

Schaake Habitat Improvement Project

Yakima River Basin Water Enhancement Project



Katherine Fitch, Restoration Ecologist

2026 Eastern Washington Riparian Restoration Symposium
Wenatchee, WA

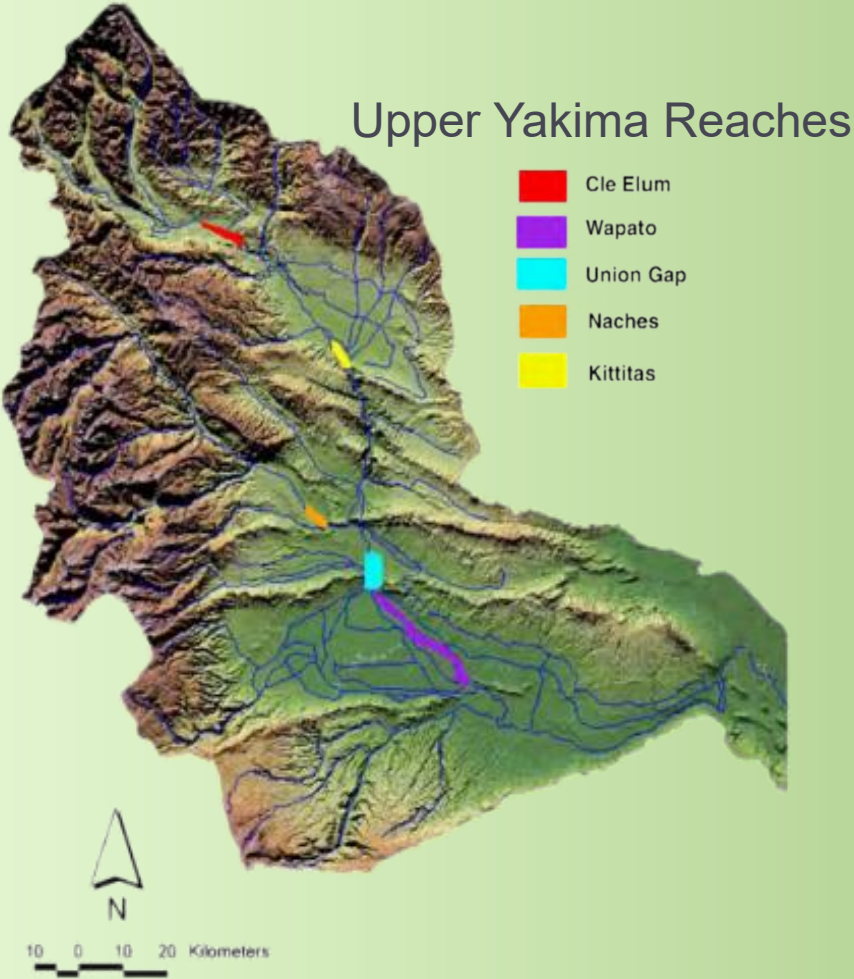


— BUREAU OF —
RECLAMATION

Outline

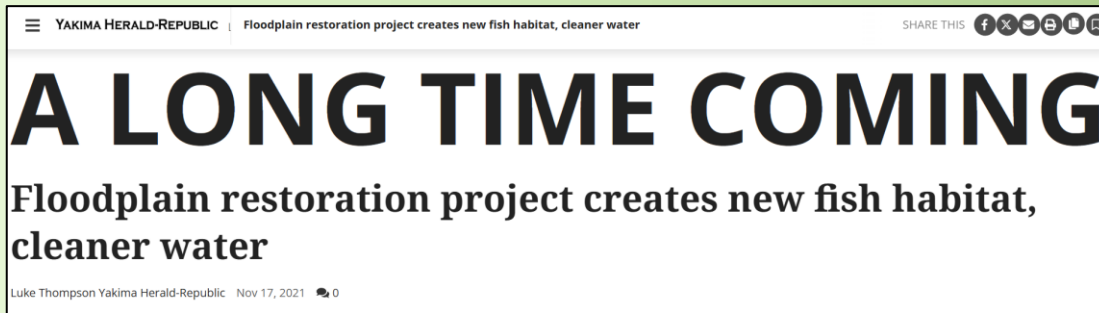
- Project Background
- Methodology and Implementation
- Hits and Misses

Project Location



Project Background

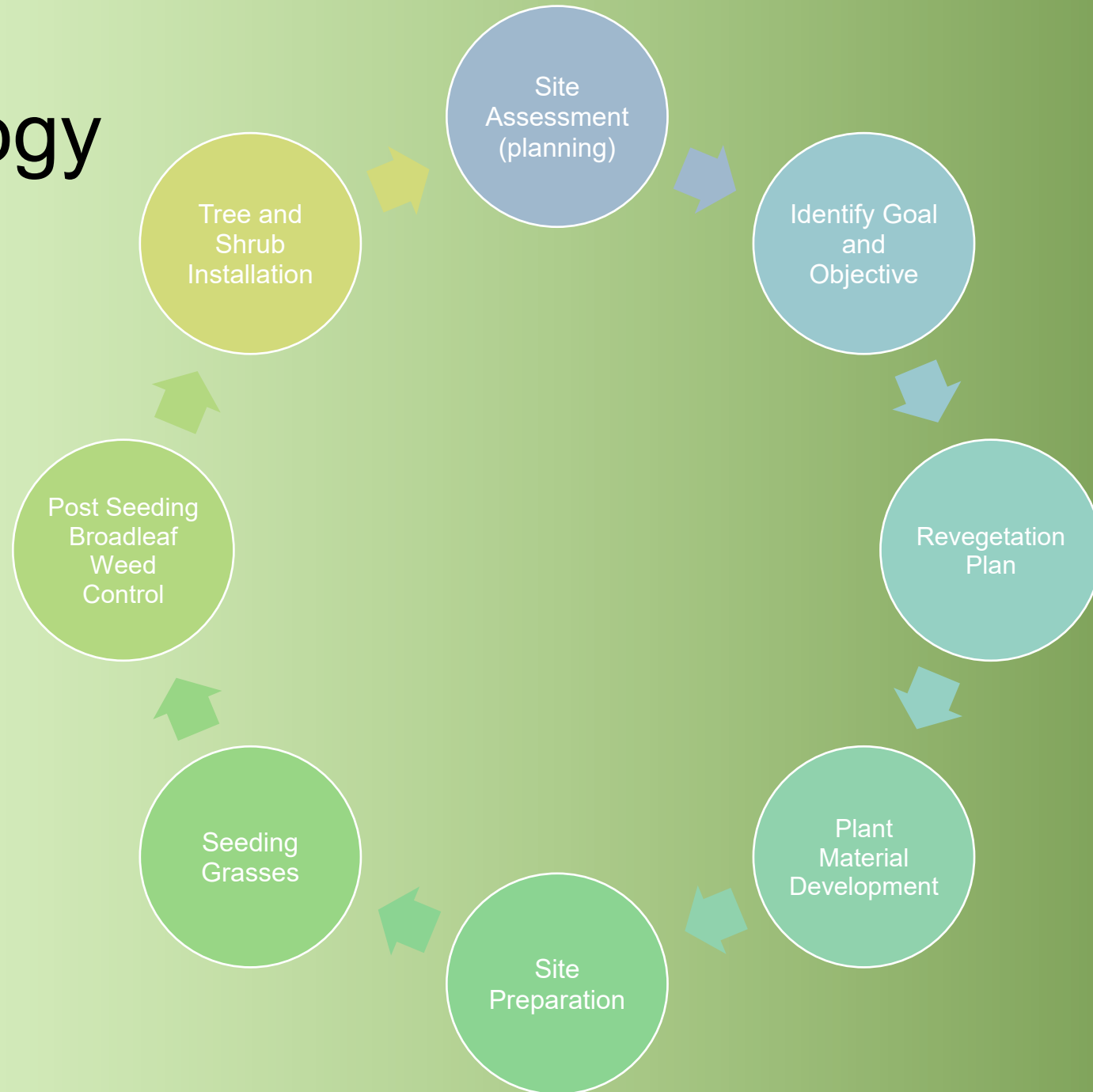
Yakima River Basin Water Enhancement Project



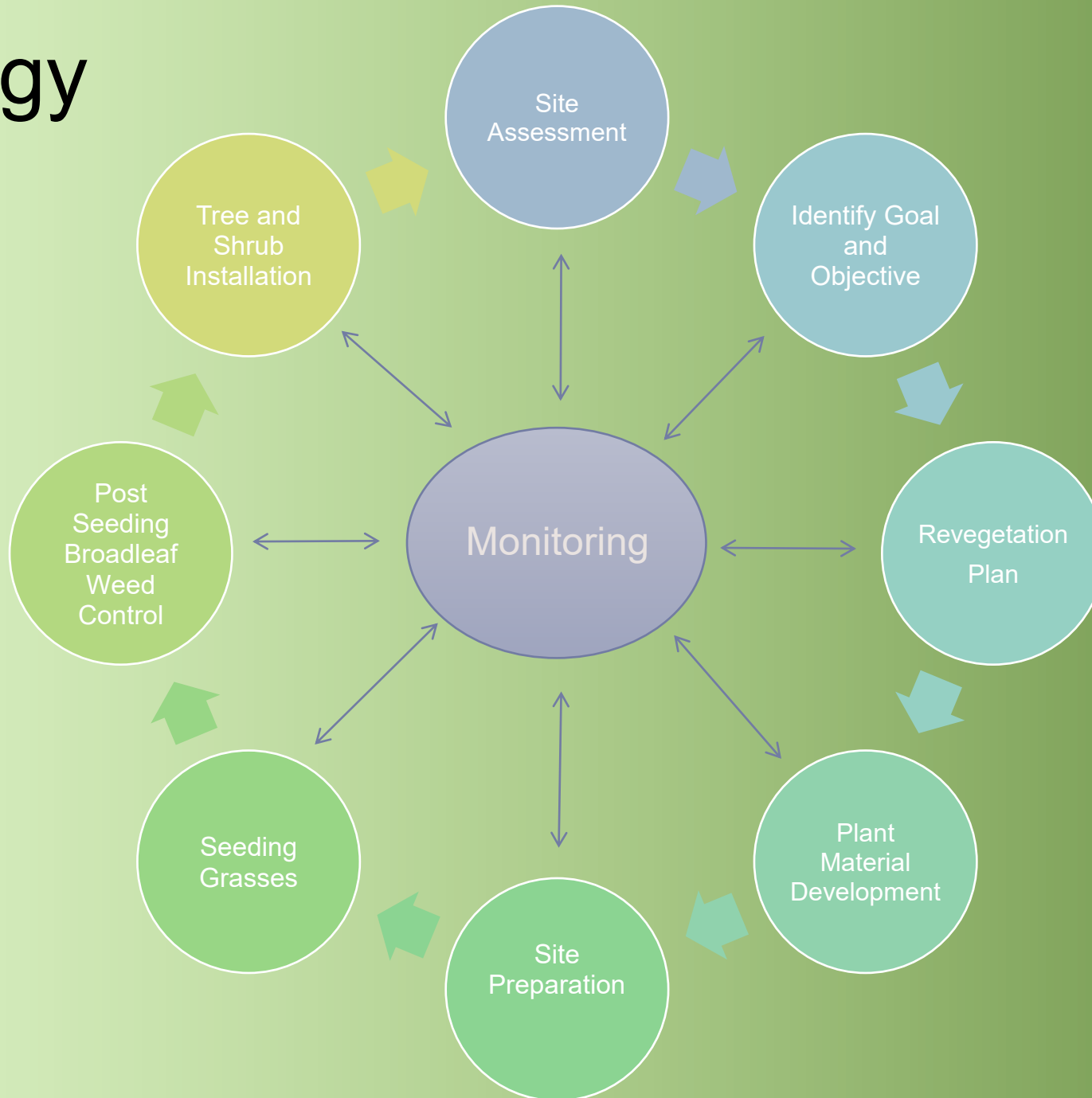
- Reclamation purchased the 280 acre property in 2003
- 155 acres slated for revegetation
- Site Assessment and Revegetation Plan 2018-2019
- Construction took place in 2019-2021
- Implementation of revegetation 2019-present



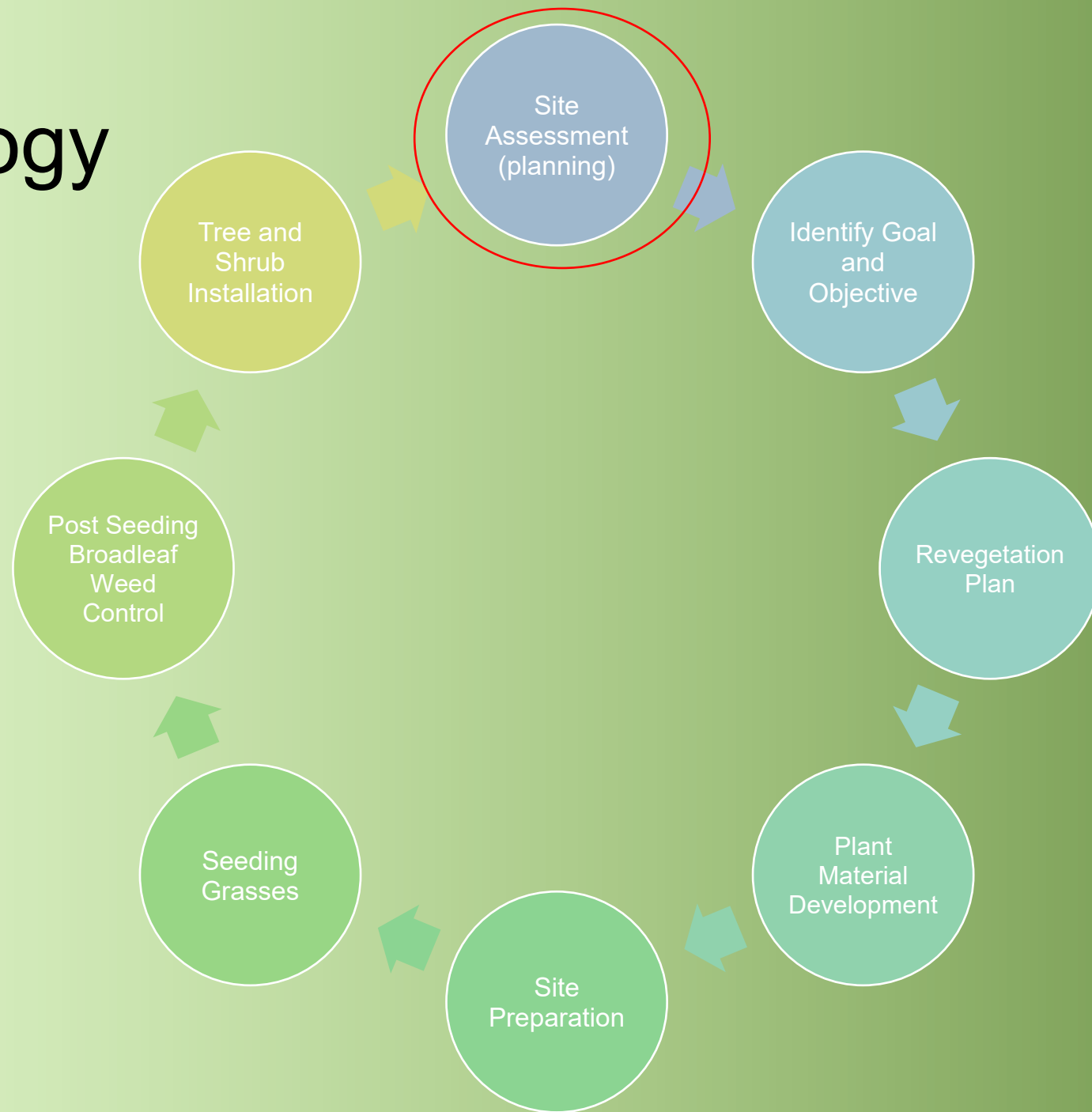
Methodology



Methodology



Methodology



Site Assessment

- Site History
- Soils
- Vegetation
- Hydrology

Site History

Site
Assessment

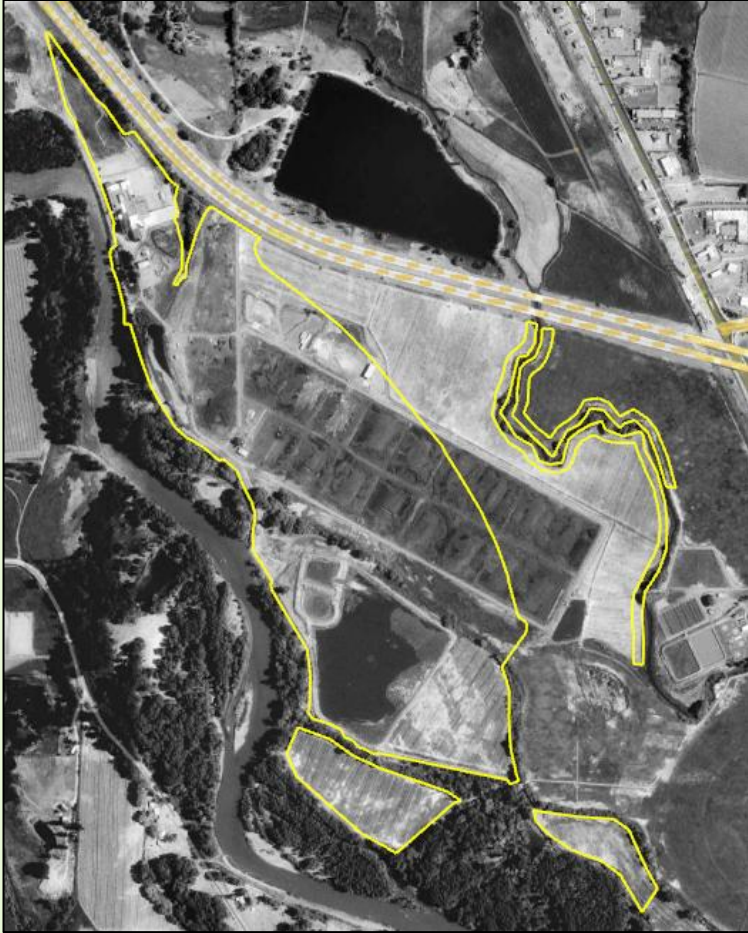


Schaake Feeders, LLC



1984

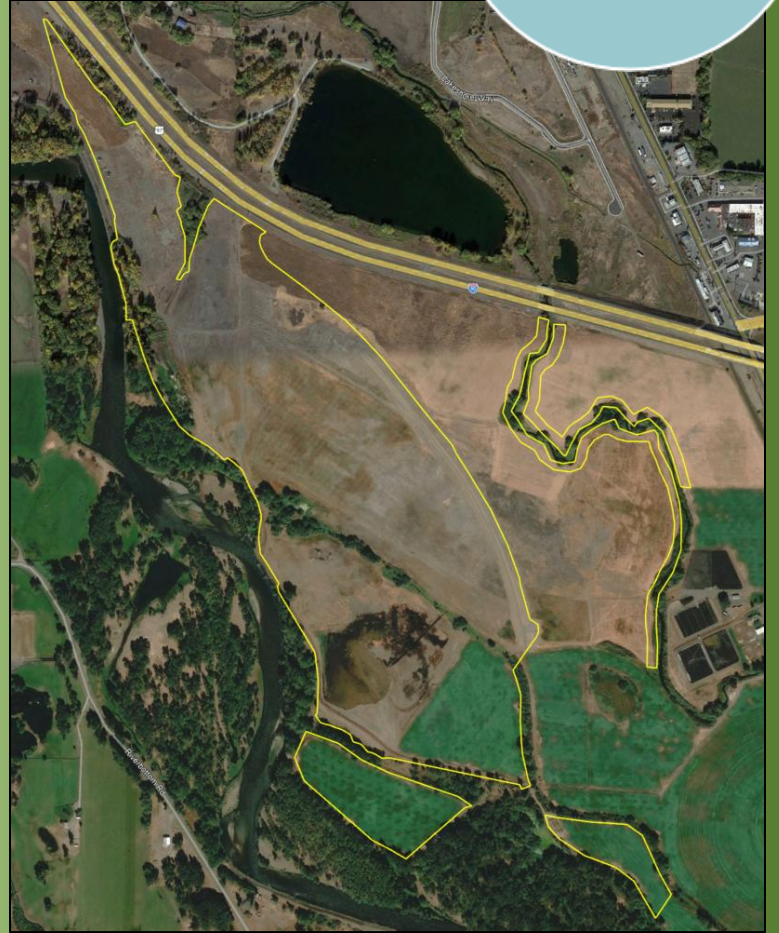
Site Assessment



2000



2003



2018

Soils

- Excessive Nutrients
- Hazardous Waste
- Compaction
- Robust Weed Seed Bank



			Low	Medium	High
Nitrogen	340	lbs/acre	[Bar chart showing Nitrogen level between Low and Medium]		
Phosphorus	107	mg/kg	[Bar chart showing Phosphorus level between High and beyond]		
Potassium	1582	mg/kg	[Bar chart showing Potassium level between High and beyond]		
Sulfur	28	mg/kg	[Bar chart showing Sulfur level between Low and Medium]		
Boron	0.85	mg/kg	[Bar chart showing Boron level between Low and Medium]		
Zinc	4.6	mg/kg	[Bar chart showing Zinc level between High and beyond]		
Manganese	6.1	mg/kg	[Bar chart showing Manganese level between High and beyond]		



Existing Vegetation

Vegetation within the project site was characterized primarily as weedy.

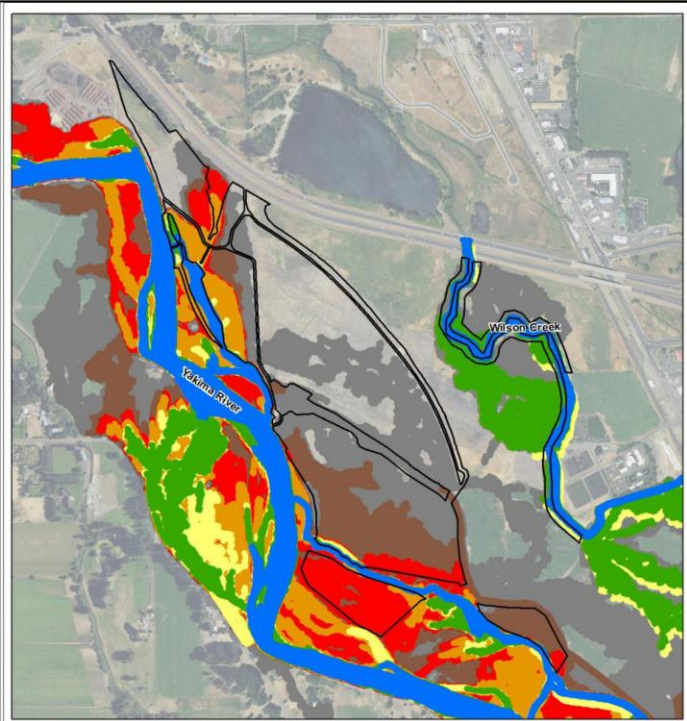
Of the 118 species recorded, 57 (48%) were non-native.

Of the 57 non-native species observed within the project site, 18 were listed as noxious weeds.

Taxonomic Name	Common Name	Taxonomic Name	Common Name
<i>Achillea millefolium</i>	yarrow	<i>Juncus balticus</i>	baltic rush
<i>Agropyron cristatum*</i>	crested wheat-grass	<i>Juncus ensifolius</i>	daggerleaf rush
<i>Agrostis stolonifera</i>	bent grass	<i>Lactuca serriola*</i>	prickly lettuce
<i>Alisma triviale</i>	water-plantain	<i>Lepidium draba*</i>	hoary cress
<i>Ahus incana</i>	mountain alder	<i>Lepidium latifolium**</i>	perennial pepperweed
<i>Alopecurus pratensis*</i>	meadow foxtail	<i>Leucanthemum vulgare**</i>	oxeye daisy
<i>Amalanchier alnifolia</i>	serviceberry	<i>Leymus cinereus</i>	great basin wildrye
<i>Amaranthus albus*</i>	white pigweed	<i>Linaria dalmatica**</i>	dalmation toadflax
<i>Amaranthus blitoides</i>	prostrate pigweed	<i>Lythrum salicaria**</i>	purple loosestrife
<i>Amaranthus retroflexus*</i>	redroot pigweed	<i>Malva neglecta*</i>	dwarf mallow
<i>Amsinckia biolor</i>	biolor fiddle-neck	<i>Medicago lupulina</i>	black medic
<i>Amsinckia menziesii</i>	Menzies fiddle-neck	<i>Medicago sativa</i>	white sweet-clover
<i>Angelica arvensis</i>	sharp-tooth angelica	<i>Mentha canadensis</i>	field mint
<i>Anthemis cotula*</i>	dog fennel	<i>Panicum capillare*</i>	witchgrass
<i>Apocynum androsaemifolium</i>	dogbane	<i>Persicaria lapathifolia</i>	smartweed
<i>Arctium minus*</i>	common burdock	<i>Phacelia hastata</i>	white-leaf phacelia
<i>Artemisia absinthium**</i>	wormwood	<i>Phalaris arundinacea***</i>	reed canarygrass
<i>Artemisia ludoviciana</i>	Western mugwort	<i>Philadelphus lewisii</i>	mock orange
<i>Asclepias speciosa</i>	showy milkweed	<i>Pinus ponderosa</i>	ponderosa pine
<i>Asparagus officinalis*</i>	asparagus	<i>Plantago lanceolata*</i>	English plantain
<i>Asarum procumbens*</i>	cat-weed	<i>Plantago major*</i>	common plantain
<i>Aster multiflorus*</i>	wild oat	<i>Plectritis macrocera</i>	white plectritis
<i>Bassia scoparia**</i>	kochia	<i>Poa bulbosa*</i>	bulbous bluegrass
<i>Barbarea orthoceras</i>	American wintercress	<i>Poa pratensis*</i>	Kentucky bluegrass
<i>Bromus tectorum*</i>	cheatgrass	<i>Polygonum aviculare*</i>	prostrate knotweed
<i>Capsella bursa-pastoris*</i>	shepherd's-purse	<i>Populus balsamifera ssp. trichocarpa</i>	black cottonwood
<i>Carex amplifolia</i>	large-leaf sedge	<i>Populus tremuloides</i>	quaking aspen
<i>Centaurea diffusa**</i>	diffuse knapweed	<i>Prunus emarginata</i>	bitter cherry
<i>Ceratocephala testiculata*</i>	hornseed buttercup	<i>Prunus virginiana</i>	chokecherry
<i>Chenopodium album*</i>	pigweed	<i>Pseudoroegneria spicata</i>	bluebunch wheatgrass
<i>Cichorium intybus*</i>	chicory	<i>Pseudotsuga menziesii</i>	Douglas fir
<i>Cirsium arvense**</i>	Canada thistle	<i>Ranunculus sceleratus</i>	blister buttercup
<i>Cirsium vulgare**</i>	bull thistle	<i>Ribes aureum</i>	golden currant
<i>Cnicus altissimus*</i>	giant thistle	<i>Rosa blanda</i>	holboell rose
<i>Cnicus latifolius*</i>	Canada thistle	<i>Rumex crispus*</i>	curly dock
<i>Collinsia parviflora</i>	blue eyed Mary	<i>Salix exigua</i>	coyote willow
<i>Collomia grandiflora</i>	large flowered collomia	<i>Salix fragilis*</i>	crack willow
<i>Conium maculatum**</i>	poison hemlock	<i>Salix lasiandra</i>	pacific willow
<i>Convolvulus arvensis**</i>	field morning-glory	<i>Salix prolixa</i>	Mackenzie willow
<i>Conyza canadensis</i>	Horseweed	<i>Salsola tragus**</i>	Russian thistle
<i>Cornus sericea</i>	red-osier dogwood	<i>Sambucus cerulea</i>	blue elderberry
<i>Crataegus douglassii</i>	Douglas' hawthorne	<i>Sambucus racemosa</i>	black elderberry
<i>Crataegus spicata</i>	spiny hawthorne	<i>Sisymbrium officinalis*</i>	yellow mustard
<i>Croton glandulosus</i>	glandular croton	<i>Sisymbrium irio</i>	white mustard
<i>Cyperus tenuiflorus</i>	slender hairgrass	<i>Sisymbrium altissimum*</i>	Jim Hill mustard
<i>Deschampsia elongata</i>	slender hairgrass	<i>Solanum dulcamara*</i>	climbing nightshade
<i>Descurainia pinnata</i>	western tansymustard	<i>Sonchum oleraceum</i>	lactuca
<i>Desmodium illinoense</i>	illinois desmodium	<i>Sonchum spaldingii</i>	spalding's dandelion
<i>Echinochloa crus-galli*</i>	barnyard-grass	<i>Symphoricarpos albus</i>	snowberry
<i>Eleocharis palustris</i>	common spikerush	<i>Symphytotrichum chilense</i>	Pacific aster
<i>Elymus elymoides</i>	squirrel tail	<i>Tanacetum vulgare**</i>	common tansy
<i>Elymus glaucus</i>	blue wildrye	<i>Taraxacum officinale*</i>	common dandelion
<i>Elymus repens*</i>	quack grass	<i>Tragopogon dubius*</i>	oysterplant
<i>Epilobium brachycarpum</i>	tall annual willowherb	<i>Trifolium repens*</i>	white clover
<i>Erodium cicutarium*</i>	stork's bill	<i>Typha latifolia</i>	common cattail
<i>Galium aparine</i>	cleavers	<i>Urtica dioica</i>	stinging nettle
<i>Glyceria elata</i>	tall mannagrass	<i>Verbascum thapsus*</i>	mullein
<i>Heraclium maximum</i>	cow parsnip	<i>Veronica americana</i>	American brooklime
<i>Hordeum jubatum</i>	foxtail barley		

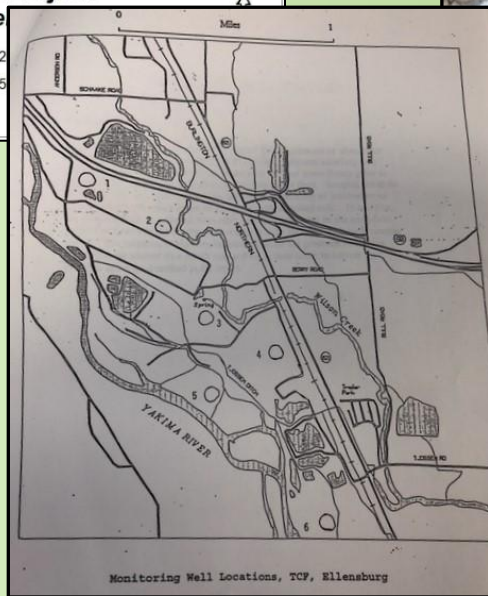
Hydrology

Site Assessment



Schaake Habitat Improvement Project
90% Engineering Design Flood Model

- Re-vegetation Area
- Annual Summer Flow
- 1.5-Year Flood
- 2-Year Flood
- 5-Year Flood
- 10-Year Flood

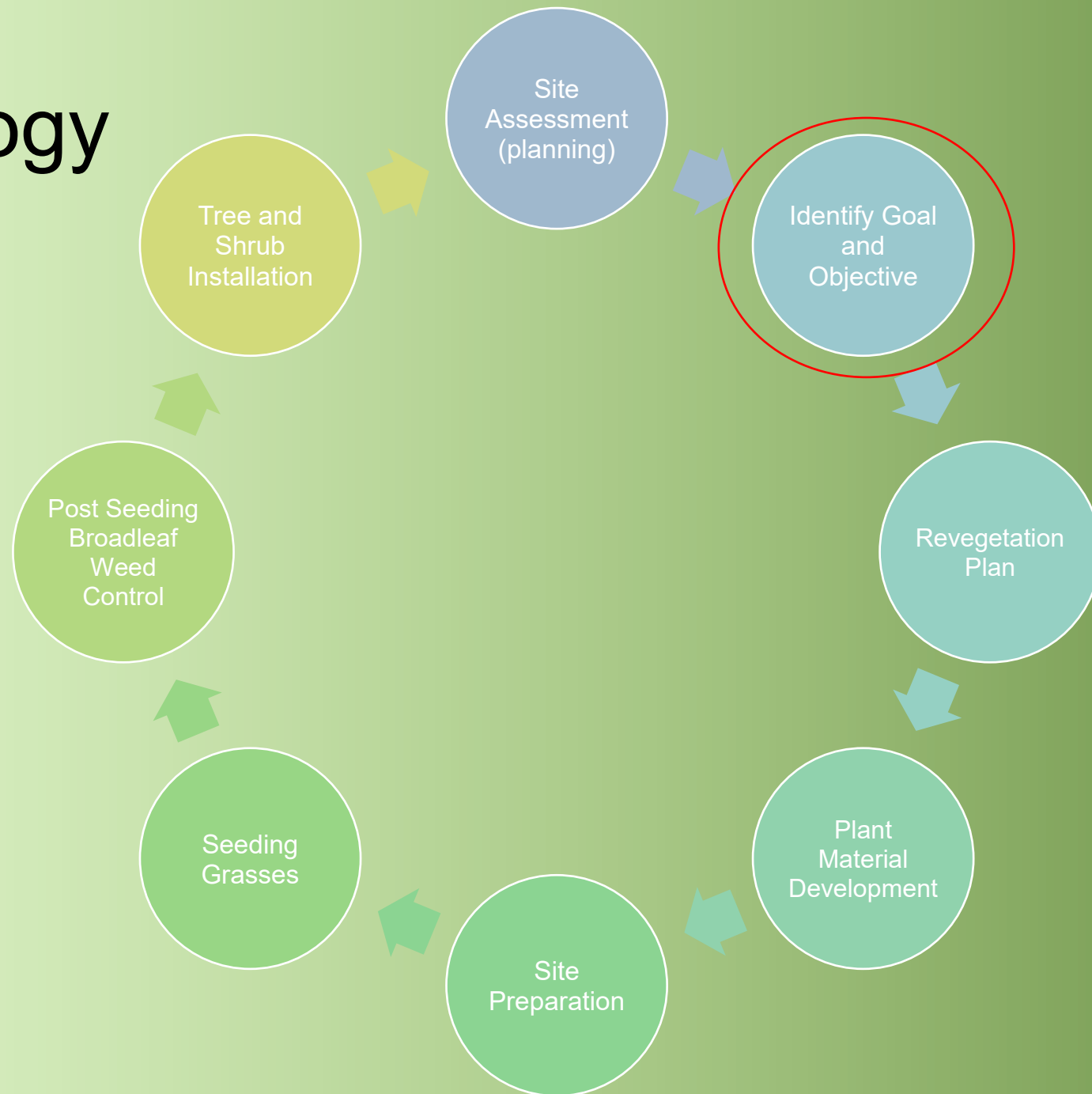


Depth to Ground Water Measurements

Twin City Foods Well Data

Flood Modeling

Methodology



Goal

To restore and enhance salmonid, riparian and upland habitat by initiating native vegetation succession.

Objective

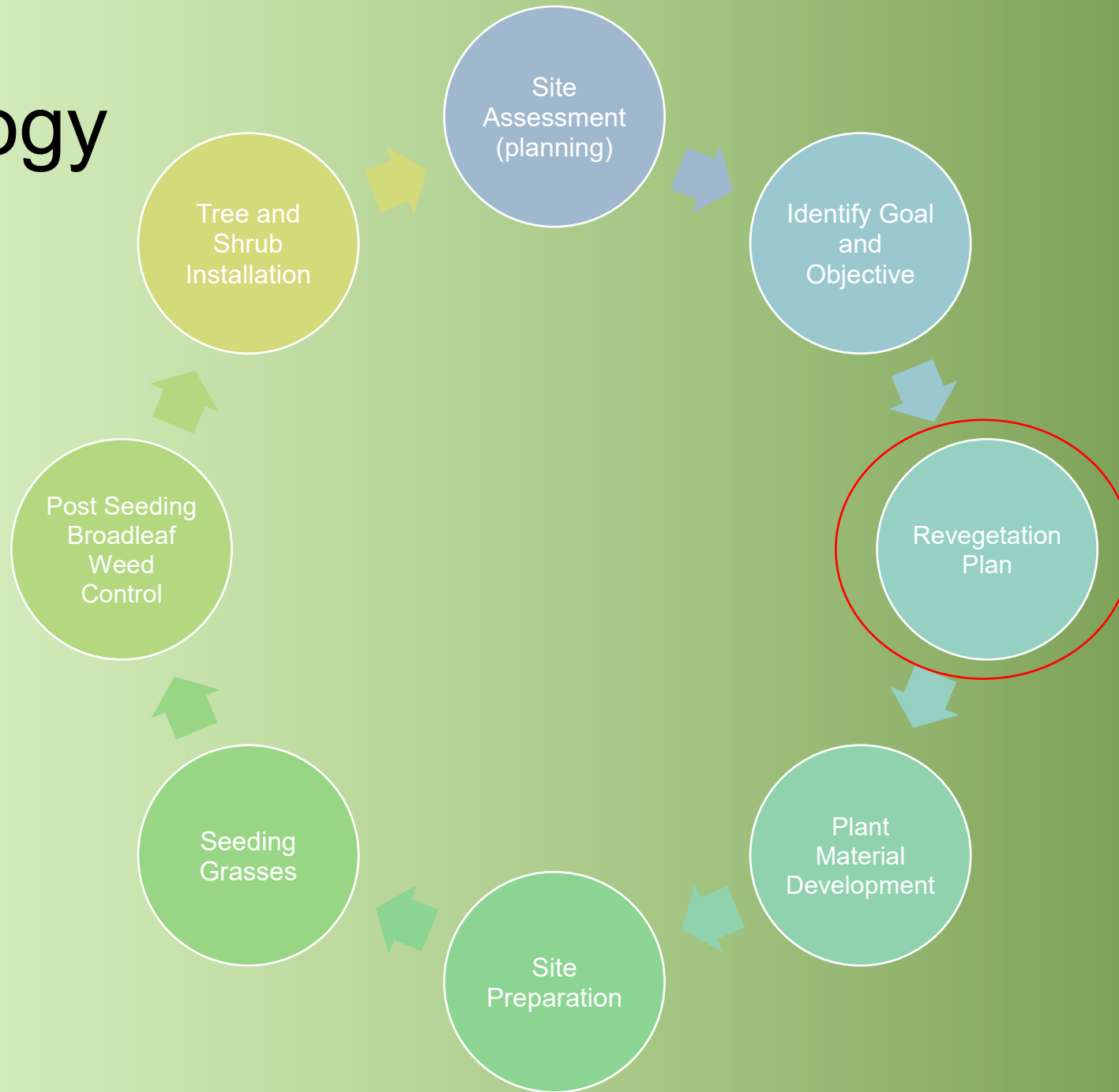
50% native herbaceous
and/or
70% native woody cover in year three.



Site
Assessment

Identify Goal
and Objective

Methodology

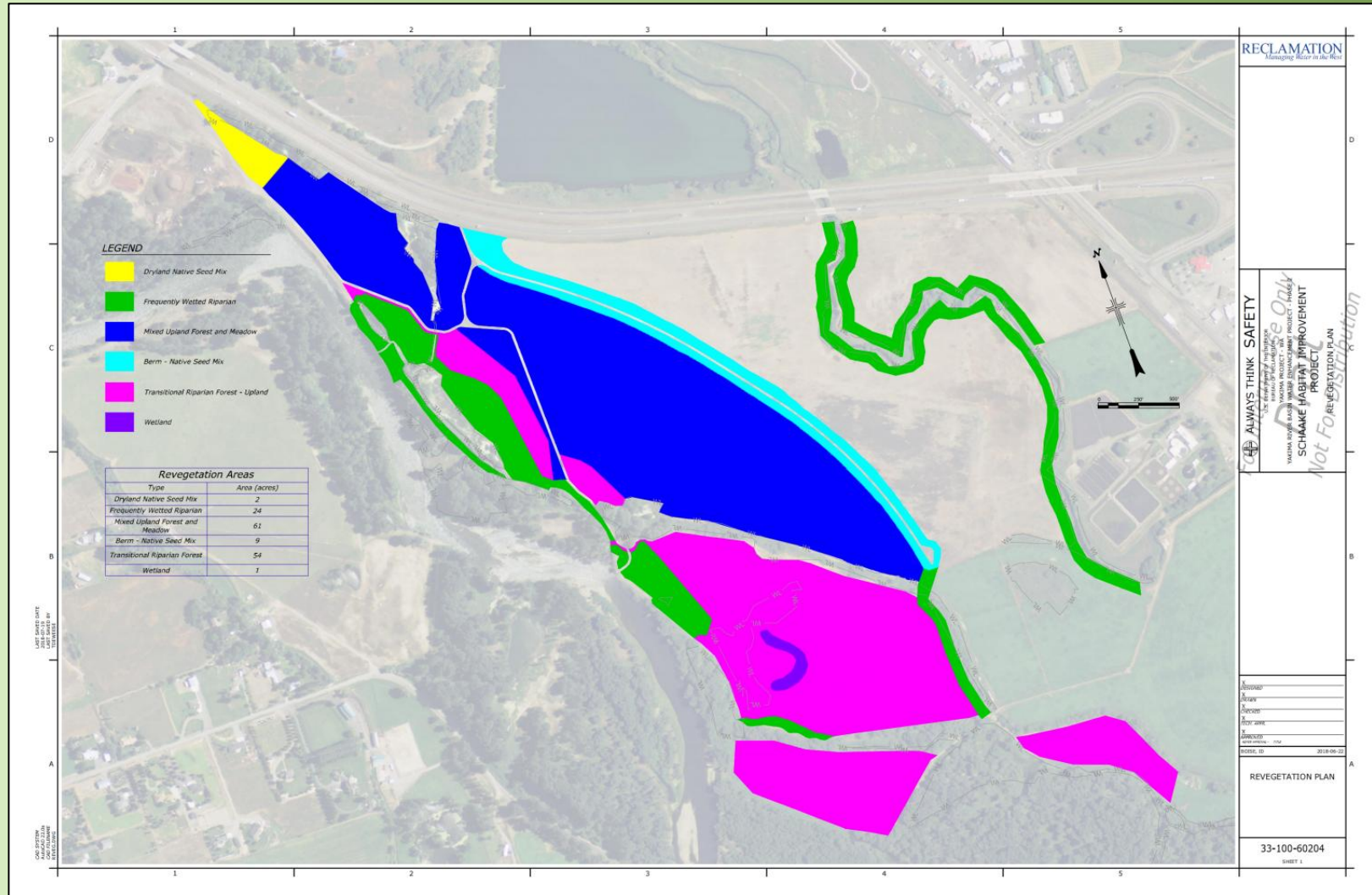


Site Assessments Inform Goals, Objectives & Revegetation Plans

Site Assessment

Identify Goal and Objective

Revegetation Plan



Revegetation Plan

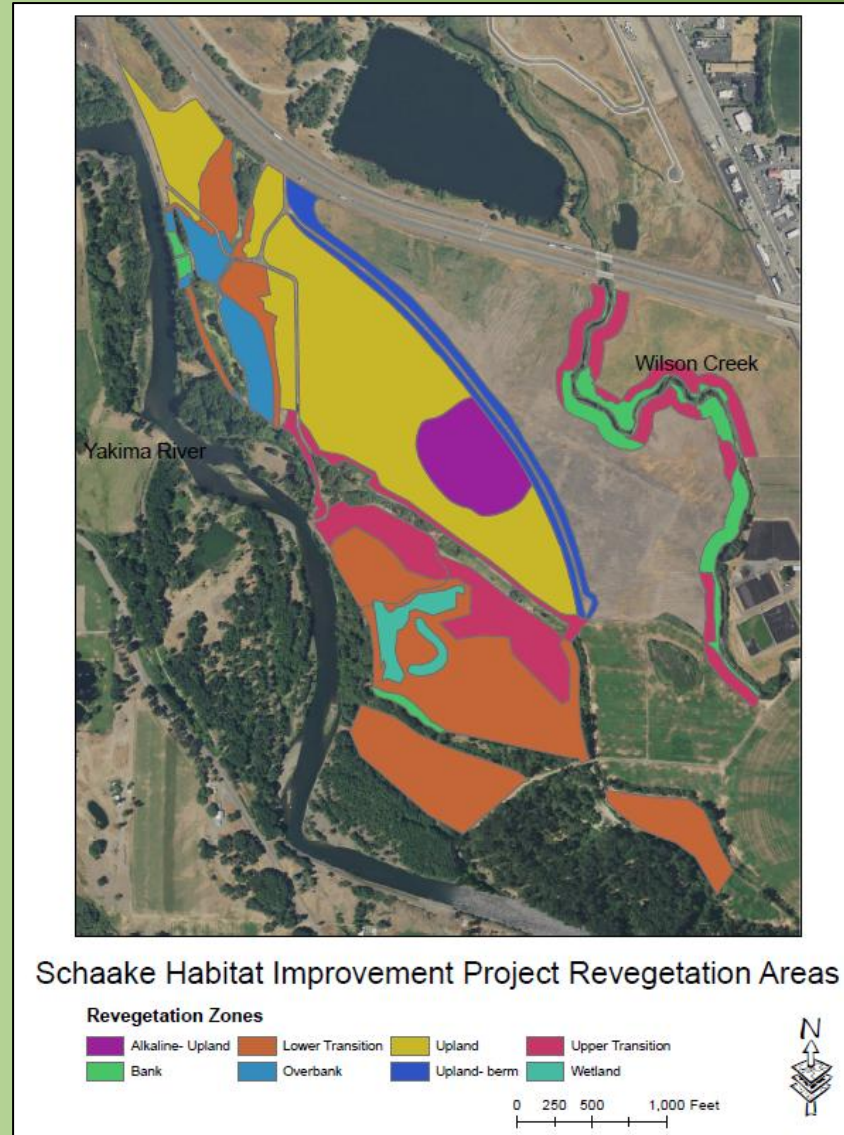
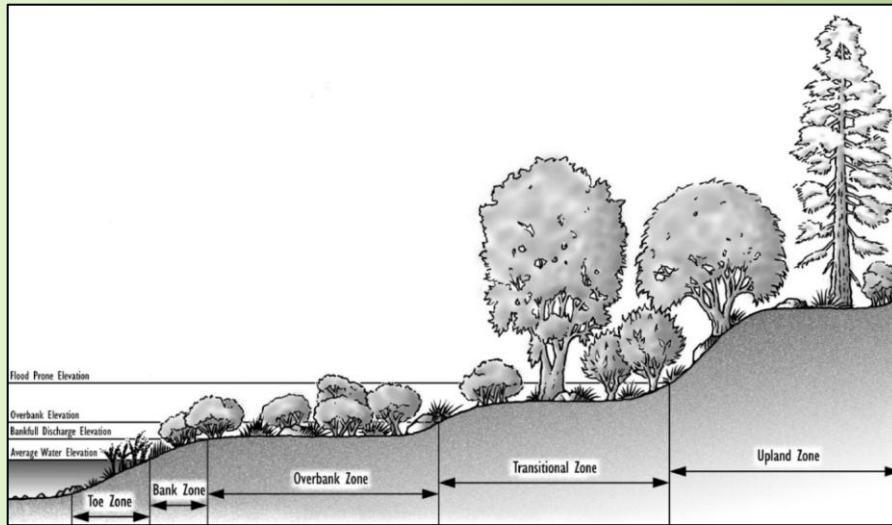
The guiding document

- Budget
- Based on site assessment
- Suitable timeline
- Designed to meet goal and objective
- Species selection based on reference sites
- Diverse, local biotypes & “workhorse” species
- Site preparation & planting methods
- Adaptive management / contingency planting



8 Different Revegetation Types

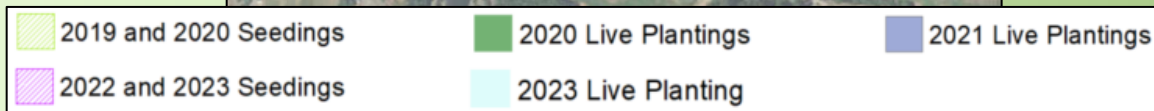
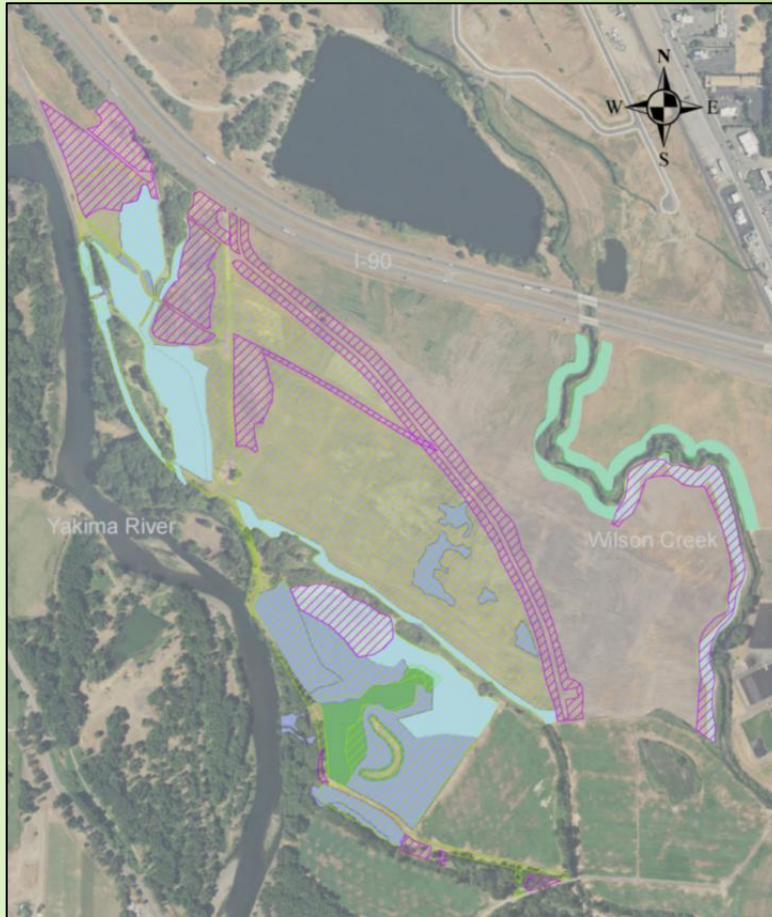
Based on hydrology, soils and revegetation goals.



32 Polygons

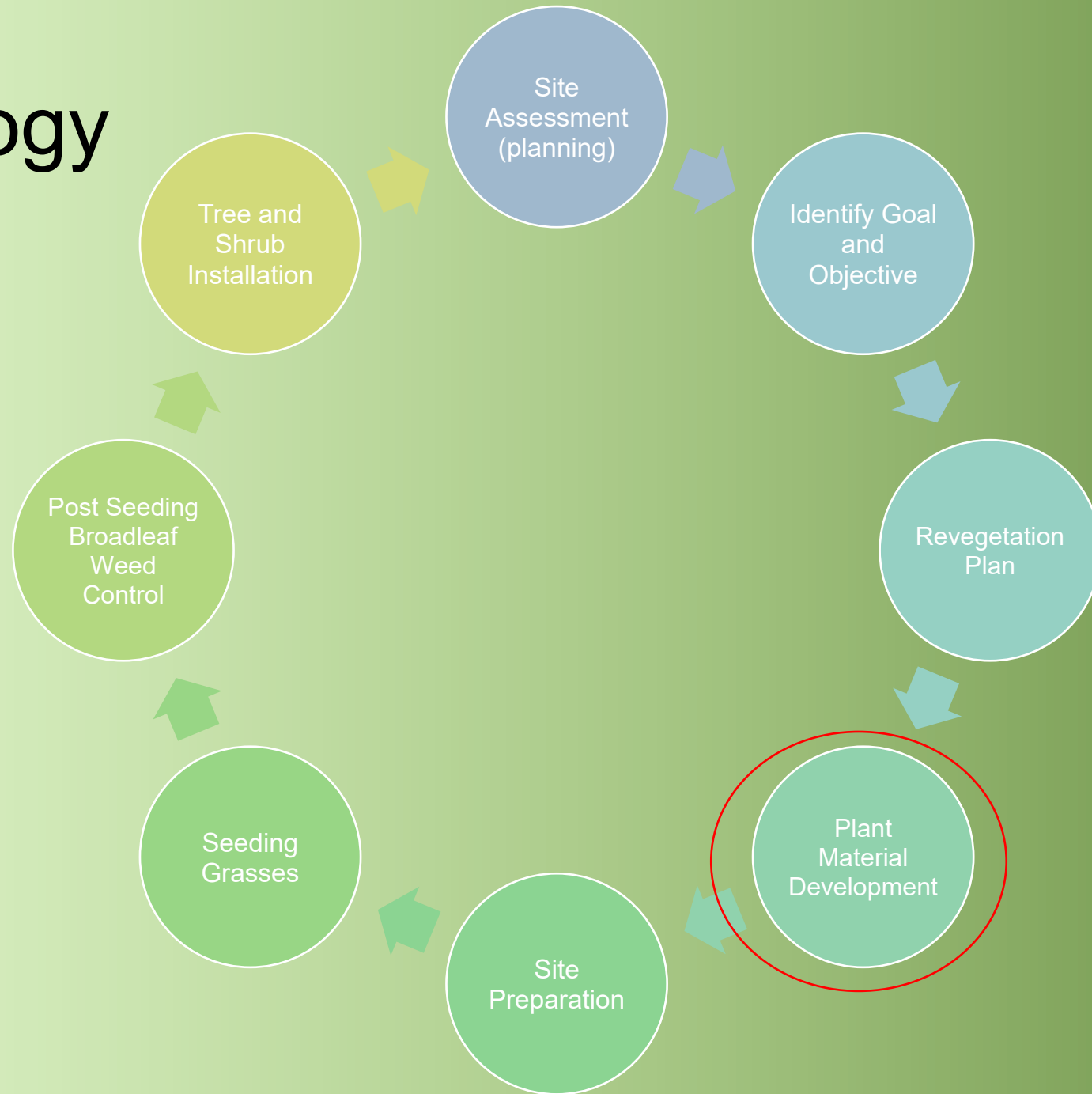


Complexities of Staged Construction and Restoration Timelines



Revegetation
Plan

Methodology



Plant Material Development (seed)



Are appropriate species from local ecotypes available for your site?



Wildland
Seed
Collection



Seed
Increase/Field
Establishment



Harvest



Seed Testing
&
Cleaning



Seed Storage
and Use



Plant Material Development (container stock)

Plant Material
Development



wetland sod
5 m x 1 m



40 c.i. trees and shrubs

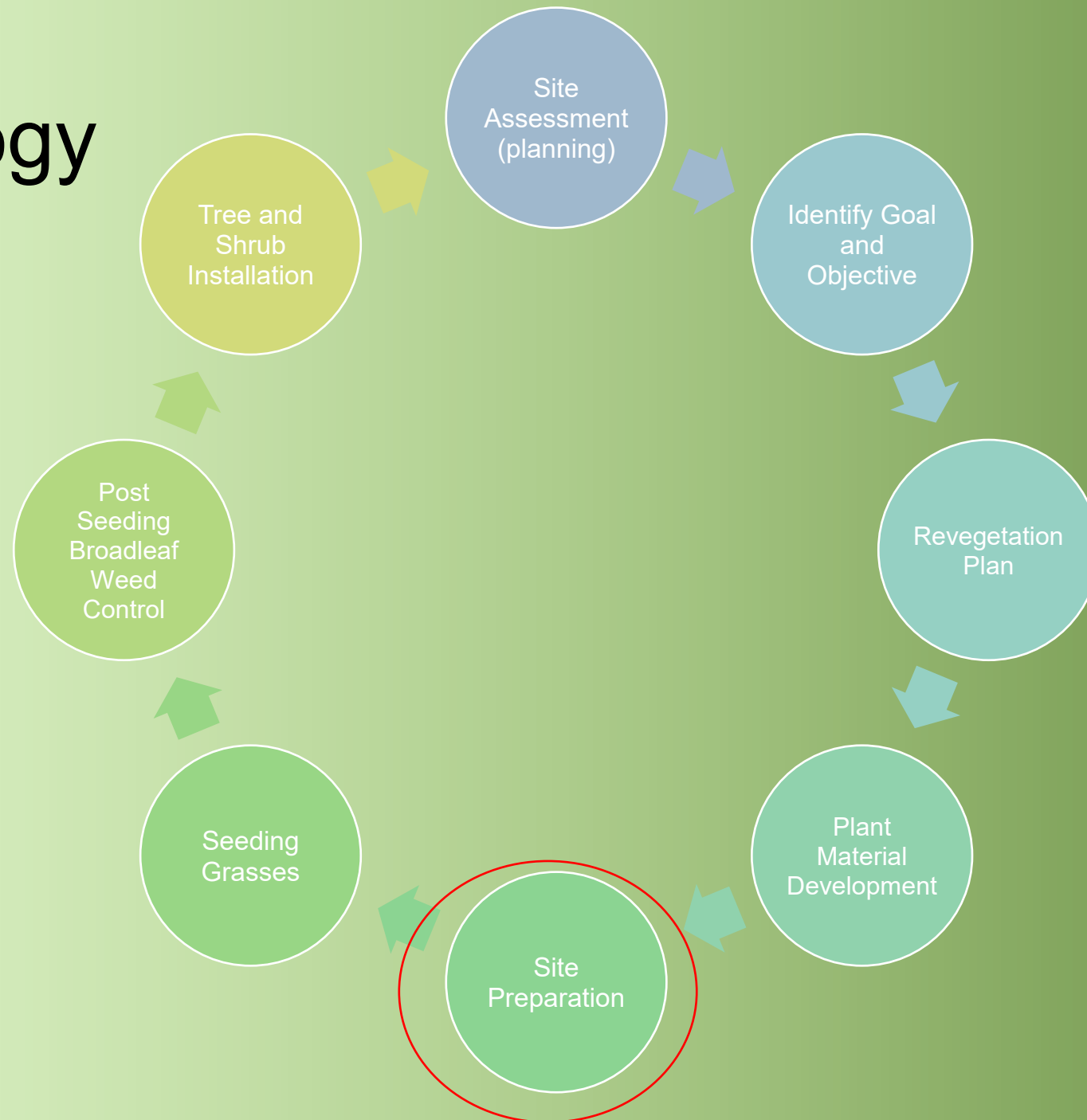


willow cuttings



10 c.i. emergent and grass plugs

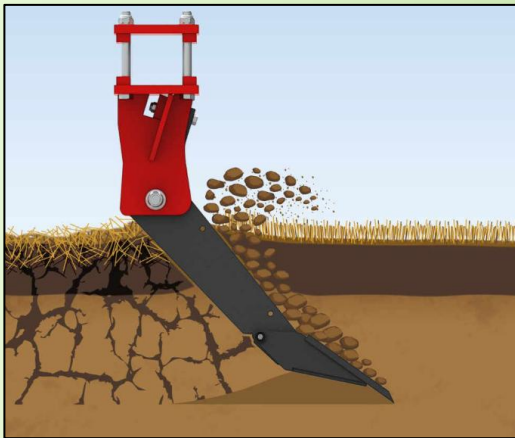
Methodology



Site Preparation

Site
Preparation

- Site clean up
- Soils nutrient mitigation
- Decompaction
- Reduction of weed seed bank
- Seed bed preparation



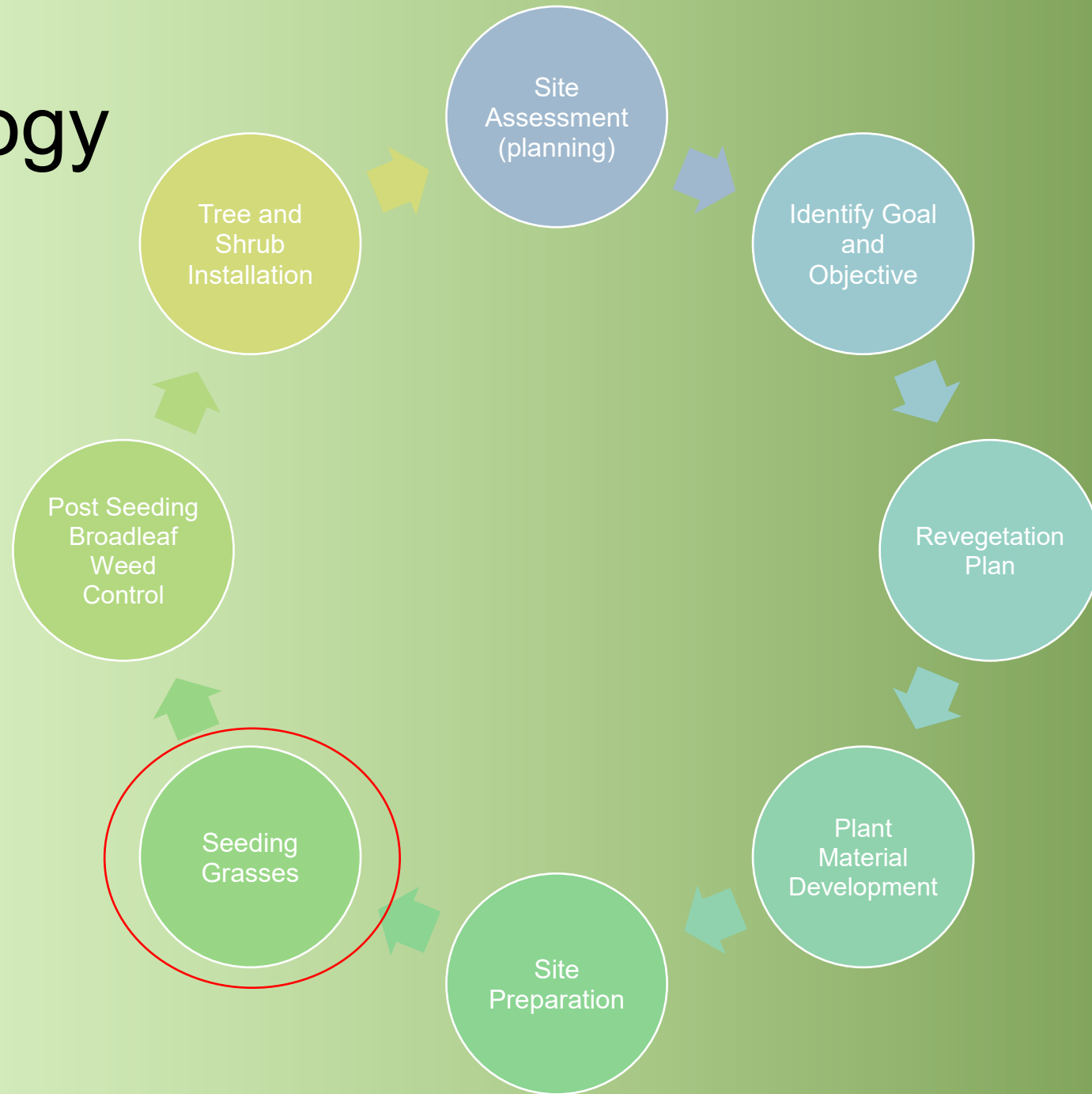
Site Preparation

Site
Preparation



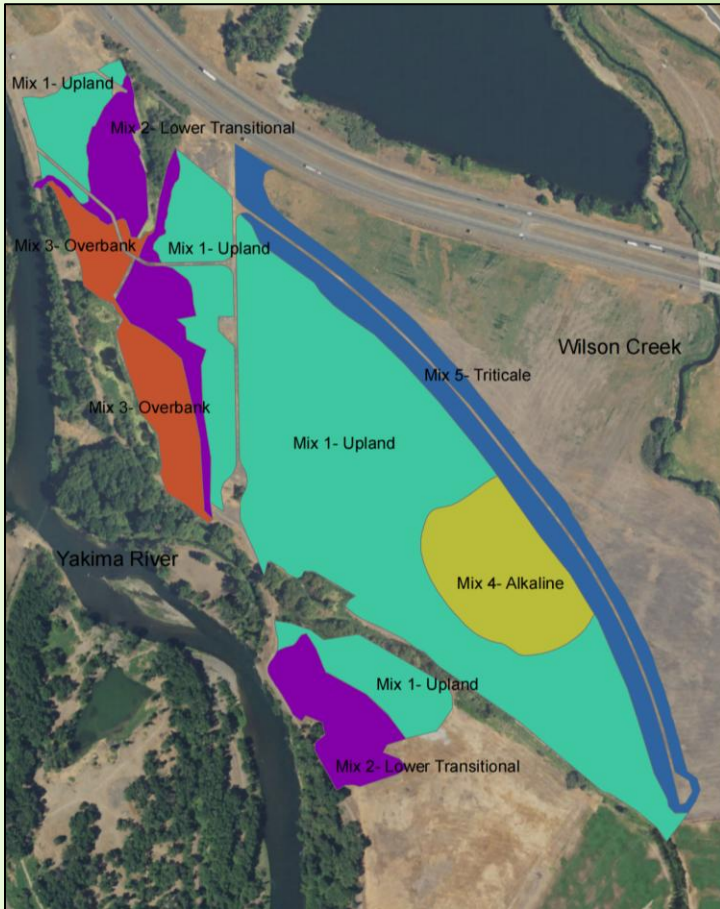
Good to go!

Methodology



Seeding Grasses

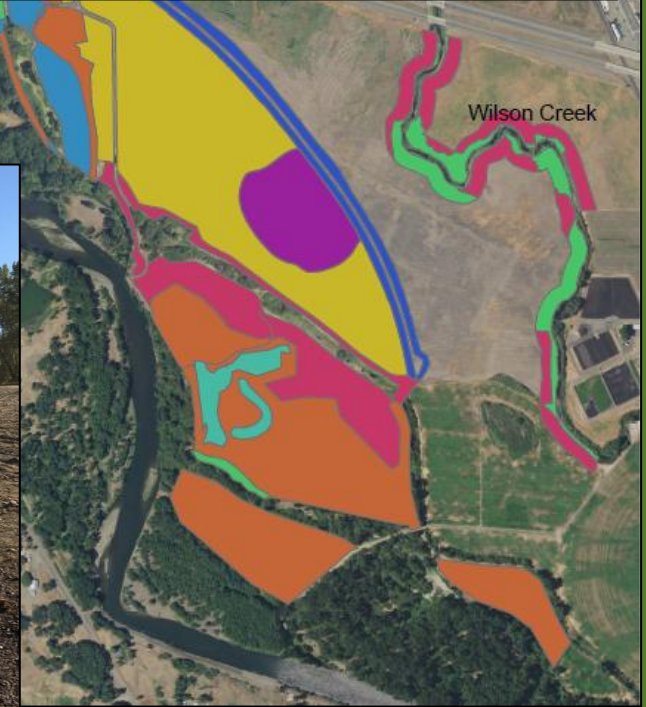
Seeding
Grasses



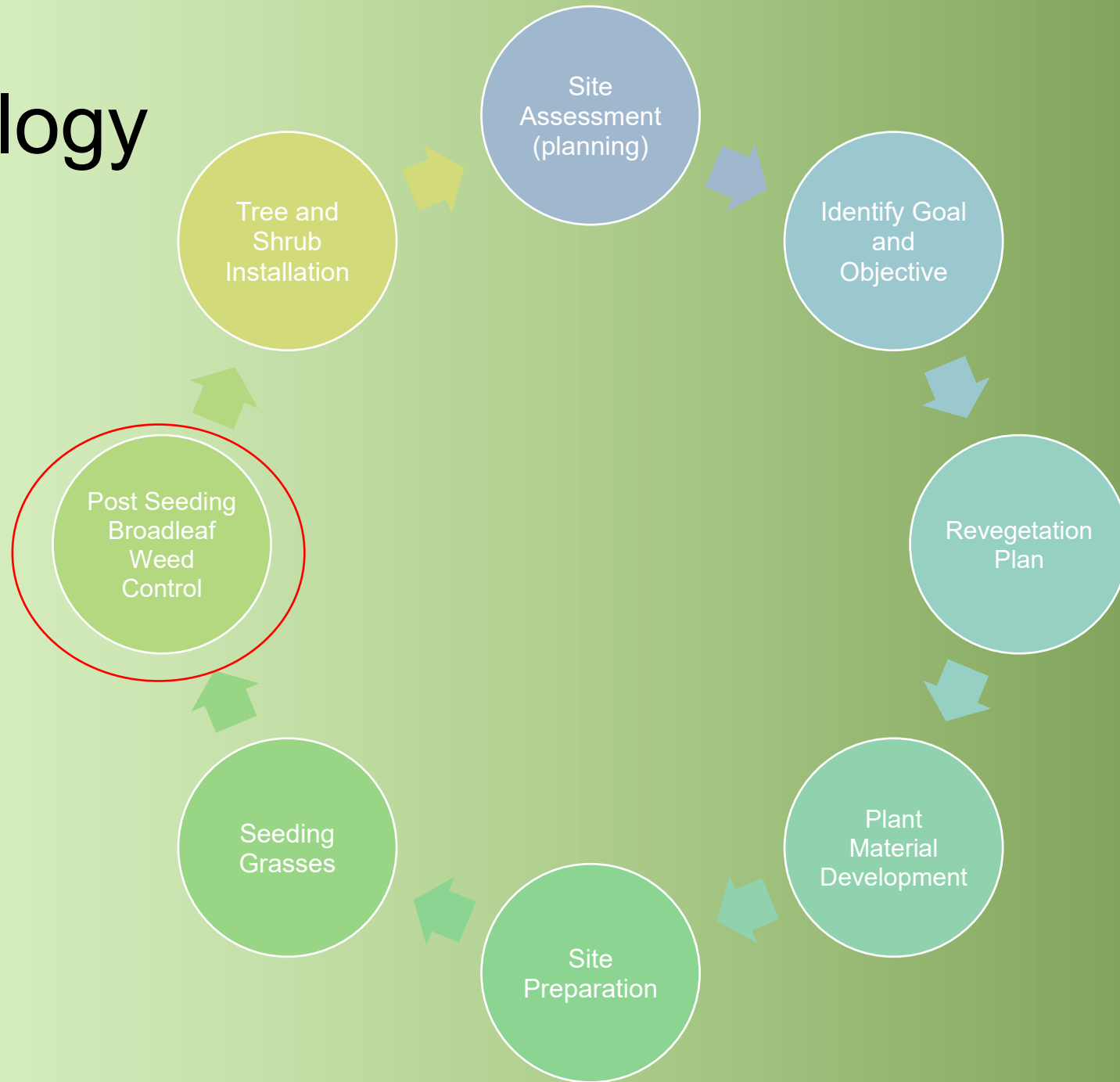
5 different seed mixes



Wetland Sod Mats



Methodology



Post Planting Broadleaf Weed Control

Post
Seeding
Broadleaf
Weed
Control

- Mechanical
- Chemical
- Manual



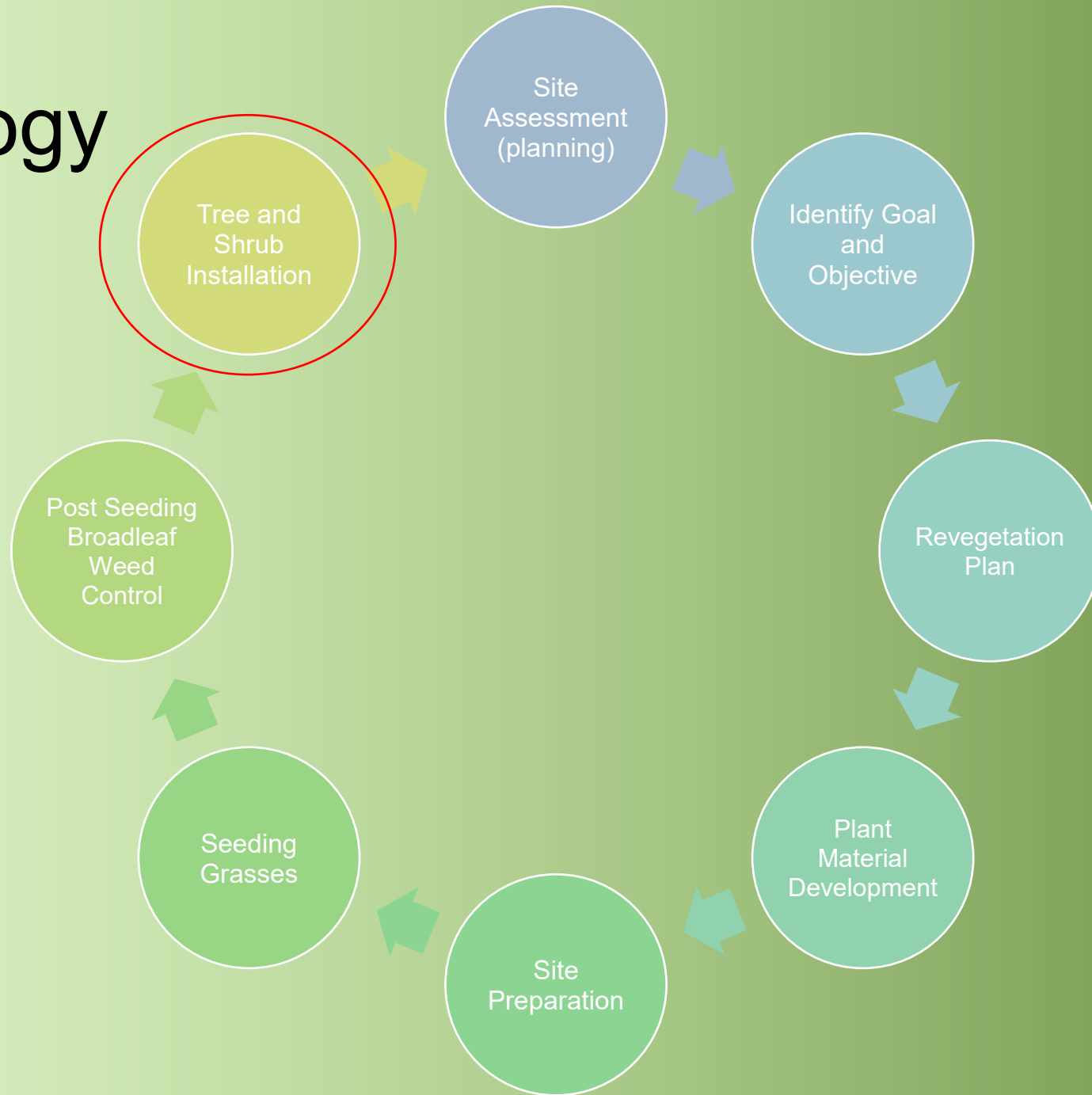
On the Road!

Post
Seeding
Broadleaf
Weed
Control



Lower Transitional planting area
ready for trees and shrubs!

Methodology



Planting Trees and Shrubs

Tree and
Shrub
Installation



Planting Trees and Shrubs

Tree and
Shrub
Installation



Planting Trees and Shrubs watering

Tree and Shrub Installation



Tree and
Shrub
Installation

Planting Trees and Shrubs mulching



Methodology

- Qualitative
- Quantitative
- Photo Points
- Drone Images



Monitoring

Monitoring



Photo 29. Wetland, 2020.



Photo 30. Wetland, 2021.



Photo 31. Wetland, 2022



Photo 32. Wetland, 2023



Adaptive Management

Monitoring



Hits, Misses and other tid bits.

Disturbance and Weed Seed Bank



70,000 CY moved and redistributed during construction phase



Installation of LWD after grass establishment

HIT! Collaboration with Reclamation

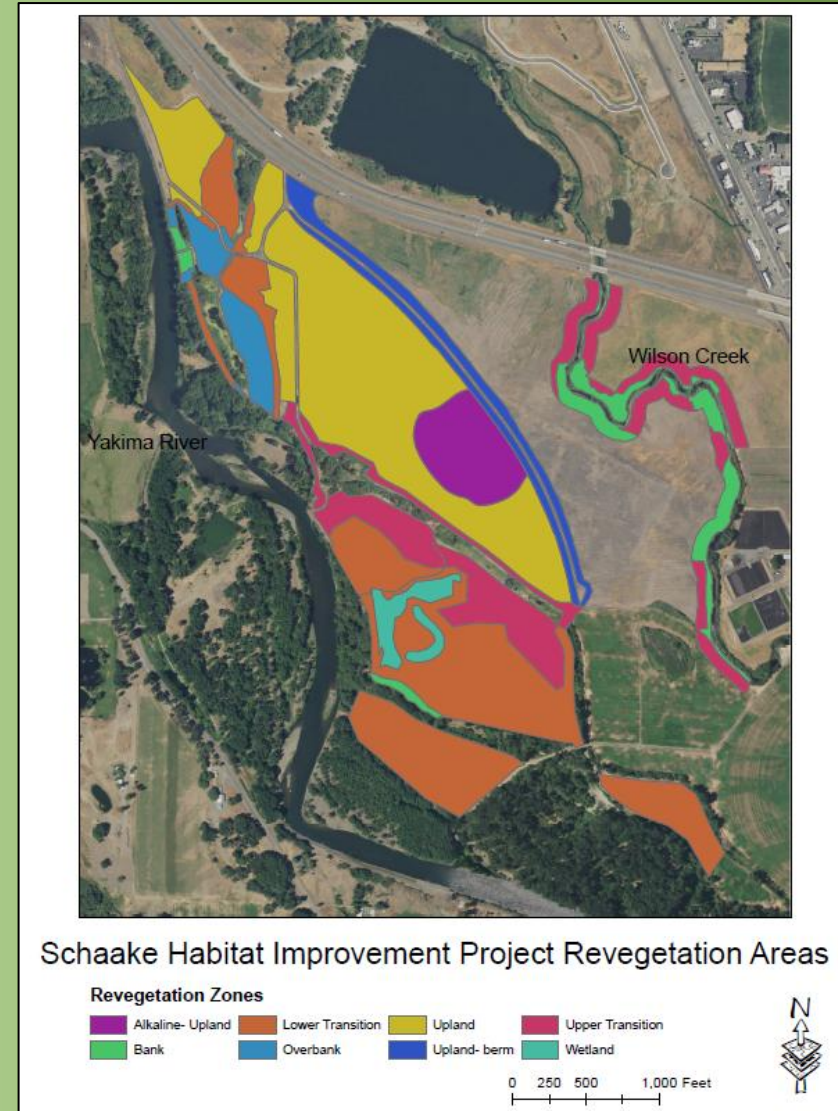


Working directly with Reclamation project managers, engineers, and construction crew in planning and implementation

Planting for Future Conditions

Sometimes you get it right and sometimes you don't!

Flood models were a reference overtime.



Labor Intensive



reed canarygrass



MISS?

HIT!



Site History Legacy- funky soils



Photograph #31. Close-up view of test pit TP-17-208 wall. This test pit encountered what looked and smelled like petroleum waste products and trash in the pit at about 2 feet. Water encountered at about 4 1/2 feet. Photo by D. Bennett 12/13/17

Hmmmm. Hit or Miss?



December, 2025
17,700 CFS

Work horse species have advantages and disadvantages.



Unrealistic Expectations



Patience!
Nature is on a different clock.

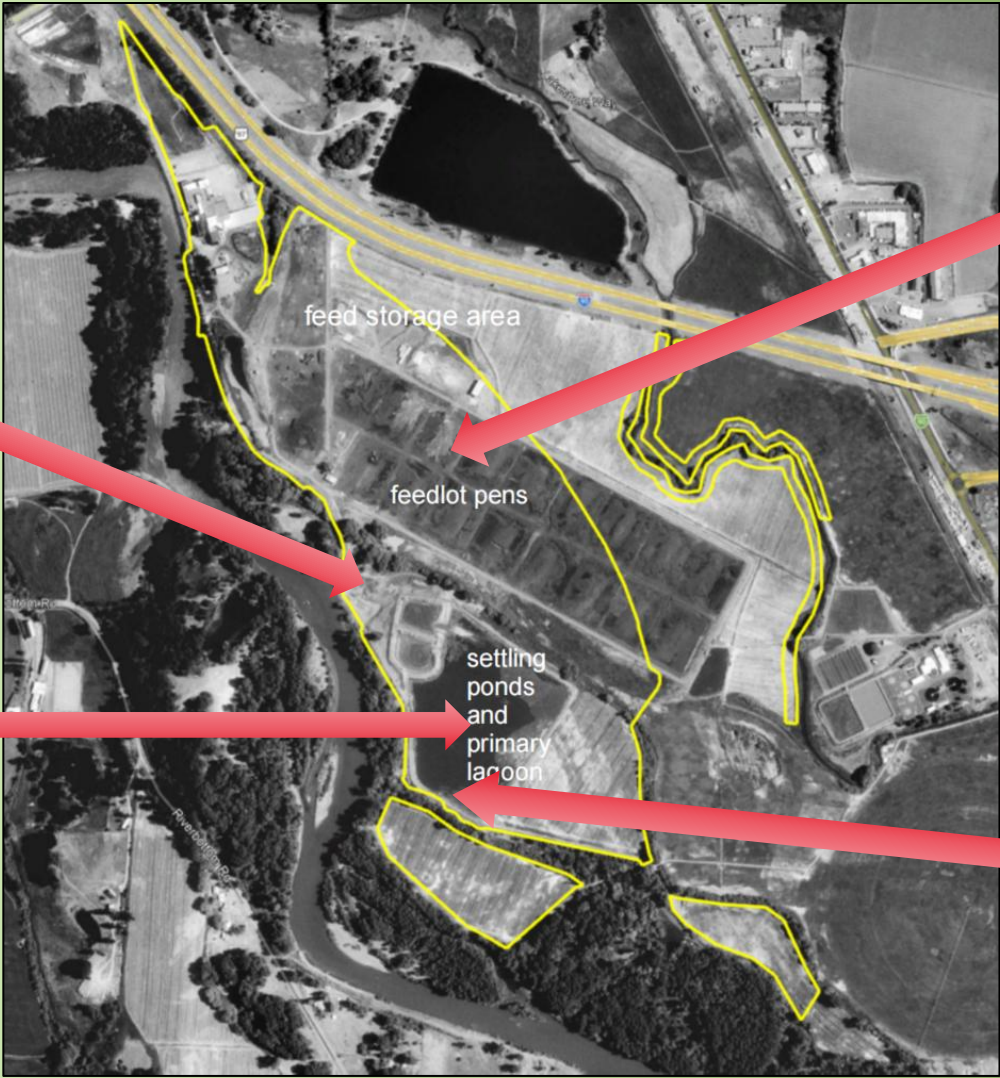


Passive Restoration / Natural Regeneration



Back to the Goal...

initiate native vegetation succession



Take Aways

1. Know the land you are trying to restore
2. Secure seed stocks of local biotypes
3. Site preparation typically takes 2 growing seasons
4. Don't rely on chemical company reps, residential/commercial vegetation management companies or conventional farmers to dictate your herbicides
5. Monitor frequently throughout the process
6. Patience/long term thinking



Questions?

