planting by planting a mixture of early and late succession species with diverse structure in close proximity. Pruning can be used to guide succession, replenish mulch, and maximize productivity. This may provide more rapid returns than with a single long-term agroforestry crop, where there may be no return on investment for a decade. Diverse strip plantings may follow ***mow-and-mulch strips*** (above) to reduce the area that must be managed by hand, and to focus plantings into a single easy to locate strip of mulch and vegetation, increasing ease of maintenance and out-planting survival.

Citations

Cereghino, P. 2022. [Memo: Rapid site investigation at Reiner Farm buffer](#). 10 June 2022. Prepared by NOAA Restoration Center, Lacey, WA. Prepared for Tulalip Tribes of Washington. 5pp.

Anderson, K., 2005. Tending the wild: Native American knowledge and the management of California's natural resources. Univ of California Press.

Tables and Figures

Table 1 – Summary of area by patch class.

Classes correspond to areas discussed in table 2, and mapped in Figure 2.

Patch Class	Acres
Active Site	4.33
Degraded Woodland	6.22
Farmland Trust	25.08
Forest	50.40
Forested Swale	3.21
Gravel Pit	2.44
Meadow	0.89
Old Tree Farm	0.21
River Verge	2.39
Staging	2.37
Weedy Patch	6.68
Grand Total	104.22

Table 2 - Classification and discussion of zones. The following draft classification of zones is offered as draft for discussion based on initial site investigation.

Current Zonation - letter code corresponds to Figure 1	Assessment	Potential Site Goals
Intact Forest (F) - areas with established mixed canopy, and	Intact forest. Well drained soil series. hazelnut/snowberry typical. Some areas	Eradicate knotweed. Diminish blackberry as part of tending. Observe patterns of

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relatively diverse understory	have high-density understory conifer installations following 2002 plantings. Canopy structure and composition drives opportunities.	species useful for revegetation and foraging. At selected sites, coppice, root prune and layer patches for continuous production of divisions and cuttings. Assess missing species, and develop biodiversity restoration strategy for species reintroduction. Develop
Degraded Woodland (W) - Sections with native forest or woodland canopy, but where native understory is general absent or severely degraded.	Typically blackberry under cottonwood. Opportunity to install understory with some shade present.	As with weedy patches, experiment with alleycropping systems (scythe mowed strips
Weedy Patches (P) - Areas in gaps in the forest canopy, dominated by introduced species	Typically knotweed/blackberry/RCG dominated. Sometimes snowberry present. Variable soils and moisture.	Experiment with alley cropping systems (mow alleys to establish mulch strips) and carbohydrate exhaustion, to establish desirable canopy gap species (amalachier/salmonberry with nettle understory; or as appropriate for context)
Swales (S) - lower elevation areas sometimes with backwater river connection, supporting moisture loving vegetation	Typically under canopy. Variable canopy density. Natural vegetation salmonberry/dogwood typical. Blackberry strong. Some	Reduce blackberry and enhance moisture loving shrub abundance. Experiment in patches to increase stand density leading to coppice management for cuttings and divisions. Limb up spruce/cedar to increase light penetration and for future bark production. Introduce high value understory diversity (nettle, etc).
River Verge (V) - Areas frequently flooded on the edge of the active river channel (no code)	High risk of disturbance, active burial, support moisture loving species, introduced species input.	willow/twinberry/ninebark cutting production. Increase native shrub density, and prevent knotweed/butterfly bush establishment.
Gravel Pits (GP) - Two sites with standing water in old gravel pits.	Excavation resulted in steep side wall, with no transition zone to support emergent	Develop design using heavy equipment and cut/fill edge to enhance wetland

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	vegetation (willow, cattail, bullrush).	functions and remove blackberry.
Active Sites (A) - Three areas are being chemically cleared of competing vegetation and installed with dense conifer forestry plantings.	Bare ground and vacant niches following spray. Survival pattern results in canopy closure/understory suppression. In some stands, rapid stem growth and tree health may benefit from thinning.	Establish biodiverse patches in canopy gaps. Prevent reestablishment of blackberry or knotweed. Experiment with seed-based biodiversity enhancement.
Meadow Sites - Area in full sun with no native canopy, dominated by pasture species.	A small area	
Southern Forest Edge - All areas with strong south facing sun exposure. (not delineated.)	The east-west buffer orientation leaves extensive southern edge with high light levels, and typically dominated by introduced species.	
Old Tree Farm (OTF)	An area planted with noble fir has grown past marketable age. Noble fir canopy may be prone to disease and insect over time..	Limb up and underplant with desirable forest species. Harvest boughs for seasonal income. Harvest logs for field station infrastructure or restoration projects over time.

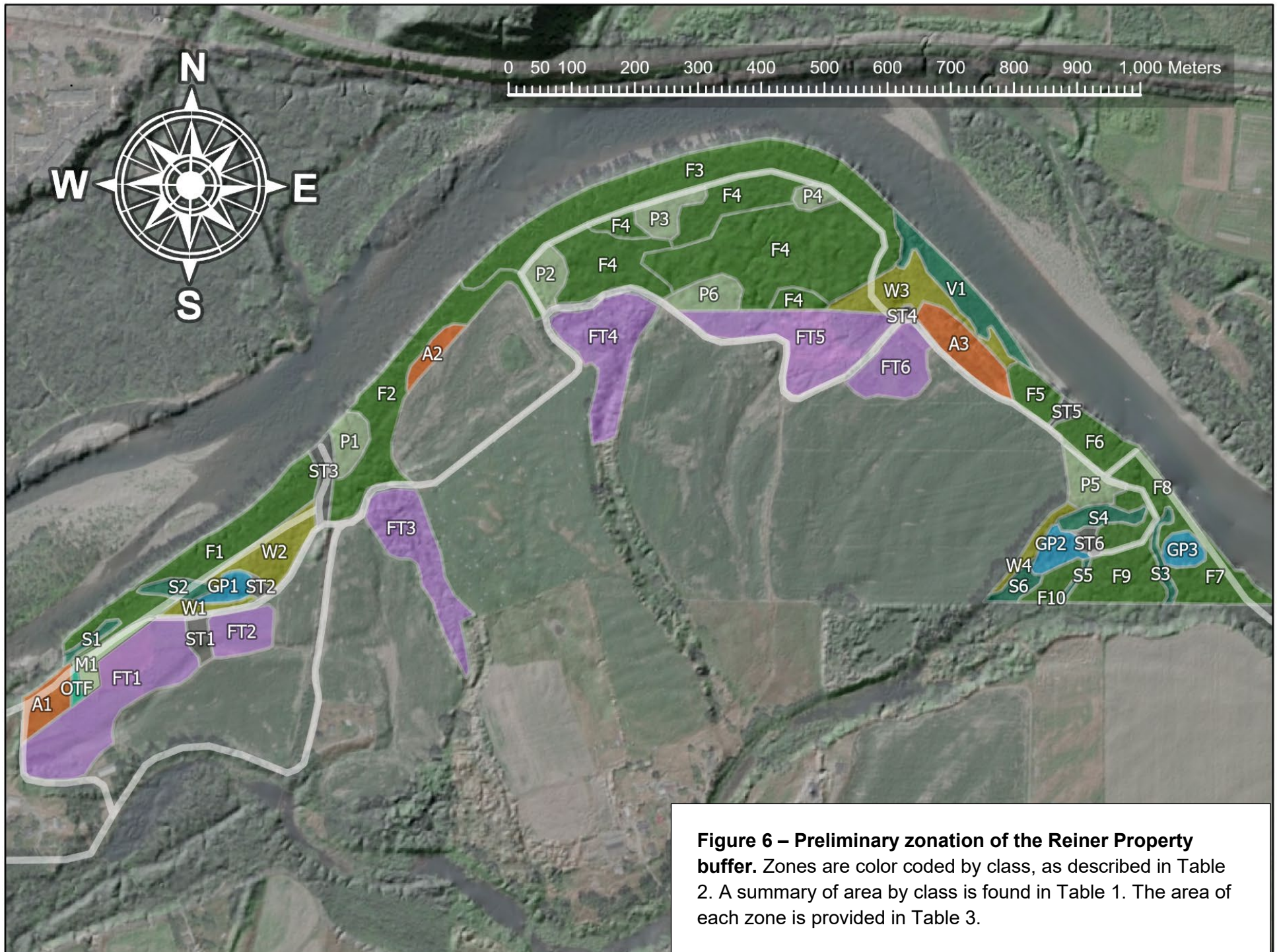


Figure 6 – Preliminary zonation of the Reiner Property buffer. Zones are color coded by class, as described in Table 2. A summary of area by class is found in Table 1. The area of each zone is provided in Table 3.

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Table 3 – Zone area. All zones mapped in figure 6 are described with their area in US Acres.

Code	Type	Acres
A1	Active Site	1.38
A2	Active Site	0.74
A3	Active Site	2.22
F1	Forest	5.60
F2	Forest	5.62
F3	Forest	9.79
F4	Forest	3.69
F4	Forest	0.64
F4	Forest	9.97
F4	Forest	0.61
F4	Forest	2.72
F5	Forest	1.22
F6	Forest	1.68
F7	Forest	4.13
F8	Forest	1.20
F9	Forest	2.69
F10	Forest	0.82
FT1	Farmland Trust	7.02
FT2	Farmland Trust	1.70
FT3	Farmland Trust	3.91
FT4	Farmland Trust	4.49
FT5	Farmland Trust	5.47
FT6	Farmland Trust	2.48
GP1	Gravel Pit	0.69
GP2	Gravel Pit	1.00
GP3	Gravel Pit	0.75
M1	Meadow	0.89
OTF	Old Tree Farm	0.21

P1	Weedy Patch	1.13
P2	Weedy Patch	1.17
P3	Weedy Patch	1.19
P4	Weedy Patch	0.55
P5	Weedy Patch	1.35
P6	Weedy Patch	1.29
S1	Forested Swale	0.33
S2	Forested Swale	0.66
S3	Forested Swale	0.51
S4	Forested Swale	0.93
S5	Forested Swale	0.16
S6	Forested Swale	0.62
ST1	Staging	0.56
ST2	Staging	0.19
ST3	Staging	0.90
ST4	Staging	0.10
ST5	Staging	0.27
ST6	Staging	0.35
V1	River Verge	2.39
W1	Degraded Woodland	0.51
W2	Degraded Woodland	2.16
W3	Degraded Woodland	2.87
W4	Degraded Woodland	0.67