Lummi Natural Resources Riparian Zone Restoration Project (RZRP)

Proposed Data Collection Protocols Field Sheets Damage Codes

Mark Wishnie and Anna McClintick
Center for Streamside Studies

Jim Hansen and Frank Bob
Lummi Natural Resources, Lummi Indian Nation

The Lummi Natural Resources Riparian Zone Restoration Project

The Lummi Natural Resources Riparian Zone Restoration Project (RZRP) was initiated three years ago as part of an ongoing effort to restore and enhance salmon habitat and Northwest coastal ecosystems. In that time 116 acres of municipal, state, and private riparian forests along reaches of the Nooksack River presently occupied by pioneering hardwoods such as red alder (Alnus rubra) and black cottonwood (Populus trichocarpa) have been thinned (where possible and appropriate) and interplanted with mixed coniferous seedlings. The project was designed primarily to improve salmon and wildlife habitat by encouraging the growth of mixed coniferous stands in riparian areas that are currently dominated by hardwoods as a result of human disturbance. Conifer dominated stands provide larger and more persistent large woody debris (LWD) and greater buffering of stream temperatures than do hardwood stands. The secondary purpose of the RZRP has been to generate scientific data for use in future restoration efforts.

In January of 1999 Lummi Natural Resources and the University of Washington's Center for Streamside Studies began to analyze the vegetative and environmental data collected in the three years since the RZRP's inception and to evaluate the project's success to date (complete reports can be obtained from the Center for Streamside Studies or from Lummi Natural Resources). One of the products of this analysis has been the establishment of new data collection protocols, field sheets, and comment and damage codes to improve the accuracy and utility of data collection. These materials are presented here as one example of an effective approach to data collection.

Why collect data, and why use a protocol?

There are two important reasons to collect data on management and restoration projects. First, even projects that are not designed explicitly for research can yield important results. Increasing numbers of government agencies, community groups, and private companies are interested in developing riparian habitat restoration programs, particularly since the listings of additional runs of pacific salmon species as endangered. None of these groups will be able to learn from the successes and failures of other restoration efforts unless they can be documented and disseminated. Even very small projects can suggest avenues of further research and identify promising new methods. Second, 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 need only be checked by a simple count of live seedlings two or three years after planting, and seedling growth data may need only be collected every three to five years, depending on the goals of the project.

Once the decision is made to engage in some sort of monitoring program, an explicit data collection protocol can ensure that the proper data is 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.) explicitly 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.

To this end, the Center for Streamside Studies and Lummi Natural Resources have made the RZRP protocols, field sheets, and comment codes available in the hopes that they may be useful to other organizations or individuals pursuing similar restoration projects.

How to use this information

These materials are presented as an example of how data collection protocols, field sheets, and comment codes for this sort of restoration project 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 RZRP monitoring program includes an initial survey of treatment sites in which a full range of site information (slope, aspect, soil type) is collected. In subsequent years data is 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.

Acknowledgements

Funding for the Riparian Zone Restoration Program treatments and monitoring has been provided by the Bureau of Indian Affairs (BIA), the US Fish and Wildlife Service's (USFWS) Jobs in the Woods program, the Washington State Jobs for the Environment program, and matching funding from landowners. Project evaluation, data entry, and data analysis were supported by the University of Washington's Center for Streamside Studies and by the USDA Forest Service's Wood Compatibility Initiative, Cooperative Agreement # PNW-99-9053-1-CA. Facilities were provided by the University of Washington's Center for Streamside Studies.

Initial Survey Protocol

Surveys are conducted in 1/50th acre fixed-radius (radius = 16.6 ft.) plots around each plot center. 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.

Plot Characteristics

LANDFORM: Identify the dominant landform of the plot using the appropriate landfrom 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 seems to vary, take several measurements and record the average.

CANOPY %: Measure canopy closure using a densiometer. Record in percent, averaging several readings if canopy closure seems to vary significantly.

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

LOCATION OF 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).

Example: The first seedling in plot 4 at Elk Flats #2 should be numbered 401, the third seedling at plot 11 should be numbered 1103, etc.

Note: Co-planted seedlings should be given the same number, but the cedar should be assigned an 'a' and the spruce a 'b.' For example, if the third and fourth seedlings at Elk Flats #1 plot #5 are a co-planted cedar and spruce, they would be numbered 503a and 503b respectively. The next seedling would be numbered 504.

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. If there is no brush competition record a "0".

GRASS: Classify grass competition using the appropriate grass competition code. If there is no grass competition record a "0".

PROT: Record the presence or absence of browse protection measures with the appropriate code. If there is no browse protection record a "0".

BRWS: Record the degree of browse using the appropriate browse classification code. If there is no browse record a "0".

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. If there is no damage record a "0".

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.

DBH CLASS: Classify the DBH of all previously established trees 6' tall or taller that fall within the plot according to the following DBH classes.

DBH classes:

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

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

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.

Data Sheet

Permanent Plot Card - Initial Survey

Project Site						Date	
Plot #		Landform		Slope %		Aspect	
Soil Type				Organic Layer		Canopy %	
Understory Release?						Plots by	
Location of Plot							

Planted Trees

Plot Size _____

Tree #	Spp	Ht	Cal	Brush	Grass	Prot	Brws	Mul	Dam	MS	A-D

Plot Size _____

Previously Established Trees

Species	DBH class	Number	Avg Ht	Avg Age	Damage

Ground Cover

Species	% Cover	Avg Ht

Notes

Initial Survey Codes

LANDFORM

1t	first terrace
2t	second terrace
fp	floodplain
other	other (describe in notes)

SOIL TYPE CODES

cs	cobble/sand
cy	day
gs	gravelly sand
lc	large cobble
lg	silty gravel
ll	silty loam
ot	other (describe in notes)
sc	sandy cobble
sg	sandy gravel
sl	sandy loam
sn	sandy
ss	silty sand
ys	sandy silt

PREVIOSULY ESTABLISHED

TREE DAMAGE CODES

ad	animal damage
bd	bark damage
bt	bent top
bw	browse
dt	dead top
l	lean
Ms	multiple stems
Ot	other (describe in notes)

TREE SPECIES CODES

Code	Scientific Name	Common Name
thpl	Thuja plicata	Western redcedar
tshe	Tsuga heterophylla	Western hemlock
abgr	Abies grandis	Grand fir
pisi	Picea sitchensis	Sitka spruce
psme	Pseudotsuga menziesii	Douglas fir
abam	Abies amabilis	Pacific silver fir
acma	Acer macrophyllum	Big-leaf maple
acci	Acer circinatum	Vine maple
alru	Alnus rubra	Red alder
potr	Populus trichocarpa	Black cottonwood
prse	Prunus serotina	Bitter cherry
other	na	Other (describe in notes)

GROUNDCOVER SPECIES CODES

Code	Scientific Name	Common Name
acci	Acer circinatum	vine maple
atfi	Athyrium filix-femina	lady fern
ciar	Cirsium arvense	Canadian thistle
eqte	Equisetum telmateia	giant horsetail
grass	na	grass spp.
grave	na	gravel
horse	na	Equisetum spp.
knotw	na	Polygonum spp.
rockk	na	misc. rock
salix	na	misc. willow spp.
strbd	na	streambed
thist	na	Cirsium spp.
trshd	na	tree shade
LWD	na	large woody debris
oece	Oemlaria cerasiformus	Indian plum
pomu	Polystichum munitum	sword fern

SEEDLING DAMAGE CODES

ad	animal damage
bb	broken stem
bc	bud collar damage
bl	broken leader
cl	crooked leader
di	diseased/sick
dl	dead leader
dt	dead top
ml	multiple leaders
ms	multiple stems
sw	sweep
l	lean

Microsite codes

d	seedling in a depression
e	seedling on hummock, LWD, or otherwise elevated
l	seedling level with surrounding site

Rp	repressed
Rt	rot
sw	sweep
to	broken top

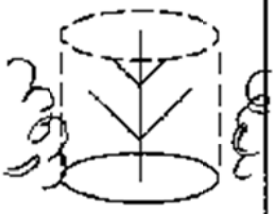
BROWSE PROTECTION CODES

0	none
1	intact budcap
2	damaged or partially removed budcap
3	intact tubular mesh screen
4	damaged or partially removed tubular mesh screen
ot	other (describe in notes)

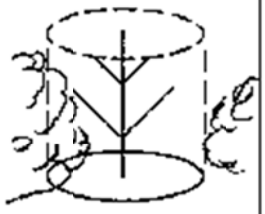
ptaq	Pteridium aquilinum	bracken fern
rula	Rubus parviflorus	dwarf bramble
rupa	Rubus pedatus	thimbleberry
rupe	Rubus pedatus	strawberry
rusp	Rubus spectabilis	salmonberry
ruur	Rubus ursinus	Pacific blackberry
sasc	Salix scouleriana	Scouler's willow
sasi	Salix sitchensis	Sitka willow
sara	Sambucus racemosa	red elderberry
stco	Stachys cooleyae	Cooly's hedge nettle
syal	Symphoricarpos albus	snowberry
sydu	Symphoricarpos duhamel	snowberry
tome	Tolmeia menziesii	pig-a-back plant
tyla	typhia latifolia	cattail
urdi	Urtica dioica	stinging nettle
vaov	Vaccinium ovalifolium	oval-leafed blueberry
other	na	other species

Brush competition codes

0
no brush shading or within 2'

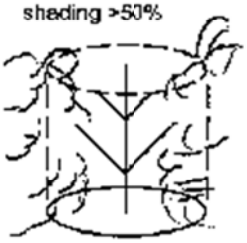


1
brush within 2'
shading <25%



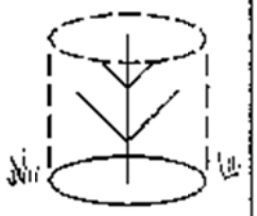
2
brush within 2'
shading 25%-50%

3
brush within 2'
shading >50%



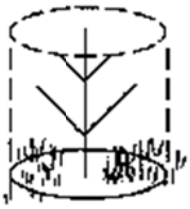
Grass competition codes

0
no sod within 2'

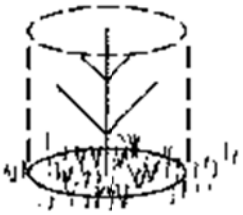


1
sod within 12"

2
sod within 6"

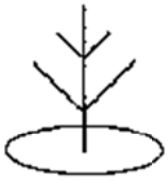


3
sod to stem

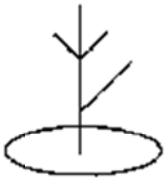


Browse codes

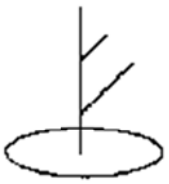
0
no browse



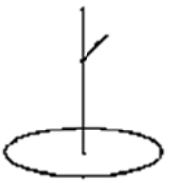
1
terminal leader not browsed, less than 1/3 lateral branches browsed



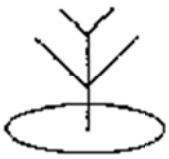
2
terminal leader not browsed, 1/3-2/3 lateral branches browsed



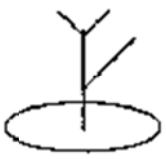
3
terminal leader not browsed, > 2/3 lateral branches browsed



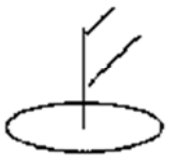
4
only terminal leader browsed



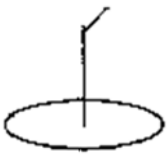
5
terminal leader completely browsed and <1/3 lateral branches browsed



6
terminal leader completely browsed and 1/3-2/3 lateral branches browsed



7
terminal leader and > 2/3 lateral branches browsed



Annual Survey Protocol

Surveys are conducted in 1/50th acre fixed-radius (radius = 16.6') plots around each plot center. 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. Bring Record the project site, plot number, date, and your initials at the top of the data sheet.

Plot Characteristics

CANOPY %: Measure canopy closure using a densiometer. Record in percent, averaging several readings if canopy closure seems to vary significantly.

Planted Trees

TREE#: Enter the seedling number. If a seedling is missing enter its number and "m" for missing in the A-D column.

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. If there is no brush competition record a "0".

GRASS: Classify grass competition using the appropriate grass competition code. If there is no grass competition record a "0".

PROT: Record the presence or absence of browse protection measures with the appropriate code. If there is no browse protection record a "0".

BRWS: Record the degree of browse using the appropriate browse classification code. If there is no browse record a "0".

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

DAM: Record damage using the appropriate seedling damage code. If there is no damage record a "0".

A-D: Record "A" if the seedling is alive, "d" if it appears dead, and "m" if it is missing. 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.*

Annual Survey Codes

TREE SPECIES CODES

Code	Scientific Name	Common Name
thpl	Thuja plicata	Western redcedar
tshe	Tsuga heterophylla	Western hemlock
abgr	Abies grandis	Grand fir
pisi	Picea sitchensis	Sitka spruce
psme	Pseudotsuga menziesii	Douglas fir
abam	Abies amabilis	Pacific silver fir
acma	Acer macrophyllum	Big-leaf maple
acci	Acer circinatum	Vine maple
alru	Alnus rubra	Red alder
potr	Populus trichocarpa	Black cottonwood
prse	Prunus serotina	Bitter cherry
other	na	Other (describe in notes)

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 (describe in notes)

SEEDLING DAMAGE CODES

ad	animal damage
bb	broken stem
bc	bud collar damage
bl	broken leader
cl	crooked leader
di	diseased/sick
dl	dead leader
dt	dead top
ml	multiple leaders
ms	multiple stems
sw	sweep
l	lean

Annual Data Sheet

Permanent Plot Card - Annual Survey

Project Site	Plot #	Date
Canopy %	Understory Release?	Plots by

Planted Trees

Tree #	Spp	Ht	Cal	Brush	Grass	Prot	Brws	Mul	Dam	MS	A-D

Notes