

Riparian Conversion Monitoring Data Collection Protocols

Increasing numbers of government agencies, community groups, and private companies are interested in developing riparian habitat restoration programs, particularly since the ESA listings of additional runs of Pacific salmon species. In order to monitor the effectiveness of these projects, standardized data collection needs to occur. To this end, the University of Washington's Center for Streamside Studies and Lummi Natural Resources made the RZRP protocols¹, field sheets, and comment codes available in the hopes that they may be useful to other organizations or individuals pursuing restoration projects.

Why Collect Data?

There are two important reasons to collect data on management and restoration projects.

1. Even projects that are not designed explicitly for research can yield important results. In order to learn from the successes and failures of rehabilitation efforts, restoration groups should document and disseminate their results. Even very small projects can suggest avenues of further research and identify promising new methods.
2. The success of any restoration project cannot be determined without some form of follow-up monitoring. Monitoring need not be frequent or extensive. For example, seedling survival may be checked by a simple count of live seedlings two or three years after planting, and seedling growth data may just be collected every three to five years, depending on the goals of the project.



A spruce seedling has been planted next to a cedar seedling to prevent deer from browsing.

protocols were designed was an initial survey of treatment sites in which a full range of site information (slope, aspect, soil type) was collected. In subsequent years data are collected only on characteristics that can be expected to vary year to year, such as seedling growth and survival and the composition of understory vegetation. Therefore, two sets of data collection protocols and field sheets are used; one for the initial survey and one for subsequent annual surveys.

¹M. Wishnie, McClinick, A., Hansen, J., Bob, F. 1999. *Lummi Natural Resources Riparian Zone Restoration Project (RZRP): Proposed Data Collection Protocols Field Sheets Damage Code*. Seattle, WA.

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Why Use Protocols?

Once the decision is made to engage in some sort of monitoring program, an explicit data collection protocol can ensure that the proper data are collected in a consistent way. Comment and damage codes (codes used to classify such phenomena as the incidence and severity of browse, the proximity of competing vegetation, etc.) identify the sort of data to be collected, and force data collection personnel to make close calls out in the field rather than back at the office.

How to Use This Information

These materials are an *example* of how data collection protocols, field sheets, and comment codes for restoration projects can be constructed. Data collection protocols need to be tailored to fit the design and intentions of each restoration project, and can vary a good deal. The monitoring project for which these

SEEDLING DAMAGE		SOIL TYPE		TREE SPECIES		
ad	animal damage	cs	cobble/sand	Code	Scientific name	Common name
bb	broken stem	cy	clay	thpl	Thuja plicata	Western redcedar
bc	bud collar damage	gs	gravelly sand	tshe	Tsuga heterophylla	Western hemlock
bl	broken leader	lc	large cobble	abgr	Abies grandis	Grand fir
cl	crooked leader	lg	silty gravel	pisi	Picea sitchensis	Sitka spruce
di	diseased/sick	ll	silty loam	psme	Pseudotsuga menziesii	Douglas fir
dl	dead leader	ot	other	abam	Abies amabilis	Pacific silver fir
dt	dead top	sc	sandy cobble	acma	Acer macrophyllum	Big-leaf maple
ml	multiple leaders	sg	sandy gravel	acci	Acer circinatum	Vine maple
ms	multiple stems	sl	sandy loam	alru	Alnus rubra	Red alder
sw	sweep	sn	sandy	potr	Populus trichocarpa	Black cottonwood
l	lean	ss	silty sand	prse	Prunus serotina	Bitter cherry
		ys	sandy silt	other	na	other
PREVIOUSLY ESTABLISHED TREE DAMAGE				GROUNDCOVER SPECIES		
ad	animal damage	bd	bark damage	acci	Acer circinatum	vine maple
bd	bark damage	bt	bent top	atfi	Athyrium filix-femina	lady fern
bt	bent top	bw	browse	ciar	Cirsium arvense	Canadian thistle
bw	browse	dt	dead top	eqte	Equisetum telmateia	giant horsetail
dt	dead top	l	lean	grass	na	grass spp.
l	lean	Ms	multiple stems	rave	na	gravel
Ms	multiple stems	ot	other	horse	na	Equisetum spp.
ot	other	Rp	repressed	knotw	na	Polygonum spp.
Rp	repressed	Rt	rot	rockk	na	misc. rock
Rt	rot	sw	sweep	salix	na	misc. willow spp.
sw	sweep	to	broken top	strbd	na	streambed
to	broken top			thist	na	Cirsium spp.
				trshd	na	tree shade
				LWD	na	large woody debris
				oece	Oemlaria cerasiformus	Indian plum
				pomu	Polystichum munitum	sword fern
				ptaq	Pteridium aquilinum	bracken fern
				rula	Rubus lasiococcus	dwarf bramble
				rupa	Rubus parviflorus	thimbleberry
				rupe	Rubus pedatus	strawberry
				rusp	Rubus spectabilis	salmonberry
				ruur	Rubus ursinus	Pacific blackberry
				sasc	Salix scouleriana	Scouler's willow
				sasi	Salix sitchensis	Sitka willow
				sara	Sambucus racemosa	red elderberry
				stco	Stachys cooleyae	Cooly's hedge nettle
				syal	Symphoricarpos albus	snowberry
				sydu	Symphoricarpos duhamel	snowberry
				tome	Tolmiea menziesii	pig-a-back plant
				tyla	Typha latifolia	cattail
				urdi	Urtica dioica	stinging nettle
				vaov	Vaccinium ovalifolium	oval-leaved blueberry
				other	na	other species
BROWSE PROTECTION CODES						
0	none					
1	intact budcap					
2	damaged or partially	removed budcap				
3	intact tubular mesh screen					
4	damaged or partially	removed tubular screen				
ot	other					
LANDFORM						
1t	first terrace	fp	floodplain			
2t	second terrace	other	other			
MICROSITE CODES						
d	seedling in a depression					
e	seedling on hummock, LWD, or otherwise elevated					
l	seedling level with surrounding site					

For initial and annual surveys, take all measurements in feet and tenths of feet or inches and tenths of inches, except for planted seedling caliper, which is measured in millimeters. Record the project site, plot number, date, and your initials at the top of the data sheet. If there is no brush, grass, browse protection (prot), degree of browse (brws) or damage record a "0". After the initial survey, record the canopy % and the measurements under the Planted Trees section annually.

Plot Characteristics

Landform: Identify the dominant landform of the plot using the appropriate landform code.

Slope: Record the average slope of the plot area in percent.

Aspect: If slope is greater than 0, identify the predominant aspect of the plot area (i.e. N, NE, E, SE, etc.)

Soil Type: Classify the texture of the first mineral layer of soil.

Organic Layer: Measure the depth of the surface organic layer in inches and tenths of inches. If the depth varies, take several measurements and record the average.

Canopy %: Measure canopy closure using a densiometer. Record in percent, averaging several readings if canopy closure varies significantly.

Understory Release?: Enter "n" if area has not been brush controlled, "y" if it has.

Location Plot: Describe the location of the plot.

Planted Trees

TREE#: Number seedlings consecutively starting with the first seedling clockwise of due north of the plot center and continuing in a clockwise fashion. Numbers should be three or four digits, beginning with the plot number and then the number of the seedling. Write the number on an aluminum write-on tag and loosely bar lock around the main stem of the seedling either at ground level or above the first whorl. The larger the diameter of the bar lock around the seedling the

longer it will be before it will need to be removed and replaced.

SPP: Record the species using the appropriate species code.

HT: Measure the height of each seedling in feet and tenths of feet from the highest point to the ground. If the seedling is leaning to one side, measure from the highest down to a point level with the base of the stem, not along the stem itself.

CAL: Measure the caliper in millimeters 1/2" above the ground using calipers and an appropriate spacer. Measure on the side of the seedling facing the plot center.

BRUSH: Classify brush competition using the appropriate brush competition code.

GRASS: Classify grass competition using the appropriate grass competition code.

PROT: Record the presence or absence of browse protection measures with the appropriate code.

BRWS: Record the degree of browse using the appropriate browse classification code.

MUL: Enter "n" if no mulch is present, "y" if mulch is present.

MS: Record the appropriate microsite elevation code.

DAM: Record damage using the appropriate seedling damage code.

A-D: Record whether or not the seedling is alive or dead. Record the seedling number and the cause of death, if known, in the "Notes" section. *Note: Take all seedling measurements even if it appears dead.*

Previously Established Trees

Species: Record the species of all previously established trees greater than 6 feet tall whose centers fall within the plot.

Number: Tally the number of previously established trees greater than 6 feet tall within each DBH class by species.

DBH Class: Classify the DBH of all previously estab-

lished trees 6' tall or taller that fall within the plot according to the following DBH classes.

DBH classes:

- 1 0"-2.5" 5
- 2 2.6"-5.0"
- 3 5.1"-10.0"
- 4 10.1"-15.0"
- 5 15.1"-20.0"
- 6 20.1"-25.0"
- 7 25.1"-30.0"
- 8 >30.1"

Height: Measure the height of the tallest tree of each species within each size class.

Age: Estimate the average age of each species in each size class by counting branch whorls or counting rings.

Damage: Note any damage and the proportion of trees in each size class that are affected (i.e. 25%, 50%, 100%).

Groundcover

Species: Record the species of brush that is more than 6 inches tall and of previously established trees that are less than 6 feet tall using the appropriate species code.

% Cover: Estimate the percentage of the total available growing space occupied by each species (such that the sum of all groundcover percentages within each plot is 100% or

less).

AVG HT: Record the average height, in feet and tenths of feet, of each groundcover species.

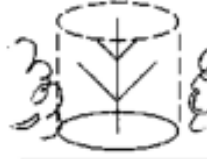



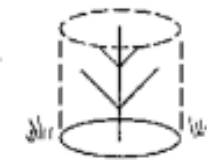



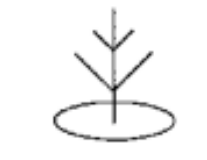
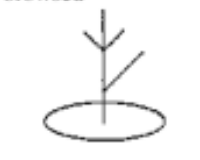
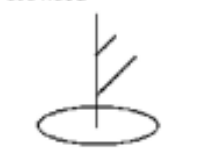
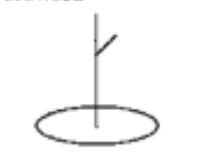
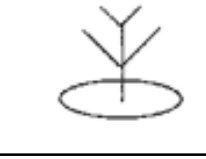
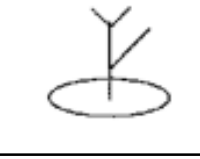
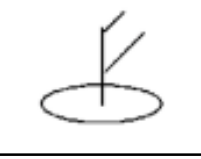

<p>Browse competition codes</p> <p>0 no brush shading or within 2'</p> 	<p>1 brush within 2' shading <25%</p> 	<p>2 brush within 2' shading 25%-50%</p> 	<p>3 brush within 2' shading >50%</p> 
<p>Grass competition codes</p> <p>0 no sod within 2'</p> 	<p>1 sod within 12"</p> 	<p>2 sod within 6"</p> 	<p>3 sod to stem</p> 
<p>Browse codes</p> <p>0 no browse</p> 	<p>1 terminal leader not browsed, less than 1/3 lateral branches browsed</p> 	<p>2 terminal leader not browsed, 1/3 - 2/3 lateral branches browsed</p> 	<p>3 terminal leader not browsed, > 2/3 lateral branches browsed</p> 
<p>4 only terminal leader browsed</p> 	<p>5 terminal leader and <1/3 lateral branches browsed</p> 	<p>6 terminal leader and 1/3 - 2/3 lateral branches browsed</p> 	<p>7 terminal leader and >2/3 lateral branches browsed</p> 

Figure 1. A description of the browse codes.

Sample plot cards can be obtained from the Center for Streamside Studies, Box 352100, Seattle WA 98195-2100, (206) 543-6920, cssuw@u.washington.edu