

## Long-Term Monitoring Plan



June 2012

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## List of Abbreviations and Acronyms

ARS	Agriculture Research Service
BCS	biological soil crust
BLM	Bureau of Land Management
CFR	Code of Federal Regulations
cm	centimeter
DIMA	Database for Inventory, Monitoring and Assessment
EDO	Elko District Office
ETWS	extra temporary workspace
FERC	Federal Energy Regulatory Commission
FWNF	Fremont-Winema National Forest
ft	foot
GPS	global positioning system
KFO	Kemmerer Field Office
KFRA	Klamath Falls Resource Area
LRA	Lakeview Resource Area
m	meter
MP	milepost
NRCS	Natural Resources Conservation Service
ODSL	Oregon Department of State Lands
OHV	off-highway vehicle
POD	Plan of Development
Project	Ruby Pipeline Project
PUP	Pesticide use Permit
QA	Quality Assurance
Reclamation	Bureau of Reclamation
ROW	right-of-way
Ruby	Ruby Pipeline, LLC
SFO	Surprise Field Office
SLFO	Salt Lake Field Office
SOP	Standard Operating Procedure
UWCNF	Uintah-Wasatch-Cache National Forest
USACE	U.S. Army Corps of Engineers
USFS	United States Forest Service
USFWS	U.S. Fish and Wildlife Service
WDO	Winnemucca District Office

# 1 Introduction

The restoration and revegetation plans [Appendix E of the Plan of Development (POD)] presented preliminary monitoring approaches for upland and wetland vegetation and defined revegetation success standards. Further, post-construction long-term monitoring of upland ROW and extra temporary workspace (ETWS), access roads, wetland, and riparian revegetation efforts is required by the Project's Final Environmental Impact Statement (FERC 2010) and the Record of Decision (BLM 2010). Wetland and riparian/stream monitoring will be conducted in accordance with the U.S. Army Corps of Engineers (USACE) stipulations (33 Code of Federal Regulations [CRF] § 332.6).

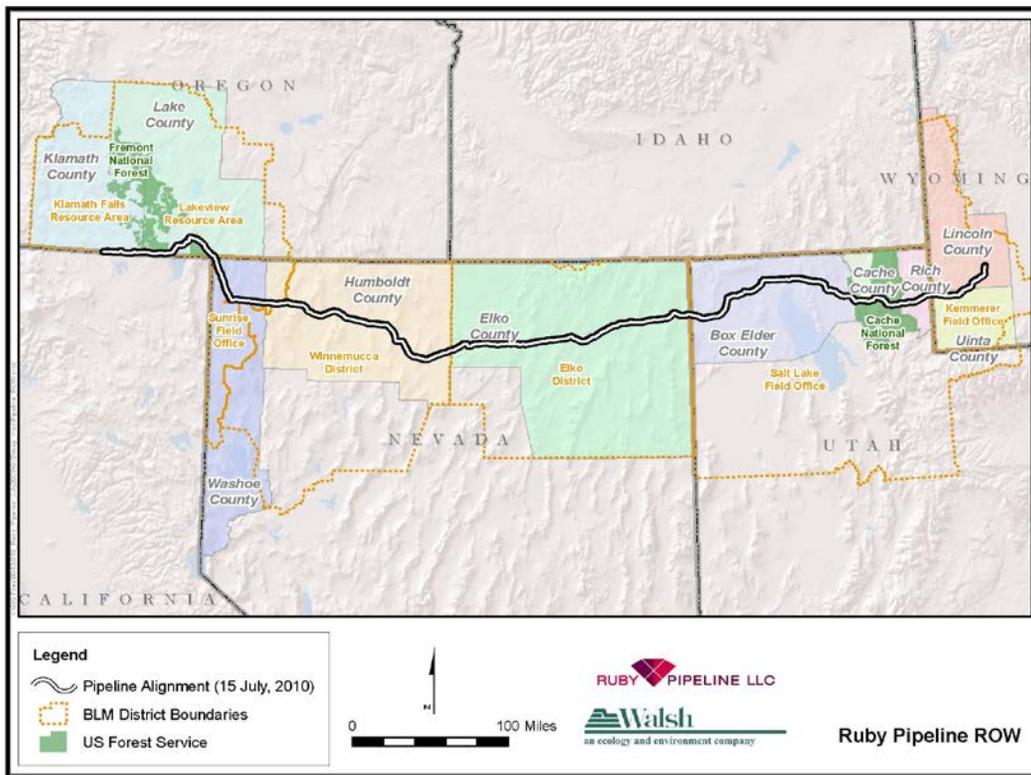
This Plan provides the standard operating procedures (SOPs) for the monitoring metrics and focuses on federal lands crossed by the Project but it will also apply to state and private lands as request by the landowner. The Project traverses lands managed by the Bureau of Land Management (BLM), U.S. Forest Service (USFS), and Bureau of Reclamation (Reclamation) (Figure 1-1). BLM lands include the Kemmerer Field Office (KFO), Salt Lake Field Office (SLFO), Elko District Office (EDO), Winnemucca District Office (WDO), Surprise Field Office (SFO), Lakeview Resource Area (LRA), and Klamath Falls Resource Area (KFRA). USFS lands include the Uinta-Wasatch-Cache National Forests (UWCNF) and the Fremont-Winema National Forests (FWNF). Reclamation lands are those managed by the Klamath Basin Area Office. The Project also traverses water bodies and wetlands under the jurisdiction of the USACE.

Vegetation monitoring will occur annually during the growing season for five years after the seeding and seedling transplanting is completed.<sup>1</sup> Annual monitoring will continue until the Federal Energy Regulatory Commission (FERC), and the appropriate land managing agencies concur that restoration and reforestation goals have been achieved for a given ROW segment, i.e., that a desirable perennial plant cover and soil surface stability have been established. Desirable plant cover would be permanent plant cover which would include seeded and planted seedling species and species that naturally become established. Noxious and invasive weeds are not desirable species. Monitoring would be conducted beyond the fifth year as agreed upon by FERC and the land management agencies if performance criteria have not been met (see Section 6, Performance Criteria).

Ruby will provide an annual post-restoration report to the land managing agencies documenting compliance with the restoration and revegetation plans (POD, Appendix E) and

the wetland, waterbody, and riparian restoration plan (POD, Appendix Q, Attachment L) as stated in Section 7, Monitoring Reports. The annual monitoring report will document progress in achieving soil stability and plant establishment.

The monitoring described in this document will be used to identify segments of the Project that require on-site review and further reclamation, restoration or weed management. Further site review and corrective action will take place across the ROW in the segment where monitoring plots identify the problem. As an example, if failed reclamation or weed infiltration is identified at one or more monitoring plots, the affected portion of the pipeline will then be assessed for the extent of the problem, and corrective action will be taken. This means, if monitoring plots at something like MP100, MP 120 and MP140 all have problems, the ROW would be assessed from at least MP 100 all the way through MP 140 or beyond for the problem(s) and corrective action (further seeding, grazing exclusion, spraying or other action) will be taken.



**Figure 1-1 Ruby Pipeline Right-Of-Way**

- 1 As part of its safety and operations activities, El Paso Corporation currently conducts monthly over flights of its entire pipeline system, including the Ruby Pipeline. These over flights are conducted to monitor third party excavation activities and assess the project for potential damage or leaks. During these over flights, conducted by fixed wing aircraft at approximately 1000 feet altitude, the staff will note any extraordinary areas showing erosion or complete vegetation failure. Should there be any such situations, Ruby will assess the problem and take appropriate action. Such corrective action will be reported to the affected land managing agency or landowner at the time the action is taken. However, these over flights and any related assessments are not part of the overall long term monitoring of project restoration success and will not be further addressed in this document. No formal monitoring reports will be generated as a result of these over flights.

## 2 Purpose of Plan

This Plan describes the procedures for long-term monitoring of the ROW upland, access roads, wetland, riparian, and extra work space revegetation; minimization of noxious and invasive weed establishment; and restoration of biological soil crust (BSC); This document also presents the SOPs for the monitoring metrics and criteria to judge revegetation success (Appendices A through F):

- Appendix A – Standard Operating Procedures for ROW Upland Seeded Area and Group 1 Access Road Monitoring;
- Appendix B – Standard Operating Procedures for ROW Upland Seedling Planting Area Monitoring;
- Appendix C – Standard Operating Procedures for Biological Soil Crust Monitoring;
- Appendix D – Standard Operating Procedures for Noxious and Invasive Weed Monitoring;
- Appendix E – Standard Operating Procedures for ROW Wetland and Riparian Area Monitoring; and
- Appendix F – Standard Operating Procedures for Wet Meadow Productivity in Nevada

Restoration and revegetation efforts will cease with successful establishment of a perennial plant cover for a given ROW segment as defined in Section 6, Performance Criteria. Ruby anticipates that successful restoration and revegetation efforts will vary for a given ROW segment because of differences in such things such as soil, terrain, grazing, and precipitation. Therefore, it is anticipated that various ROW segments will be released from restoration efforts and further monitoring at different times. Private landowners may request monitoring of revegetation success and soil stability on their land. No eligible or unevaluated cultural sites would be disturbed during monitoring efforts without a data recovery (mitigation) plan.

### **3 Summary of the Restoration and Revegetation Approach**

The purposes of the Project ROW restoration and revegetation (including reforestation on Spreads 6 and 7) efforts are to establish a perennial vegetation cover in accordance with FERC's guidelines on upland erosion control and revegetation (18 CRF § 380.15), minimize noxious and invasive weed establishment, stabilize the soil surface, and restore wildlife habitat. Restoration of the ROW and ETWS will consist of backfilling excavated subsoils, restoring pre-existing terrain contours, replacing the topsoil, installing erosion control devices, preparing seedbeds, performing weed abatement efforts, and seeding as appropriate, as fully described in the upland restoration and revegetation plans (POD, Appendix E) and wetland, waterbody, and riparian restoration plan (POD, Appendix Q, Attachment L).

Upland revegetation will be accomplished by the seeding of different grass, forb, and shrub seed mixtures correlated to the spatial arrangement of ecological sites along the ROW. Container-grown seedlings will be planted in high-quality sage-grouse and pygmy rabbit, pronghorn antelope and mule deer winter ranges, and forest areas. Wetland revegetation will be accomplished by using seed mixes specific to the ecoregion of wetland occurrence. There is only one seed mix for riparian areas across the Project. Container-grown shrubs and trees, and willow stakes will also be planted in wetland and riparian areas that had a woody plant component prior to pipeline construction. The seeding was started October 2010 and completed August 2011. The planting of the container-grown seedling was started May 2011 and is scheduled to be completed May 2012.

## 4 Monitoring Goals and Objectives

The establishment of a perennial plant cover is essential to achieving soil stability, BSC recovery, noxious and invasive weed abatement, and wildlife habitat restoration. Establishment of a perennial plant cover is the indicator of successful restoration as defined in Section 6, Performance Criteria. The goals of the Project's long-term monitoring program are to document that the revegetated plant community restoration, noxious and invasive weed abatement, and soil-surface stability objectives are being achieved; and to identify ROW segments where additional restoration work may be necessary. Ruby will meet with FERC, BLM, USFS, and Reclamation periodically to discuss restoration and revegetation success. Ruby is responsible for success at particular locations along the right of way until released by the FERC and any appropriate land managing agency, assuming that such release is not unreasonably withheld.

The establishment of the perennial vegetation cover will be assessed through the detailed evaluation of upland, wetland, and riparian monitoring plots. The monitoring plots will be placed in the various seed mix and seedling planting areas along the ROW as described in Section 5 to ensure adequate representation of the various ecological sites. Areas identified during pre-construction surveys as having a high infestation of noxious and invasive weeds will also be monitored after construction. All equipment wash stations will be examined for weed colonization. The ROW will also be monitored for newly established weed sites. Appropriate remedial action will occur to correct undesirable situations in consultation with FERC and the appropriate land management agencies.

While this document establishes the monitoring processes that will be used to assess project success with restoration, Ruby remains responsible for overall restoration of the ROW. Should company personnel, agency personnel or members of the public identify specific circumstances of concern not included in the monitoring program, Ruby will assess the success of restoration at such locations and take corrective action if agreed as necessary with the affected land managing agency or landowner.

The monitoring goals will be achieved by the following objectives:

- Identify appropriate monitoring plots for ROW uplands, decommissioned access roads, riparian/streams, wetlands, ETWS, noxious and invasive weed locations, and equipment wash stations;
- Develop detailed SOPs for the various monitoring metrics;
- Train field crews in applying the SOPs;
- Annually survey the monitoring plots to obtain data for the metrics being examined;

- Identify the cause of failed revegetation efforts and take action to correct the situation as necessary;
- Analyze and compare acquired monitoring data to the established performance criteria defined in Section 6;
- Conduct ROW restoration monitoring for five years<sup>1</sup>. Monitoring beyond the fifth year may occur as agreed upon with FERC and the land management agency ; and
- Prepare annual monitoring reports for submittal to FERC, BLM, USFS, Reclamation, USACE, ODSL, and USFWS after survey completion.

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<sup>1</sup> Monitoring will be done for 10 years at the sagebrush seedling sites and the Barrel Springs Traditional Cultural Property as called out on pages 5-26 and 5-27 of Appendix E of the Plan of Development.

## 5 Monitoring Approach

Separate monitoring protocols will be applied to the upland ROW, BSC, noxious and invasive weeds, wetlands and riparian areas, and equipment wash stations. Monitoring will begin in the spring of 2012 after the seeding and seedling planting efforts are completed and continue for five years. Monitoring may continue beyond year five as agreed upon by FERC and the land management agency. Negligible disturbance to soil, vegetation, and cultural resources within the ROW or control plots will occur during monitoring.

The approach to ROW monitoring will follow the protocols presented by Herrick et al. (2005a, 2005b). Training videos for applying these protocols are available at [http://usda-ars.nmsu.edu/monit\\_assess/videos\\_main.php](http://usda-ars.nmsu.edu/monit_assess/videos_main.php).

### 5.1 Upland ROW Monitoring

Upland revegetation was accomplished by seeding the ROW and other disturbed areas with ecological site-specific seed mixes. Shrub and trees seedlings were also planted in high-quality wildlife habitat areas and agreed upon by Ruby, FERC and the appropriate land management agency. Both the seeding and seedling revegetation efforts will be monitored.

#### 5.1.1 Seeded Areas

A long-term, quantitative monitoring program will document ROW vegetation establishment and soil-surface stability progress. If vegetation establishment and soil surface stability in a monitoring plot is not making progress towards the objectives, then the representative ROW will also be inspected to document the extent of the problem.

Ruby will use a stratified randomization process to select the permanent monitoring sites (Herrick et al. 2005b, Elzinga et al. 1998). The monitoring sites will consist of both ROW and control plots. Monitoring site stratification will be based on seed mix; BLM, USFS, or Reclamation office; and construction spread. Ideally, three sites per stratified unit will be randomly selected for monitoring. However, for some seed mix planting areas, the number of monitoring sites may be only one or two because of the availability of federal lands or length of the seeding area. The KFO has stipulated that monitoring sites be established in Wyoming on grazing allotment lands regardless of land ownership. Milepost (MP) will be used as the criterion for random site selection. Table 5.1-1 lists the 116 selected monitoring sites.

**Table 5.1-1 Seed Mix Monitoring Sites Located on Federal Lands**

State	Federal Landowner	Spread	Seed Mix	Milepost	coordX	coordY
Wyoming	KFO	1A	Sagebrush steppe	4.5	-110.368692	41.716792
Wyoming	KFO	1A	Sagebrush steppe	8.0	-110.396050	41.680020
Wyoming	KFO	1A	Salt-desert shrub	13.0	-110.479652	41.645102
Wyoming	KFO	1A	Salt-desert shrub	19.1	-110.552631	41.586457
Wyoming	KFO	1A	Salt-desert shrub	22.0	-110.599313	41.572008
Wyoming	KFO	1A	Sagebrush steppe	27.4	-110.677779	41.541307
Wyoming	KFO	1A	Mountain big sagebrush	33.0	-110.773561	41.523615
Wyoming	KFO	1A	Mountain big sagebrush	33.7	-110.845132	41.520132
Wyoming	KFO	1A	Sagebrush steppe	40.0	-110.896011	41.528464
Wyoming	KFO	1A	Sagebrush steppe	42.0	-110.934155	41.529317
Wyoming	KFO	1A	Sagebrush steppe	45.0	-110.987319	41.541245
Wyoming	KFO	1A	Mountain big sagebrush	47.0	-111.025453	41.540475
Utah	SLFO	1A	Basin big sagebrush	49.0	-111.064066	41.540546
Utah	SLFO	1A	Basin big sagebrush	50.0	-111.083479	41.540487
Utah	SLFO	1A	Black sagebrush	59.0	-111.235591	41.485559
Utah	SLFO	2A	Mountain big sagebrush	66.5	-111.505821	41.466370
Utah	UWCNF	2A	Forest Service	74.0	-111.505821	41.466370
Utah	SLFO	2A	Mountain big sagebrush	76.0	-111.540593	41.461887
Utah	SLFO	1B	Shadscale	152.0	-112.716734	41.763328
Utah	SLFO	1B	Shadscale	158.5	-112.838657	41.762998
Utah	SLFO	1B	Greasewood	167.0	-113.002438	41.762106
Utah	SLFO	1B	Greasewood	170.0	-113.060446	41.761735
Utah	SLFO	1B	Greasewood	173.2	-113.122286	41.759456
Utah	SLFO	3	Wyoming big sagebrush	176.0	-113.148581	41.724438
Utah	SLFO	3	Black sagebrush	185.0	-113.289929	41.654455
Utah	SLFO	3	Wyoming big sagebrush	192.0	-113.410723	41.635407
Utah	SLFO	3	Black sagebrush	196.0	-113.482724	41.625443

**Table 5.1-1 Seed Mix Monitoring Sites Located on Federal Lands**

State	Federal Landowner	Spread	Seed Mix	Milepost	coordX	coordY
Utah	SLFO	3	Wyoming big sagebrush	202.0	-113.572912	41.588223
Utah	SLFO	3	Black sagebrush	213.0	-113.714192	41.438790
Utah	SLFO	3	Shadscale	219.0	-113.827956	41.427090
Utah	SLFO	3	Shadscale	223.0	-113.902713	41.426267
Nevada	EDO	3	Black sagebrush	236.0	-114.135443	41.455810
Nevada	EDO	3	Low precipitation Wyoming big sagebrush	238.0	-114.173717	41.454307
Nevada	EDO	3	Low precipitation Wyoming big sagebrush	250.0	-114.366263	41.426423
Nevada	EDO	3	Black sagebrush	254.0	-114.442491	41.421095
Nevada	EDO	3	Shadscale	261.0	-114.576370	41.411135
Nevada	EDO	3	Black greasewood	263.0	-114.613924	41.404601
Nevada	EDO	3	Black greasewood	266.0	-114.670384	41.400788
Nevada	EDO	3	Low precipitation Wyoming big sagebrush	271.0	-114.765798	41.403097
Nevada	EDO	3	Black sagebrush	275.0	-114.837187	41.391968
Nevada	EDO	3	Low sagebrush	279.0	-114.911664	41.388978
Nevada	EDO	3	Low sagebrush	284.0	-114.999316	41.367087
Nevada	EDO	4	Low sagebrush	301.0	-115.269378	41.261222
Nevada	EDO	4	Low precipitation Wyoming big sagebrush	307.0	-115.374065	41.226814
Nevada	EDO	4	Low precipitation Wyoming big sagebrush	314.0	-115.496597	41.265521
Nevada	EDO	4	Black sagebrush	317.0	-115.546119	41.270441
Nevada	EDO	4	Black sagebrush	318.0	-115.564470	41.265038
Nevada	EDO	4	Black sagebrush	319.0	-115.582659	41.260447
Nevada	EDO	4	Low precipitation Wyoming big sagebrush	323.0	-115.658432	41.253233
Nevada	EDO	4	Low sagebrush	338.0	-115.941993	41.227867
Nevada	EDO	4	Mountain big sagebrush	343.0	-116.034241	41.211202

**Table 5.1-1 Seed Mix Monitoring Sites Located on Federal Lands**

State	Federal Landowner	Spread	Seed Mix	Milepost	coordX	coordY
Nevada	EDO	4	Low sagebrush	355.0	-116.259356	41.211583
Nevada	EDO	5	Big sagebrush + bitterbrush	372.0	-116.575359	41.221250
Nevada	EDO	5	Big sagebrush + bitterbrush	375.0	-116.630928	41.216461
Nevada	EDO	5	Low sagebrush	377.0	-116.668529	41.210800
Nevada	EDO	5	Low precipitation Wyoming big sagebrush	380.0	-116.724009	41.209087
Nevada	EDO	5	Low precipitation Wyoming big sagebrush	385.0	-116.815055	41.210519
Nevada	EDO	5	Big sagebrush + bitterbrush	390.0	-116.900081	41.185671
Nevada	EDO	5	Low precipitation Wyoming big sagebrush	392.0	-116.934958	41.173236
Nevada	WDO	5	Fuel break	395.0	-116.986403	41.155137
Nevada	WDO	5	Shadsale	399.0	-117.057337	41.133232
Nevada	WDO	5	Shadsale	406.0	-117.184173	41.102328
Nevada	WDO	5	Shadsale	488.0	-118.470264	41.509038
Nevada	WDO	5	Black greasewood	410.6	-117.271099	41.074325
Nevada	WDO	5	Low precipitation Wyoming big sagebrush	425.0	-117.51870	41.1152171
Nevada	WDO	5	Fuel break	445.0	-117.718097	41.322914
Nevada	WDO	5	Black greasewood	460.0	-117.966116	41.398885
Nevada	WDO	5	High precipitation Wyoming big sagebrush	486.0	-118.432698	41.508995
Nevada	WDO	5	Alkali sacaton	487.0	-118.451205	41.511480
Nevada	WDO	5	Black greasewood	499.0	-118.667840	41.472357
Nevada	WDO	5	Fuel break	501.0	-118.705080	41.479763
Nevada	WDO	5	Little sagebrush	505.0	-118.773639	41.505711
Nevada	WDO	5	Little sagebrush	507.0	-118.795761	41.527373
Nevada	WDO	5	Little sagebrush	510.0	-118.832428	41.557103

**Table 5.1-1 Seed Mix Monitoring Sites Located on Federal Lands**

State	Federal Landowner	Spread	Seed Mix	Milepost	coordX	coordY
Nevada	WDO	5	Mountain big sagebrush	513.0	-118.886735	41.565818
Nevada	WDO	5	Mountain big sagebrush	524.0	-119.094803	41.573702
Nevada	WDO	5	High precipitation Wyoming big sagebrush	529.0	-119.190020	41.568353
Nevada	WDO	5	Mountain big sagebrush	530.0	-119.208384	41.568706
Nevada	SFO	5	Low sagebrush	532.0	-119.245151	41.575239
Nevada	SFO	5	Low sagebrush	534.0	-119.282237	41.573215
Nevada	SFO	5	Low precipitation Wyoming big sagebrush	537.0	-119.339798	41.575135
Nevada	SFO	5	Fuel break	540.0	-119.397128	41.580443
Nevada	SFO	5	Mountain big sagebrush	544.0	-119.473244	41.585012
Nevada	SFO	5	Low precipitation Wyoming big sagebrush	545.0	-119.492898	41.586258
Nevada	SFO	5	Low precipitation Wyoming big sagebrush	547.0	-119.531481	41.588694
Nevada	SFO	5	Sandy big sagebrush	548.0	-119.550466	41.589888
Nevada	SFO	6	Sandy big sagebrush	550.0	-119.589131	41.592310
Nevada	SFO	6	Sandy big sagebrush	554.0	-119.665722	41.597171
Nevada	SFO	6	Sandy big sagebrush	558.0	-119.738592	41.593229
Nevada	SFO	6	Black greasewood	561.0	-119.767193	41.631155
Nevada	SFO	6	Black greasewood	565.0	-119.804599	41.681886
Nevada	SFO	6	Black greasewood	569.0	-119.829938	41.736724
Nevada	SFO	6	Low sagebrush	571.0	-119.841736	41.764109
Nevada	SFO	6	Mountain big sagebrush	575.0	-119.868281	41.818598

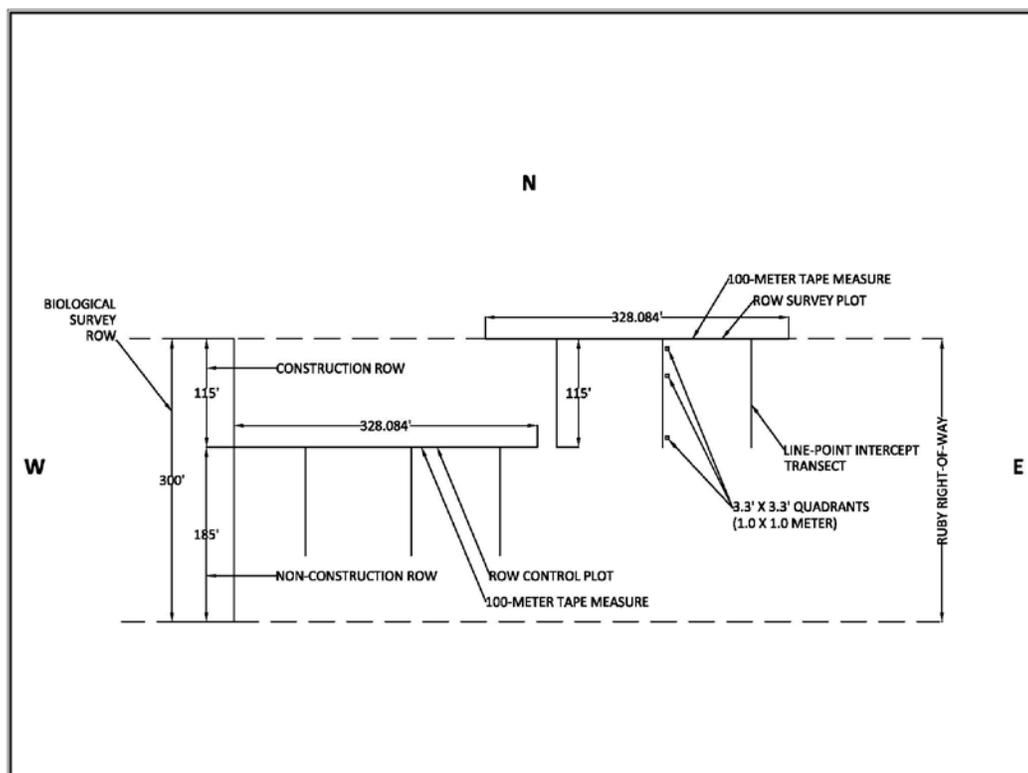
**Table 5.1-1 Seed Mix Monitoring Sites Located on Federal Lands**

State	Federal Landowner	Spread	Seed Mix	Milepost	coordX	coordY
Nevada	SFO	6	Mountain big sagebrush	576.0	-119.875291	41.832014
Nevada	SFO	6	Low sagebrush	580.0	-119.910440	41.883526
Nevada	SFO	6	Low sagebrush	586.0	-119.948718	41.965583
Oregon	LRA	6	Sagebrush steppe	592.0	-120.018699	42.025787
Oregon	LRA	6	Sagebrush steppe	594.0	-120.044852	42.044784
Oregon	LRA	6	Sagebrush steppe	599.0	-120.101457	42.100869
Oregon	FWNF	6	Forest	606.0	-120.206558	42.157455
Oregon	FWNF	6	Forest	607.0	-120.224773	42.162395
Oregon	FWNF	6	Forest	608.2	-120.243651	42.165722
Oregon	FWNF	7	Forest	638.0	-120.702174	42.001248
Oregon	FWNF	7	Forest	640.0	-120.740994	42.001848
Oregon	FWNF	7	Forest	648.0	-120.893093	42.009428
Oregon	FWNF	7	Scabland	639.8	-120.737322	42.001782
Oregon	FWNF	7	Scabland	641.19	-120.763657	42.005312
Oregon	KFRA	7	Low sagebrush	650.0	-120.931193	42.006124
Oregon	KFRA	7	Mountain big sagebrush	652.3	-120.973979	42.009953
Oregon	KFRA	7	Low sagebrush	657.0	-121.059240	41.994912
Oregon	Reclamation	7	Low sagebrush	662.33	-121.155476	42.005703
Oregon	Reclamation	7	Low sagebrush	665.17	-121.215293	42.002649
Oregon	KFRA	7	Mountain big sagebrush	663.0	-121.174557	41.999748
Oregon	KFRA	7	Mountain big sagebrush	666.2	-121.234329	42.000366
Oregon	KFRA	7	Low sagebrush	671.0	-121.325620	41.998526

The overarching objective of monitoring site establishment is to select sites that will be representative of the surrounding terrain, soils, vegetation, and land use through the stratified randomization process. However, some sites may prove not to be suitable because they would not be representative of the surrounding land use. Grazing allotments, wild horse range, and access road shapefiles obtained from the BLM and USFS would then be used to

help understand how land use may impact the monitoring sites. Ruby will also inspect the monitoring sites to determine if they could be disproportionately impacted from proximity to such things as concentrated livestock or wild horse grazing areas, watering and corral facilities, or roads.

The monitoring approach will follow the methods presented by Herrick et al. (2005a) (Appendix A). However, instead of using the spoke design for transect orientation as is the standard for the Herrick et al. approach, the monitoring and control plot transects will be established perpendicular to the ROW (Figure 5.1-1). The perpendicular placement of transects is appropriate for linear features such as riparian corridors and transportation infrastructure (Herrick et al 2005a; Duniway et al. 2010). Orienting transects perpendicular to ROW would better account for variability in the metrics and plant recruitment along the ROW sides from adjacent undisturbed vegetation than the spoke design.



**Figure 5.1-1 Establishment of the survey and control plots at a ROW monitoring site.**

The randomly selected monitoring sites will be verified in the field. If a site is not acceptable because of unforeseen excessive disturbances that is not representative of the surrounding

land use such OHV travel, wild horse, or big game use then the original site would be rejected and another location selected from a pool of substitute sites for a specific stratification that were randomly selected for this purpose.

The Wyoming, Utah, and Oregon monitoring sites will consist of ROW and control plots (Figure 5.1-1). The control plots will be adjacent to the ROW plots located within the 300-foot biological survey corridor not disturbed by the Project. Control plots will not be located in known sensitive biological or cultural areas. To the extent possible, the control plots will contain soil, aspect, and vegetation similar to that found on surrounding terrain. Control plots in Nevada will not be needed as their revegetation performance criteria are based on *in situ* ROW plant growth and soil surface stability compared with pre-defined performance standards provided by the BLM (see Section 6.1.1). Ruby recognizes Nevada's request that sampling control plots is not required to access reclamation success. However, Ruby will sample control plots to allow for the comparison of reclamation data across the length of the entire Project.

The monitoring and control plots will be GPS located and the same plots will be surveyed throughout the monitoring program. However, if the plots at a monitoring site become unacceptable for continued monitoring because of some event such as flooding, excessive OHV travel, or wildfire then new plots would be established. If the plots cannot be successfully relocated then other options would be explored with FERC and the appropriate land managing agencies. One such option would be monitoring site abandonment. The plot re-location discussion would take into account the number of years the plot has been monitored and the status of the vegetation and soil in meeting the performance criteria. In addition, as plots reach the success criteria, Ruby would not conduct further sampling of these plots. The federal land manager within the affected jurisdiction will be consulted in this regard.

A ROW monitoring plot will be 100 x 35 m (328 x 115 ft) or 100 x 59 m (328 x 195 ft) depending on ROW width (Figure 5.1-1). The three transects in a monitoring plot will be randomly located based on the meter marks along a 100-m metric tape. The tape measure will be located generally along the northern side of the ROW. A transect will be located at a ninety degree angle to the 100-m tape measure. The beginning and ending points will be GPS-located and marked with rebar. The same transects will be measured throughout the monitoring program. The control plots will also consist of three transects established in the same manner and orientation as the ROW transects.

Fifty points placed 0.5 meters apart will be scored for plant basal and foliar canopy cover, litter cover, bare ground, or BSC cover (Herrick et al. 2005a). These metrics are indicators of plant establishment and soil stability which are important attributes to assessing revegetation success on the ROW. The number of point intercepts will depend on the length of the transect.

A 1.0 x 1.0 meter quadrant will be randomly located three times along the line-point intercept transects. Meter marks along the tape measure would be used to randomly select the three plot locations. The one-meter quadrant will be used to measure plant species density, species richness, and BSC occurrence (Herrick et al. 2005b). Surface soil and subsoil samples for the soil aggregate stability test will be obtained from the center of the quadrants. The quadrant will be oriented to a transect by placing one corner at the randomly chosen meter mark with the other corner placed at the next higher meter mark.

Ruby will follow the guidelines of Herrick et al. (2005b) for determining the appropriate number of plots and transects per plot that are necessary to adequately monitor a seeding area. Generally, there are three monitoring sites and three transects per site for each seed area stratification. This level of sampling will be sufficiently robust according to Herrick et al.'s Option 1 and 2 for determining sample size. Options 1 and 2 define the number of samples needed to detect vegetation change based on pre-defined plant community attributes.

Ruby will use the data collected from the first year of monitoring to calculate the statistically robust number of monitoring sites and transects per site needed for years 2 through 5 sampling using Herrick's et al. Option 3. Option 3 calls for the use of statistical equations to determine the required number of monitoring sites and transects needed per monitoring unit.

Photographic documentation of vegetation and soils along transects will occur per instruction in Appendix A following the guidelines of Herrick et al. (2005a). A GPS-referenced digital photograph will be taken. The digital camera will be placed at the beginning of a transect and it will be focused along the length of the transect. Photograph identification cards will show site, transect number, date, direction, and crew number.

In addition to the measurement of plant community metrics, qualitative observations of specific disturbances that may hinder plant establishment such as grazing and off-highway vehicle (OHV) impacts will be documented at all monitoring sites (Table 5.1-2). The level of OHV travel will be based on the percentage of the monitoring site covered with tire marks. Grazing would include livestock, big game, and wild horses. The level of grazing would be judged based on apparent plant consumption, hoof prints, and fecal droppings covering the

monitoring site. ROW and control plots will be assessed separately at a monitoring site. Corrective action will be addressed with the BLM when grazing or OHV travel is greater than Class 4.

**Table 5.1-2 Grazing and Off-Highway Vehicle Travel Index**

Index Class	Definition
1	No apparent grazing, fecal droppings, or hoof prints; or OHV tire marks in the plot.
2	<10 percent plants grazed, fecal droppings or hoof prints; or OHV tire marks in the plot
3	10-25 percent plants grazed, fecal droppings or hoof prints; or OHV tire marks in the plot
4	25-50 percent plants grazed, fecal droppings or hoof prints; or OHV tire marks in the plot
5	>50 percent plants grazed or fecal droppings or hoof prints; or OHV trend marks in the plot OHV trend marks in the plot

### 5.1.2 Seedling Planting Areas

Various taxa of sagebrush, little leaf horsebrush, antelope bitterbrush, and curleaf mountain mahogany seedlings were planted in appropriate locations to facilitate habitat restoration. Monitoring of the seedling planting areas will document seedling survival. A stratified random sample will be used to select the monitoring sites based on MP. Three monitoring plots will be established per seedling species mix; federal land management office; and construction spread (Table 5.1-.3). For some seedling planting areas, the number of monitoring sites may be fewer because of the limited availability of federal lands or length of the planting area. If a site becomes unavailable for continued monitoring as with the seed area monitoring sites, then a plot relocation discussion would be held with FERC and the appropriate land management agency.

**Table 5.1-3 Seedling Monitoring Plots Located on Federal Lands**

State	Federal Landowner	Spread	Seedling Species	Milepost	coordX	coordY
Wyoming	KFO	1A	Wyoming big sagebrush	7.0	-110.3808821	41.6882244
Wyoming	KFO	1A	Wyoming big sagebrush	18.0	-110.5355463	41.5960150

**Table 5.1-3 Seedling Monitoring Plots Located on Federal Lands**

State	Federal Landowner	Spread	Seedling Species	Milepost	coordX	coordY
Wyoming	KFO	1A	Wyoming & mountain big sagebrush	31.0	-110.7353562	41.5214886
Wyoming	KFO	1A	Wyoming & mountain big sagebrush	33.0	-110.7734497	41.5236245
Wyoming	KFO	1A	Wyoming & mountain big sagebrush	34.0	-110.7922312	41.5205911
Wyoming	KFO	1A	Wyoming big sagebrush	42.0	-110.9341119	41.5293135
Utah	SLFO	1A	Basin big sagebrush	49.0	-111.0642259	41.5405457
Utah	SLFO	1A	Basin big sagebrush	50.0	-111.0837735	41.5404862
Utah	SLFO	1A	Black sagebrush	59.0	-111.2356553	41.4855378
Utah	SLFO	1A	Black sagebrush	60.2	-111.2567600	41.4790583
Utah	SLFO	3	Black sagebrush	185.0	-113.2899312	41.6544543
Utah	SLFO	3	Black sagebrush	196.0	-113.4824887	41.6254268
Utah	SLFO	3	Black sagebrush	229.0	-114.0098121	41.4532426
Nevada	EDO	3	Wyoming big sagebrush	261.3	-114.5817137	41.4102064
Nevada	EDO	3	Wyoming big sagebrush	264.5	-114.6423531	41.3996451
Nevada	EDO	3	Black sagebrush	277.0	-114.8741681	41.3929794
Nevada	EDO	3	Low & black sagebrush	279.0	-114.9119513	41.3888805
Nevada	EDO	4	Wyoming big & black sagebrush	302.0	-115.2858581	41.2537983
Nevada	EDO	4	Wyoming big & black	304.0	-115.3195260	41.2397715

**Table 5.1-3 Seedling Monitoring Plots Located on Federal Lands**

State	Federal Landowner	Spread	Seedling Species	Milepost	coordX	coordY
			sagebrush			
Nevada	EDO	4	Black sagebrush	311.0	-115.4444462	41.2465602
Nevada	EDO	4	Black sagebrush	317.0	-115.5463537	41.2703943
Nevada	EDO	4	Black sagebrush	319.0	-115.5823987	41.2604848
Nevada	EDO	4	Wyoming big sagebrush	320.5	-115.6110659	41.2573997
Nevada	EDO	4	Wyoming big sagebrush	340.4	-115.9868447	41.2208024
Nevada	EDO	4	Low sagebrush	352.0	-116.2019240	41.2126203
Nevada	EDO	4	Low sagebrush	363.0	-116.4091798	41.2079161
Nevada	EDO	4	Low sagebrush	365.0	-116.4464256	41.2068356
Nevada	EDO	4	Basin & Wyoming big sagebrush	372.0	-116.5755549	41.2212427
Nevada	WDO	5	Little leaf horsebrush	480.1	-118.333697621	41.4682960016
Nevada	WDO	5	Little leaf horsebrush	480.7	-118.340023608	41.4757666931
Nevada	WDO	5	Mountain & Wyoming big sagebrush	513.0	-118.8864922	41.5658358
Nevada	WDO	5	Mountain & Wyoming big sagebrush	517.0	-118.9621654	41.5714373
Nevada	WDO	5	Wyoming big sagebrush	528.0	-119.1708236	41.5689646
Nevada	WDO	5	Mountain & Wyoming big sagebrush	530.0	-119.2085598	41.5687798
Nevada	SFO	5	Low sagebrush	532.0	-119.2450561	41.5751767
Nevada	SFO	5	Low	534.0	-119.2822433	41.5732152

**Table 5.1-3 Seedling Monitoring Plots Located on Federal Lands**

State	Federal Landowner	Spread	Seedling Species	Milepost	coordX	coordY
			sagebrush			
Nevada	SFO	5	Wyoming big sagebrush	537.0	-119.3399036	41.5751494
Nevada	SFO	5	Wyoming big sagebrush	538.0	-119.3777661	41.5762209
Nevada	SFO	5	Mountain & Wyoming big sagebrush	543.0	-119.4544089	41.5838149
Nevada	SFO	5	Mountain & Wyoming big sagebrush	545.0	-119.4929167	41.5862593
Nevada	SFO	5	Basin & Wyoming big sagebrush	549.0	-119.5698290	41.5911023
Nevada	SFO	6	Basin big & low sagebrush	560.0	-119.7577639	41.6186574
Nevada	SFO	6	Basin big sagebrush	563.3	-119.7889267	41.6604196
Nevada	SFO	6	Low sagebrush	584.0	-119.9355274	41.9383694
Nevada	SFO	6	Low sagebrush	586.0	-119.9487230	41.9656145
Oregon	FWNF	6	Ponderosa pine	603.0	-120.1548920	42.1373951
Oregon	FWNF	6	Ponderosa pine	605.5	-120.1979871	42.1541553
Oregon	FWNF	6	Ponderosa pine	611.5	-120.2952503	42.1558263
Oregon	FWNF	7	Ponderosa pine	638.0	-120.7022134	42.0012483
Oregon	FWNF	7	Ponderosa pine	640.0	-120.7410145	42.0018521
			Ponderosa pine	643.5	-120.8059042	42.0148344
Oregon	KFRA	7	Bitterbrush & curleaf	652.0	-120.9680333	42.0115895

**Table 5.1-3 Seedling Monitoring Plots Located on Federal Lands**

State	Federal Landowner	Spread	Seedling Species	Milepost	coordX	coordY
			mountain mahogany			
Oregon	KFRA	7	Ponderosa pine	654.7	-121.0145514	41.9968762
Oregon	Reclamation	7	Bitterbrush & curleaf mountain mahogany	664.0	-121.1938378	42.0013879
Oregon	Reclamation	7	Bitterbrush & curleaf mountain mahogany	660.0	-121.1139912	42.0020974
Oregon	KFRA	7	Ponderosa pine	666.3	-121.2359150	42.0011106
Oregon	KFRA	7	Bitterbrush & curleaf mountain mahogany	671.0	-121.3256602	41.9985317

The permanent monitoring sites will consist of ROW plots in Wyoming, Utah, Nevada, and Oregon. GPS coordinates will locate the plots. Plot size will be approximately 100 x 35 m (328 x 115 ft) or 100 x 59 m (328 x 195 ft) depending on ROW width. Seedling survival will be assessed by recording the number of live seedlings versus number planted or number dead plants in the plot (Appendix B). GPS-located photographic documentation of the seedlings will occur for each sampling season. In addition to the measurement of plant community metrics, qualitative observations of specific disturbances that may hinder plant establishment such as grazing and OHV impacts will be documented using the index presented in Table 5.1-2.

## 5.2 Biological Soil Crust Monitoring

BSC monitoring will occur to document its recovery rate on the ROW. The occurrence of BSC is an indicator of soil surface stability (Belnap et al. 2001).

BSC monitoring will occur in areas along the ROW in Utah and Nevada that have been identified as supporting BSC communities based on the spatial analysis of soil and plant community attributes (Table 5.2-1). One area in Spread 5 was treated with mycorrhizal

inoculums to evaluate if it would increase the rate of BSC recovery. A monitoring plot at each location will be approximately 30 x 30-feet, centered in the ROW with its approximately eastern boundary lined with the beginning MP in Table 5.2-1. The plot will be located via GPS for future reference. A 30 x 30-foot reference plot will be placed outside of the ROW in areas not disturbed by the Project that is within the 300-foot biological survey corridor and that has similar vegetation and soils attributes and aspect, to the greatest extent possible. A quadrant (25 x 25 centimeters [cm]) will be used to measure BSC cover by morphological group (Appendix C). Approximately 15 quadrants will be randomly placed within the macro plots. Monitoring will occur once per year in conjunction with the revegetation monitoring. Photographs will also document BSC establishment. BSC occurrence by morphologic group will also be recorded as part of the upland ROW monitoring effort.

**Table 5.2-1 Potential High Quality Biological Soil Crusts Sites Identified in Western Utah and Nevada**

State	Spread	Federal Landowner	MP	coordX	coordY
Utah	1B	SLFO	158.5–158.6	41.76297369	-112.8436948
Nevada	3	EDO	254.0–262.0	41.41522163	-114.5510574
Nevada	5	WDO	487.8–499.5	41.50126041	-118.4052221
Nevada <sup>1</sup>	5	WDO	493.00-493.13	41.481520	-118.559464

<sup>1</sup> Area inoculated with mycorrhizha using AM 120™

### 5.3 Noxious and Invasive Weed Monitoring

The noxious (as defined by state noxious weed law) and invasive weed monitoring program will assess weed establishment within the ROW, wetland and riparian areas, and equipment cleaning stations (POD, Appendix H and Appendix C). Noxious and invasive weed monitoring will focus on high infestation areas (relative cover >26 percent except for Oregon wetlands which is >10 percent) identified by the pre-construction surveys (Table 5.3-1). Weed establishment will also be ascertained in the ROW seed mix and seedling long-term monitoring plots (Tables 5.1-1 and 5.1-3). Weed monitoring will focus on identifying high-infestation sites and appropriate management actions for weed abatement (Appendix D). Ruby would not treat certain widespread invasive species that are not legally considered noxious, such as cheatgrass and Russian thistle, unless treatment is needed to ensure the success of Ruby's Restoration and Revegetation Plan (Appendix H Noxious and Invasive Weed Control Plan).

The Sheldon National Wildlife area weed monitoring program will be addressed under a separate agreement with the USFWS.

Ruby will focus its weed survey within the construction ROW. If a weed population is >26% in the construction corridor it will be treated. Ruby will work with BLM to also treat areas within the 300-ft ROW.

The FWNF will be conducting their own weed monitoring and control on their lands along the ROW and access roads. Ruby has agreed to provide additional funding in the Cost Recovery Account to help fund this activity in 2012. Ruby would provide newly discovered weed locations, species, and infestation levels of to the FWNF based on the weed surveys. The target goal for the FWNF is zero percent weed cover at all sites.

In addition, FWNF requested that loading/unloading areas (within FERC's 30' approval width for access roads) also be monitored for weed introduction and reclamation stability. Specifically, the loading/unloading areas that received major use were in the vicinity of Rogger Meadow (Spread 6 road junctions of L10, L7, L6, L5) and in the vicinity of road junction CT17, L17, L16 on Spread 7.

The ROW will be monitored for newly established (post-construction) weed areas as part of normal operation activities. Also, reports from BLM or other agencies on newly established weed sites would be verified during the weed monitoring surveys. These post-construction weed sites will not be subject to the >26% relative cover threshold for treatment. The newly established weed sites will be treated regardless of relative cover and the presence of weeds outside of the ROW.

The high-density weed monitoring sites identified in the 2008 and 2009 field surveys for the Project will be monitored twice a year. As populations of noxious weeds were identified in the Project area by MP during construction, the list of weed monitoring sites will be adjusted and updated as needed. The monitoring metric is percent relative plant cover by species. Ideally, total relative cover of noxious or invasive weeds would be less than 26 percent. Photographs will be collected at GPS located photo points.

**Table 5.3-1 Noxious and Invasive Weed Monitoring Sites Located on Federal Lands<sup>1</sup>**

State	Federal Landowner	Spread	Monitoring needs	Milepost	Id No.	coordX	coordY
<b>ROW and facility weed monitoring sites</b>							

**Table 5.3-1 Noxious and Invasive Weed Monitoring Sites Located on Federal Lands<sup>1</sup>**

State	Federal Landowner	Spread	Monitoring needs	Milepost	Id No.	coordX	coordY
Wyoming	KFO	1A	Musk thistle	47.69	NW-389-007	41.550190	-111.035470
Utah	SLFO	1A	Musk thistle	50.56	NW-389-004	41.540210	-111.090780
Nevada	EDO	3	Russian knapweed	241.44	NW-31-008	41.462930	-114.188790
Nevada	EDO	5	Hoary cress (whiteweed)	382.71	NW-378-002	41.206710	-116.742100
Nevada	EDO	5	Hoary cress (whiteweed)	386.59	NW-431-002		
Nevada	WDO	5	Hoary cress (whiteweed)	492.77	NW-12-006	41.500840	-118.495730
Nevada	WDO	5	Hoary cress (whiteweed)	514.17	NW-23-001	41.561500	-118.847180
Nevada	SFO	6	Downy brome	562.00	NW-13-001	41.596610	-119.740850
Oregon	LRA	6	Canadian thistle	605.73	NW-174-001	42.129530	-120.137740
Oregon	FWNF	6	Thistle	609.15	NW-20-003	42.152610	-120.193510
Oregon	LRA	6	Bull thistle	614.02	NW-173-020	42.183500	-120.293050
Oregon	LRA	7	Canadian thistle	614.59	NW-333-002	42.195430	-120.351190
Oregon	LRA	7	Scotch thistle	614.78	NW-184-017	42.187720	-120.366040
Oregon	LRA	7	Canadian thistle	615.01	NW-155-003	42.160980	-120.291520
Oregon	LRA	7	Canada thistle	618.49	NW-152-004	42.125580	-120.322280
Oregon	LRA	7	Canada thistle	618.51	NW-152-005	42.125860	-120.322860
Oregon	LRA	7	Medusahead	619.05	NW-	42.122330	-120.332150

**Table 5.3-1 Noxious and Invasive Weed Monitoring Sites Located on Federal Lands<sup>1</sup>**

State	Federal Landowner	Spread	Monitoring needs	Milepost	Id No.	coordX	coordY
			rye		152-002		
Oregon	LRA	7	Canada thistle	619.30	NW-21-010	42.123080	-120.338780
Oregon	LRA	7	Field bindweed	619.30	NW-21-011	42.123310	-120.338980
Oregon	LRA	7	Whitetop (hoary cress)	619.34	NW-152-034	42.120130	-120.336950
Oregon	LRA	7	Canada thistle	619.36	NW-152-008	42.120210	-120.337510
Oregon	LRA	7	Canada thistle	619.36	NW-152-009	42.120230	-120.337620
Oregon	LRA	7	Field bindweed	619.37	NW-21-012	42.122780	-120.341200
Oregon	LRA	7	Canada thistle	619.39	NW-21-026	42.122550	-120.342530
Oregon	LRA	7	Field bindweed	619.40	NW-12-013	42.122500	-120.342780
Oregon	LRA	7	Canada thistle	619.45	NW-152-023	42.118270	-120.336710
Oregon	LRA	7	Poison hemlock	619.46	NW-152-020	42.118170	-120.336860
Oregon	LRA	7	Canada thistle	619.47	NW-152-022	42.118000	-120.336740
Oregon	LRA	7	Medusahead rye	619.50	NW-361-006	42.118270	-120.338710
Oregon	LRA	7	Scotch thistle	621.16	NW-471-001	0.000000	0.000000
Oregon	LRA	7	Scotch thistle	621.19	NW-416-003	42.097850	-120.356710
Oregon	LRA	7	Scotch thistle	621.60	NW-471-002	0.000000	0.000000
Oregon	LRA	7	Scotch thistle	622.74	NW-21-	42.106010	-120.388540

**Table 5.3-1 Noxious and Invasive Weed Monitoring Sites Located on Federal Lands<sup>1</sup>**

State	Federal Landowner	Spread	Monitoring needs	Milepost	Id No.	coordX	coordY
					008		
Oregon	LRA	7	Scotch Thistle	622.78	NW-21-007	42.105980	-120.389300
Oregon	LRA	7	Quackgrass	629.12	NW-21-022	42.056040	-120.503300
Oregon	LRA	7	Medusahead rye	637.07	NW-384-001	42.008730	-120.604780
Oregon	LRA	7	Medusahead rye	637.07	NW-384-001	42.008730	-120.604780
Oregon	FWNF	7	Medusahead rye	648.15	NW-175-003	42.014620	-120.812460
Oregon	FWNF	7	Medusahead rye	648.16	NW-156-017	42.014530	-120.812780
Oregon	KFRA	7	Quackgrass	651.80	NW-21-037	42.033250	-120.885760
Oregon	KFRA	7	Musk thistle	656.06	NW-332-005	42.011360	-120.962690
Oregon	KFRA	7	Medusahead rye	656.37	NW-332-008	42.011680	-120.968920
Oregon	KFRA	7	Canada thistle	656.51	NW-332-009	42.011230	-120.971470
Oregon	KFRA	7	Medusahead rye	659.21	NW-332-017	41.996470	-121.017940
Oregon	KFRA	7	Medusahead rye	659.31	NW-332-019	41.996340	-121.019890
Oregon	KFRA	7	Medusahead rye	659.32	NW-332-020	41.996290	-121.020140
Oregon	KFRA	7	Medusahead rye	659.33	NW-332-021	41.995780	-121.020020
Oregon	KFRA	7	Medusahead rye	661.29	NW-332-043	41.994960	-121.057720
Oregon	KFRA	7	Medusahead rye	661.47	NW-	41.995250	-121.061080

**Table 5.3-1 Noxious and Invasive Weed Monitoring Sites Located on Federal Lands<sup>1</sup>**

State	Federal Landowner	Spread	Monitoring needs	Milepost	Id No.	coordX	coordY
					332-047		
Oregon	KFRA	7	Medusahead rye	661.55	NW-332-072	41.994850	-121.062760
Oregon	KFRA	7	Medusahead rye	661.57	NW-332-051	41.995040	-121.063120
Oregon	KFRA	7	Medusahead rye	661.80	NW-332-068	41.995080	-121.067630
Oregon	KFRA	7	Medusahead rye	661.96	NW-332-059	41.995720	-121.070610
Oregon	KFRA	7	Medusahead rye	662.14	NW-332-114	41.995510	-121.074150
Oregon	KFRA	7	Medusahead rye	662.17	NW-332-113	41.995140	-121.074740
Oregon	KFRA	7	Medusahead rye	662.20	NW-332-111	41.995120	-121.075310
Oregon	KFRA	7	Medusahead rye	662.25	NW-332-110	41.995350	-121.076280
Oregon	KFRA	7	Medusahead rye	662.41	NW-332-106	41.995720	-121.079380
Oregon	KFRA	7	Medusahead rye	662.51	NW-332-104	41.995600	-121.081280
Oregon	KFRA	7	Medusahead rye	662.55	NW-332-103	41.995600	-121.082010
Oregon	KFRA	7	Medusahead rye	662.68	NW-332-101	41.996150	-121.084660
Oregon	KFRA	7	Medusahead rye	662.74	NW-332-098	41.996100	-121.085710
Oregon	KFRA	7	Medusahead rye	662.76	NW-332-097	41.996350	-121.086150
Oregon	KFRA	7	Medusahead rye	663.94	NW-332-137	41.996500	-121.109860
Oregon	KFRA	7	Medusahead rye	664.28	NW-	41.997440	-121.118320

**Table 5.3-1 Noxious and Invasive Weed Monitoring Sites Located on Federal Lands<sup>1</sup>**

State	Federal Landowner	Spread	Monitoring needs	Milepost	Id No.	coordX	coordY
					332-132		
Oregon	KFRA	7	Medusahead rye	664.35	NW-332-130	41.997240	-121.120730
Oregon	KFRA	7	Medusahead rye	664.76	NW-332-126	41.997540	-121.126540
Oregon	KFRA	7	Medusahead rye	665.96	NW-332-119	41.997620	-121.140220
Oregon	KFRA	7	Medusahead rye	666.14	NW-344-002	41.996740	-121.143720
Oregon	KFRA	7	Medusahead rye	666.54	NW-344-004	41.996680	-121.144560
Oregon	KFRA	7	Medusahead rye	666.60	NW-383-036	42.006660	-121.153040
Oregon	KFRA	7	Medusahead rye	666.70	NW-344-011	41.998920	-121.149680
Oregon	Reclamation	7	Medusahead rye	666.76	NW-344-013	41.999170	-121.151100
Oregon	KFRA	7	Medusahead rye	666.90	NW-344-016	41.999210	-121.154370
Oregon	KFRA	7	Medusahead rye	668.10	NW-332-157	42.000160	-121.179600
Oregon	KFRA	7	Medusahead rye	668.25	NW-332-143	42.000230	-121.182510
Oregon	KFRA	7	Medusahead rye	668.72	NW-332-148	42.001140	-121.191560
Oregon	KFRA	7	Medusahead rye	668.80	NW-332-150	42.001250	-121.193210
Oregon	KFRA	7	Medusahead rye	668.88	NW-156-016	42.001430	-121.194680
Oregon	KFRA	7	Medusahead rye	668.88	NW-332-151	42.001390	-121.194690
Oregon	KFRA	7	Bull thistle	669.46	NW-37-	42.049160	-121.190300

**Table 5.3-1 Noxious and Invasive Weed Monitoring Sites Located on Federal Lands<sup>1</sup>**

State	Federal Landowner	Spread	Monitoring needs	Milepost	Id No.	coordX	coordY
					001a		
Oregon	KFRA	7	Bull thistle	669.46	NW-37-001b	42.049170	-121.189190
Oregon	KFRA	7	Bull thistle	669.46	NW-47-001	42.049540	-121.197930
Oregon	KFRA	7	Bull thistle	669.87	NW-20-006a	42.056500	-121.229200
Oregon	KFRA	7	Medusahead rye	669.87	NW-382-042	42.107940	-121.222820
Oregon	KFRA	7	Bull thistle	669.88	NW-36-001	42.050060	-121.233080
Oregon	KFRA	7	Medusahead rye	673.84	NW-156-009	42.000680	-121.287080
Oregon	KFRA	7	Medusahead rye	674.16	NW-156-008	42.000970	-121.293200
Oregon	KFRA	7	Medusahead rye	674.24	NW-156-012	41.999860	-121.294790
Oregon	KFRA	7	Bull thistle	674.25	NW-20-006b	42.058020	-121.291260
Oregon	KFRA	7	Quackgrass	675.27	NW-332-159	41.999150	-121.313910
Oregon	KFRA	7	Quackgrass	675.29	NW-332-158	41.999250	-121.314390
Oregon	KFRA	7	Bull thistle	676.75	NW-175-004	41.997890	-121.342010
Oregon	KFRA	7	Quackgrass	677.61	NW-25-008	42.040540	-121.366360
Oregon	KFRA	7	Quackgrass	677.61	NW-25-011	42.045170	-121.360700
Oregon	KFRA	7	Perennial pepperweed	677.61	NW-383-001	42.017950	-121.600060
Oregon	KFRA	7	Perennial pepperweed	677.61	NW-	42.017870	-121.598640

**Table 5.3-1 Noxious and Invasive Weed Monitoring Sites Located on Federal Lands<sup>1</sup>**

State	Federal Landowner	Spread	Monitoring needs	Milepost	Id No.	coordX	coordY
					383-002		
<b>Weed cleaning stations</b>							
Utah	KFO	2	Weed presence	48	CS-UT-1	41.5406488 9050	-111.0459048040
Utah	SLFO	1B	Weed presence	123	CS-UT-17	41.6273701 6560	-112.2523128510
Nevada	SLFO	3	Weed presence	230	CS-NV-1	41.4577026 2860	-114.040349740
Nevada	EDO	3	Weed presence	239	CS-NV-2C	41.4631308 8880	-114.1888548270
Nevada	WDO	5	Weed presence	490	CS-NV-11B	41.5008114 9240	-118.4957470200
Nevada	WDO	5	Weed presence	509	CS-NV-13	41.5912366 1990	-119.5697636660
Oregon	SFO	5	Weed presence	588	CS-OR-1	41.9950894 5950	-119.9645607300
Oregon	LRA	6	Weed presence	605	CS-OR-2	42.1528662 1890	-120.1935026820
Oregon	FWNF	6	Weed presence	609	CS-OR-3	42.1685835 7410	-120.2564925720
Oregon	LRA	7	Weed presence	639	CS-OR-8	42.0018800 5500	-120.7267379850
Oregon	FWNF	7	Weed presence	646	CS-OR-10	42.0138896 2500	-120.8471340670
Oregon	FWNF	7	Weed presence	652	CS-OR-10B	42.0094782 8400	-120.9752332460
Oregon	KFRA	7	Weed presence	655	CS-OR-11	41.9958831 8140	-121.0209006910
Oregon	KFRA	7	Weed presence	656	CS-OR-12	41.9943044 3140	-121.0363717460
Oregon	KFRA	7	Weed presence	656	CS-OR-13	41.9946791 0700	-121.0470222620
Oregon	KFRA	7	Weed presence	656	CS-OR-11B	41.9942322 2210	121.03215851400

**Table 5.3-1 Noxious and Invasive Weed Monitoring Sites Located on Federal Lands<sup>1</sup>**

State	Federal Landowner	Spread	Monitoring needs	Milepost	Id No.	coordX	coordY
Oregon	KFRA	7	Weed presence	656	CS-OR-12B	41.9941503 2720	-121.0397380770
Oregon	KFRA	7	Weed presence	657	CS-OR-13B	41.9949084 6830	-121.0531857630
Oregon	KFRA	7	Weed presence	662	CS-OR-14	42.0043211 0370	-121.1596365610
Oregon	KFRA	7	Weed presence	664	CS-OR-14B	42.0016396 3390	-121.1947605760

<sup>1</sup> Information from "Noxious\_Weeds\_Table\_9May2011.xlsx"

A visual assessment will be used to assess relative cover of weeds at a monitoring site. Control plots will not be necessary because the presence or absence of weeds will be assessed. If weeds are present, then their relative cover will be visually assessed. The Daubenmire cover-class scale (Elzinga et al. 1998) will be used to define relative cover by weed species in relationship to the other plant species present in the monitoring plot (Table 5.3-2). The size of the monitoring plot would vary depending on the extent of the weed infestation. The surveyor will evaluate the plant community at the monitoring plot and assign a Daubenmire cover class to noxious and invasive weeds and desirable plants.

**Table 5.3-2 Daubenmire Plant Cover Class Scale**

Plant Cover Class	Range of Plant Cover (%)
6	96-100
5	76-95
4	51-75
3	26-50
2	6-25
1	0-5

The need for treatment will be determined based on the relative cover of noxious or invasive weeds on the ROW, the potential to inhibit desirable plant establishment, and weed cover adjacent to the ROW of land not disturbed by the Project. The need for weed abatement

procedures will be discussed with BLM, USFS, or Reclamation as appropriate prior to treatment application. Treating weeds on the ROW will not be effective abatement if there is a weed seed source in the immediate vicinity. Ruby would be responsible for weed treatments on the ROW. The reseeded area may be necessary to reduce the chances of weed re-establishment after a treatment prescription. In the event that large weed infestations occur or reoccur, an evaluation would determine causes of infestation or re-infestation and an appropriate strategy for abatement. Any significant changes in weed treatment as contained in the weed management plan (POD, Appendix H) will be discussed with appropriate agencies prior to implementation.

## 5.4 Access Road Monitoring

To facilitate monitoring, the access roads were divided into three groups based on the degree of reclamation required after Project completion. Group 1 roads are those that were decommissioned, reclaimed and revegetated after their use were no longer required to access the ROW. Group 2 roads include those that were modified in some way during pipeline construction to facilitate equipment access to the ROW and were then subsequently reclaimed after they were no longer needed. Group 2 roads are accessible to the public. Group 3 roads are those that were utilized during the Project, but were not modified and subsequent reclamation was not required. These roads are accessible to the public. Group 3 roads will not be monitored.

Group 1 access roads will be monitored using the same protocol established for the upland seeded areas (Table 5.4-1; Appendix A). One permanent monitoring site will be established on the reclaimed road. Three line-point intercepts transects will be established as described for the seeding areas. All transects will be placed perpendicular to the road and randomly located along the length of the access road. Metrics to be measured include plant basal and foliar canopy cover, litter cover, and bare ground at each meter mark along a transect. Representative control plots will be set-up with each of the monitoring sites in undisturbed vegetation in close proximity to the road.

**Table 5.4-1 Group 1 Access Roads**

State	Access Road	Length (feet)	Closest Milepost
Utah	03-002-AR1	30	182
Utah	03-002-AR2	30	182
Utah	03-002-AR3	30	182

**Table 5.4-1 Group 1 Access Roads**

State	Access Road	Length (feet)	Closest Milepost
Utah	03-002-AR4	30	182
Utah	03-002-AR5	30	183
Utah	03-002-AR6	30	183
Utah	03-002-AR7	30	184
Utah	03-002-AR8	30	184
Utah	03-002-AR9	30	185
Utah	03-002-AR10	30	188
Utah	03-002-AR11	30	188
Utah	03-002-AR12	30	190
Nevada	W-5	845	550
Oregon	CT-F	1848	638
Oregon	CT-B	475	606
Oregon	CT-C	1320	606

Group 2 roads would be monitored in years 1, 3 and 5 of the monitoring program. Monitoring would be accomplished through the use of permanent photo-points using GPS coordinates and would occur at Class A or high-density weed locations (Table 5.4-2). Photos would be obtained from the same location and aspect for all sampling years following the procedure described in Herrick et al. (2005a). The monitoring metric would be percent relative plant cover by species (Appendix D).

**Table 5.4-2 Group 2 Access Roads**

State	Access Road	Noxious Weed and its Designation <sup>1</sup>
Wyoming	LW-22	Canada thistle unknown density
Wyoming	U-16A	Milk Thistle unknown density
Wyoming	U-15	Milk Thistle unknown density
Wyoming	U-24	Canada Thistle unknown density

**Table 5.4-2 Group 2 Access Roads**

<b>State</b>	<b>Access Road</b>	<b>Noxious Weed and its Designation<sup>1</sup></b>
Wyoming	U-21C	Milk Thistle unknown density
Wyoming	U-19	Milk Thistle high density
Utah	R-5	Milk Thistle high density
Utah	R-5A	Milk Thistle unknown density
Utah	R-5F	Canada Thistle unknown density
Utah	R-5A	Milk Thistle unknown density
Utah	B-6F	Pepperweed high density
Utah	B-4A	Whitetop unknown density
Utah	B-8	Fieldbind weed high density
Utah	B-10	Fieldbind weed and hoary cress high density
Utah	B-13	Medusadead rye Class A
Utah	B-16D	Hoary cress high density
Utah	B-15A	Quackgrass unknown density
Utah	B-15B	Medusadead rye Class A
Utah	B-16A	Fieldbind weed high density
Utah	B-18	Fieldbind weed high density
Utah	B-18C	Fieldbind weed high density
Utah	R-19	Canada Thistle unknown density
Utah	C-3A	Canada Thistle high density
Utah	R-8B	Black henbane Class A
Utah	R-8B	Canada Thistle unknown density
Utah	R-19	Canada Thistle unknown density
Utah	R-19	Black henbane Class A
Utah	R-19A	Milk Thistle unknown density

**Table 5.4-2 Group 2 Access Roads**

<b>State</b>	<b>Access Road</b>	<b>Noxious Weed and its Designation<sup>1</sup></b>
Utah	R-24	Canada Thistle unknown density
Utah	R-26	Milk Thistle unknown density
Utah	C-8	Canada Thistle unknown density
Utah	C-5	Dyer's woad unknown density
Utah	C-10	Dyer's woad unknown density
Utah	C-11	Fieldbind weed, Canada thistle, and Milk thistle - unknown densities
Utah	C-5	Canada thistle, Scotch thistle, Dyer's woad unknown densities
Utah	C-1	Canada thistle, Milk thistle and Black henbane Class A and high densities
Utah	C-3A	Canada thistle high density
Utah	C-5	Dyer's woad unknown density
Utah	C-18	Canada thistle, Medusadhead rye, and Field bind weed - Class A, high density and unknown density
Utah	C-17	Medusadhead rye, Dyer's woad, Field binde weed, Leafy spurge - Class A, high density and unknown density
Utah	C-15A	Field bind weed high density
Utah	C-15A1	Field bind weed unknown density
Utah	C-14A	Canada thistle unknown density
Utah	C-18	Canada thistle, Medusadhead rye, Dyer's woad and Field bind weed - Class A unkn and high density
Utah	B-1E	Dyer's woad and Canada thistle high density
Utah	B-1B	Dyer's woad high density
Utah	B-1H	Field bind weed high density

**Table 5.4-2 Group 2 Access Roads**

<b>State</b>	<b>Access Road</b>	<b>Noxious Weed and its Designation<sup>1</sup></b>
Utah	B-3	Dyer's woad unknown density
Utah	B-2RMP	Medusadhead rye and Leafy spurge Class A
Utah	B-2F	Leafy spurge, Canada thistle, Dyer's woad, and Medusadhead rye - Class A and unkn density
Utah	B-9RMP	Yellow starthistle Class A
Utah	B-20	Field bind weed, Poison hemlock, and Canada thistle Class A and high density
Utah	B-5WS	Quackgrass high density
Utah	B-60	Quackgrass high density
Utah	E-3WS	Russian knapweed high density
Utah	E-6	Spotted knapweed Class A
Nevada	Desert Valley Well Line	Spotted knapweed Class A
Nevada	H-8WS	Hoary cress high density
Nevada	H-45	Malta starthistle and Bull thistle Class A
Nevada	H-46B	Unknown Species Possible Class A
Nevada	W-1A	Unknown Species Possible Class A
Nevada	W-1B	Unknown Species Possible Class A
Oregon	L-10	Medusadhead rye Class A
Oregon	L-9	Scotch thistle high density
Oregon	L-12	Bull thistle high density
Oregon	L-12D	Canada thistle high density
Oregon	L-14	Scotch thistle high density
Oregon	L-1WS	Canada thistle and Poison hemlock high density
Oregon	K-3	Medusadhead rye Class A

**Table 5.4-2 Group 2 Access Roads**

State	Access Road	Noxious Weed and its Designation <sup>1</sup>
Oregon	K-10E	Medusadhead rye Class A
Oregon	K-14C	Medusadhead rye Class A
Oregon	K-11A	Medusadhead rye Class A
Oregon	L-15	Medusadhead rye Class A
Oregon	CT-17	Hoary cress unknown density
Oregon	L-20A	Medusadhead rye Class A

<sup>1</sup>Weed identification and densities labeled as “unknown” require field verification.

The WDO has requested that two sites where cuts were made into 15 percent slopes be monitored to insure that the erosion control devices stay in place. Road H-48 (latitude = 41.5752877; longitude = -118.9638467) will be monitored at the same time that Group 1 roads are monitored. The other site occurs at MP 517.7 (latitude = 41.5729495 ; longitude = -118.9762497) and it will be monitored at the same time the seeding monitoring occurs. GPS-enabled photographs will be obtained of the erosion control devices and a written assessment of their effectiveness.

## 5.5 ROW Wetland and Riparian Monitoring

Wetland and riparian monitoring will occur at 13 sites in Wyoming, Utah, and Nevada. Monitoring sites will be randomly established so as to be representative of wetland and riparian areas within a given ecoregion per federal office (Table 5.4-1). The same seed mix for revegetation was applied to wetlands and riparian areas within an ecoregion.

**Table 5.5-1 Wetlands and Riparian Monitoring Plots Located on Federal Lands in Wyoming, Utah, and Nevada<sup>1</sup>**

State	Federal Landowner	Ecoregion	Milepost	coordX	coordY
Wyoming	KFO	Salt Desert Shrub Basins and Slopes	22.72	41.56836736	-110.6126826
Wyoming	KFO	Foothill Shrublands and Low Mountains	36.51	41.51891047	-110.832666
Utah	SLFO	Foothill	49.58	41.54052258	-111.0719384

State	Federal Landowner	Ecoregion	Milepost	coordX	coordY
		Shrublands and Low Mountains			
Utah	SLFO	Shadscale Dominated Saline Basins	171.30	41.7615327	-113.0914852
Nevada	EDO	Dissected High Lava Plateau	268.9	41.40096209	-114.6793358
Nevada	EDO	Semi-arid Uplands	351.6	41.20435658	-116.1623017
Nevada	EDO	Upper Humboldt Plains	362.8	41.21077822	-116.373186
Nevada	WFO	Upper Lahontan Basin	467.60	41.40494534	-118.0492276
Nevada	WFO	Lahontan Sagebrush slopes	R398.2	41.137167466	-117.0427038
Nevada	WFO	High Lava Plains	511.60	41.5615693	-118.8605043
Nevada	WFO	High Lava Plains	513.50	41.5654904	-118.8961392
Nevada	WFO	High Lava Plains	516.00	41.5714530	-118.9435811
Nevada	SFO	High Lava Plains	572.84	41.73779297	-119.8303895

<sup>1</sup> Information extracted from POD, Appendix Q, Attachment L, Tables 4-1, 4-2, 4-3, 4-4

ODSL stipulations (ODSL Permit No. 43783 RF) require that all wetlands and riparian areas in Oregon crossed by the Project be monitored for a minimum of five years under a separate protocol (Table 5.4-2).

**Table 5.5-2 Oregon Wetlands and Riparian Areas**

Wetland Identification Number <sup>1</sup>	Spread	Landowner	MP	coordX	coordY
WW-152-001	6	Private	618.60–619.17	42.12154577	-120.3343145
WW-173-011	6	FWNF	615.21–615.21	42.15856204	-120.295017
WW-173-007	6	Private	614.86–614.86	42.16325781	-120.2929252
WW-200-001	6	LRA	613.47–613.51	42.17309924	-120.295017
WW-38-003	6	FWNF	612.03–612.18	42.1662676	-120.2486315

**Table 5.5-2 Oregon Wetlands and Riparian Areas**

<b>Wetland Identification Number<sup>1</sup></b>	<b>Spread</b>	<b>Landowner</b>	<b>MP</b>	<b>coordX</b>	<b>coordY</b>
WW-172-004	6	Private	607.08–607.09	42.13859802	-120.1592441
WW-184-003	6	Private	605.73–605.81	42.13077707	-120.138192
WW-184-002	6	Private	599.86–599.87	42.06640693	-120.0711583
WW-153-001	7	KFRA	663.36–663.37	41.99611435	-121.0978974
WW-154-005	7	Private	655.24–665.25	42.00760933	-120.9479313
WW-154-003	7	FWNF	654.92–654.98	42.00547021	-120.9435766
WW-154-004	7	FWNF	654.83–654.87	42.00523826	-120.9415264
WW-154-002	7	FWNF	652.78–652.81	42.00826812	-120.9022944
WW-153-006	7	FWNF	652.14–652.17	42.00981419	-120.8900312
WW-153-005	7	FWNF	651.78–651.80	42.0106599	-120.8829329
WW-175-002	7	FWNF	646.74–646.76	42.00996005	-120.7871406
WW-37-003	7	FWNF	643.70–643.79	42.00169665	-120.7309046
WW-171-012	7	Private	643.09–643.19	42.00151536	-120.7192485
WW-172-002	7	Private	640.87–640.88	42.00890049	-120.6771013
WW-43-008	7	Private	637.73–637.74	42.01060715	-120.6173713
WW-43-005	7	Private	637.68–637.75	42.01061934	-120.6175649
WW-36-001	7	Private	632.34–632.37	42.01631558	-120.518095
WW-25-100	7	Private	623.56–631.93	42.01691109	-120.5096284
WW-152-004	7	Private	620.25–621.08	42.09903527	-120.355201
WW-152-003	7	Private	619.37–619.50	42.11849689	-120.3390081
WW-152-002	7	Private	619.36–619.36	42.12014914	-120.3374506
SS-153-004	6	SFO	588	41.997865	-119.964474
SS-46-003	6	SFO	589	42.007516	-119.967087

**Table 5.5-2 Oregon Wetlands and Riparian Areas**

<b>Wetland Identification Number<sup>1</sup></b>	<b>Spread</b>	<b>Landowner</b>	<b>MP</b>	<b>coordX</b>	<b>coordY</b>
SS-175-005	6	SFO	589	42.005592	-119.976975
SS-46-002	6	SFO	589	42.005968	-119.981400
SS-20-016	6	Private	590	42.005354	-119.986167
SS-200-002	6	Private	590	42.005117	-119.987272
SS-20-015	6	Private	590	42.005301	-119.988011
SS-46-001	6	Private	591	42.013527	-119.999966
SS-184-003	6	Private	596	42.066173	-120.071574
SS-184-009	6	LRA	599	42.092476	-120.109896
SS-184-008	6	LRA	600	42.103289	-120.120101
SS-184-007	6	LRA	600	42.104327	-120.122751
SS-20-014	6	Private	601	42.116384	-120.123022
SS-311-002	6	Private	601	42.118443	-120.127520
SS-184-006	6	Private	601	42.115315	-120.129913
SS-184-005	6	Private	601	42.118267	-120.131004
SS-174-005	6	Private	602	42.130959	-120.136093
SS-184-004	6	Private	602	42.125876	-120.136851
SS-192-017	6	FWNF	603	42.141097	-120.153878
SS-174-004	6	FWNF	603	42.138284	-120.156842
SS-192-016	6	Private	604R	42.147122	-120.158657
SS-174-003B	6	FWNF	603	42.138831	-120.159310
SS-192-015	6	Private	604R	42.149071	-120.159580
SS-192-014	6	Private	604R	42.150030	-120.160385
SS-192-018	6	FWNF	603	42.141649	-120.161678

**Table 5.5-2 Oregon Wetlands and Riparian Areas**

<b>Wetland Identification Number<sup>1</sup></b>	<b>Spread</b>	<b>Landowner</b>	<b>MP</b>	<b>coordX</b>	<b>coordY</b>
SS-174-002A	6	FWNF	603	42.139205	-120.161726
SS-192-018B	6	FWNF	603	42.141588	-120.161744
SS-192-018A	6	FWNF	603	42.141462	-120.161770
SS-192-013	6	Private	604	42.156203	-120.168130
SS-192-020	6	Private	604R	42.137177	-120.170062
SS-192-011	6	Private	604	42.158229	-120.170568
SS-332-001	6	Private	604R	42.143902	-120.171471
SS-192-019	6	Private	604R	42.137288	-120.172165
SS-192-010	6	Private	605	42.161168	-120.173821
SS-192-005	6	Private	604	42.144235	-120.174923
SS-192-021	6	Private	604	42.144571	-120.177647
SS-192-008	6	Private	605	42.166178	-120.179452
SS-192-009	6	Private	605	42.166928	-120.180908
SS-20-006	6	Private	605	42.152796	-120.194657
SS-20-005	6	Private	605	42.153030	-120.194705
SS-20-004	6	Private	605	42.153028	-120.194799
SS-20-003	6	Private	605	42.153017	-120.194880
SS-20-002	6	FWNF	606	42.159302	-120.211910
SS-20-001	6	FWNF	607	42.163751	-120.231798
SS-192-003	6	FWNF	608	42.168660	-120.239974
SS-192-004	6	FWNF	608	42.182014	-120.242621
SS-43-001	6	FWNF	609	42.170361	-120.264245

**Table 5.5-2 Oregon Wetlands and Riparian Areas**

<b>Wetland Identification Number<sup>1</sup></b>	<b>Spread</b>	<b>Landowner</b>	<b>MP</b>	<b>coordX</b>	<b>coordY</b>
SS-51-022	6	FWNF	609	42.170686	-120.264916
SS-51-021	6	FWNF	609	42.172043	-120.269357
SS-43-002	6	FWNF	609	42.170411	-120.270312
SS-21-001	6	Private	610	42.172805	-120.271691
SS-21-002	6	Private	610	42.172986	-120.271999
SS-51-018	6	Private	610	42.173015	-120.272411
SS-51-017	6	Private	610	42.173439	-120.273674
SS-173-030	6	Private	611	42.158161	-120.285607
SS-173-029	6	Private	611	42.156140	-120.285984
SS-173-031	6	Private	611	42.160825	-120.286978
SS-173-039A	6	Private	610	42.175761	-120.287393
SS-173-028	6	Private	612	42.153613	-120.287662
SS-173-040	6	Private	611	42.176935	-120.287715
SS-173-034	6	Private	612	42.162555	-120.287768
SS-173-033	6	Private	611	42.162341	-120.287793
SS-173-032	6	Private	611	42.161623	-120.288112
SS-173-041	6	Private	610	42.177878	-120.288139
SS-173-035	6	Private	611	42.165906	-120.288206
SS-171-015	6	Private	611	42.165906	-120.288206
SS-173-036	6	Private	611	42.166261	-120.289445
SS-155-007	6	Private	611	42.164094	-120.290534
SS-155-008	6	Private	611	42.164010	-120.290538
SS-155-009	6	Private	611	42.163899	-120.290614

**Table 5.5-2 Oregon Wetlands and Riparian Areas**

<b>Wetland Identification Number<sup>1</sup></b>	<b>Spread</b>	<b>Landowner</b>	<b>MP</b>	<b>coordX</b>	<b>coordY</b>
SS-192-023	6	Private	611	42.177462	-120.290694
SS-155-001	6	Private	611	42.166340	-120.290736
SS-155-006	6	Private	611	42.164671	-120.290868
SS-21-029	6	Private	612	42.144826	-120.290910
SS-155-005	6	Private	611	42.164807	-120.291002
SS-155-004	6	Private	611	42.165576	-120.291082
SS-155-010	6	Private	611	42.163408	-120.291328
SS-173-001	6	Private	611	42.165656	-120.291414
SS-155-011	6	Private	611	42.163076	-120.291510
SS-155-024	6	Private	611	42.160706	-120.291529
SS-155-015	6	Private	610	42.176213	-120.291738
SS-155-012	6	Private	611	42.166729	-120.291740
SS-155-016	6	Private	610	42.176289	-120.291776
SS-155-017	6	Private	610	42.175991	-120.291960
SS-173-016	6	Private	611	42.160668	-120.292046
SS-173-002	6	Private	611	42.165158	-120.29216
SS-155-018	6	Private	610	42.175815	-120.292403
SS-155-002	6	Private	610	42.163979	-120.292503
SS-173-025	6	Private	612	42.150042	-120.292540
SS-173-006	6	Private	611	42.163673	-120.292796
SS-21-009	6	Private	611	42.164079	-120.292865
SS-173-007	6	Private	611	42.162997	-120.292952
SS-155-014	6	Private	610	42.178193	-120.293088

**Table 5.5-2 Oregon Wetlands and Riparian Areas**

<b>Wetland Identification Number<sup>1</sup></b>	<b>Spread</b>	<b>Landowner</b>	<b>MP</b>	<b>coordX</b>	<b>coordY</b>
SS-173-017	6	Private	611	42.160689	-120.293090
SS-173-008	6	Private	611	42.162848	-120.293205
SS-173-026	6	Private	612	42.150882	-120.293403
SS-173-009	6	Private	611	42.161048	-120.293604
SS-173-044	6	Private	610	42.183269	-120.293608
SS-173-024	6	Private	612	42.150109	-120.293617
SS-173-027	6	Private	612	42.150855	-120.293627
SS-173-043	6	Private	610	42.182991	-120.293653
SS-173-042	6	Private	610	42.180354	-120.293771
SS-173-023	6	Private	612	42.150431	-120.294058
SS-173-021	6	Private	612	42.150704	-120.294490
SS-173-019	6	Private	611	42.151379	-120.294673
SS-155-021	6	Private	611	42.172225	-120.294783
SS-173-011	6	Private	611	42.158791	-120.294809
SS-173-020	6	Private	612	42.151212	-120.294876
SS-155-020	6	Private	611	42.172755	-120.294880
SS-173-018	6	Private	612	42.151288	-120.294893
SS-173-012	6	Private	611	42.157462	-120.294934
SS-173-014	6	Private	612	42.154742	-120.295035
SS-173-013	6	Private	612	42.155005	-120.295082
SS-173-045	6	Private	610	42.182462	-120.295665
SS-173-046	6	Private	610	42.182895	-120.297258
SS-155-013	6	Private	610	42.183258	-120.298523

**Table 5.5-2 Oregon Wetlands and Riparian Areas**

<b>Wetland Identification Number<sup>1</sup></b>	<b>Spread</b>	<b>Landowner</b>	<b>MP</b>	<b>coordX</b>	<b>coordY</b>
SS-173-047	6	Private	610	42.187247	-120.300799
SS-173-048	6	Private	610	42.189737	-120.303086
SS-173-049	6	Private	610	42.191863	-120.306073
SS-200-001	6	Private	614	42.127054	-120.317050
SS-152-006	6	Private	614	42.126544	-120.319432
SS-152-005	6	Private	615	42.124907	-120.324295
SS-152-004	6	Private	615	42.124503	-120.325291
SS-152-003	6	Private	615	42.121575	-120.334371
SS-152-001	7	Private	615	42.120346	-120.336664
SS-152-010	7	Private	616	42.117757	-120.336835
SS-152-002	7	Private	615	42.120394	-120.336851
SS-152-007	7	Private	616	42.118501	-120.338958
SS-152-008	7	Private	616	42.117779	-120.339653
SS-152-009	7	Private	616	42.109363	-120.346631
SS-152-011	7	Private	617	42.102522	-120.352273
SS-152-012	7	Private	617	42.102356	-120.352426
SS-50-009	7	Private	617	42.196866	-120.352885
SS-152-013		State of Oregon	620	42.092699	-120.412413
SS-152-013		State of Oregon	623	42.068997	-120.453751
SS-33-014	7	State of Oregon	623	42.059802	-120.461207
SS-33-01	7	State of Oregon	624	42.058203	-120.462509
SS-33-016	7	State of Oregon	624	42.056884	-120.463675

**Table 5.5-2 Oregon Wetlands and Riparian Areas**

<b>Wetland Identification Number<sup>1</sup></b>	<b>Spread</b>	<b>Landowner</b>	<b>MP</b>	<b>coordX</b>	<b>coordY</b>
SS-33-017	7	State of Oregon	624	42.054769	-120.465319
SS-29-010	7	State of Oregon	624	42.047767	-120.471034
SS-29-009	7	State of Oregon	626	42.034656	-120.481610
SS-29-008	7	State of Oregon	626	42.030166	-120.485238
SS-29-007	7	Private	628	42.016848	-120.505864
SS-29-006	7	Private	628	42.016857	-120.509097
SS-42-002	7	Private	628	42.000232	-120.513385
SS-126-013	7	Private	628	42.000446	-120.514248
SS-126-014	7	Private	628	42.003412	-120.517257
SS-172-001	7	Private	628	42.016334	-120.517828
SS-36-001	7	Private	628	42.015245	-120.524002
SS-142-003	7	Private	629	42.003989	-120.527006
SS-142-004	7	Private	629	42.007697	-120.533439
SS-36-002	7	Private	629	42.012720	-120.539548
SS-142-005	7	Private	629	42.008601	-120.542858
SS-214-001	7	Private	630	42.011390	-120.551811
SS-214-002	7	Private	630	42.011669	-120.552661
SS-214-003	7	Private	630	42.011828	-120.552929
SS-29-013	7	Private	631	42.010325	-120.565427
SS-29-014	7	Private	631	42.010256	-120.566405
SS-29-015	7	Private	631	42.009869	-120.567515
SS-51-002	7	Private	631	42.006409	-120.576813

**Table 5.5-2 Oregon Wetlands and Riparian Areas**

<b>Wetland Identification Number<sup>1</sup></b>	<b>Spread</b>	<b>Landowner</b>	<b>MP</b>	<b>coordX</b>	<b>coordY</b>
SS-51-003	7	Private	631	42.006146	-120.577419
SS-43-009	7	Private	631	42.007157	-120.577476
SS-43-010	7	Private	631	42.007144	-120.577809
SS-43-011	7	Private	631	42.007147	-120.577884
SS-43-012	7	Private	631	42.006827	-120.578515
SS-51-004	7	Private	631	42.005697	-120.578709
SS-51-005	7	Private	632	42.004356	-120.582563
SS-171-004	7	Private	632	42.004856	-120.582841
SS-171-001	7	Private	632	42.005012	-120.584654
SS-171-002	7	Private	632	42.004426	-120.585165
SS-51-006	7	Private	632	42.004608	-120.586233
SS-43-014	7	Private	632	42.00576475	-120.5864867
SS-43-015	7	Private	632	42.00857751	-120.5917585
SS-172-002	7	Private	633	42.008118	-120.603373
SS-33-023	7	Private	633	42.009175	-120.606159
SS-43-017	7	Private	633	42.009172	-120.609319
SS-43-018	7	Private	633	42.009454	-120.611554
SS-33-019	7	Private	633	42.010510	-120.616189
SS-192-022	7	Private	634	42.009139	-120.619469
SS-202-002	7	Private	634	42.005971	-120.621078
SS-43-022	7	Private	634	42.005971	-120.621078
SS-43-023	7	Private	634	42.011459	-120.621478
SS-33-028	7	Private	634	42.010958	-120.621541

**Table 5.5-2 Oregon Wetlands and Riparian Areas**

<b>Wetland Identification Number<sup>1</sup></b>	<b>Spread</b>	<b>Landowner</b>	<b>MP</b>	<b>coordX</b>	<b>coordY</b>
SS-33-029	7	Private	634	42.011753	-120.633347
SS-43-025	7	Private	635	42.016878	-120.640363
SS-29-025	7	Private	635	42.011541	-120.640486
SS-43-024	7	Private	635	42.016898	-120.640708
SS-29-024	7	Private	635	42.011140	-120.641959
SS-29-023	7	Private	635	42.011008	-120.642916
SS-43-026	7	Private	635	42.018780	-120.644966
SS-43-027	7	Private	635	42.018683	-120.647671
SS-29-022	7	Private	635	42.009993	-120.648002
SS-42-022	7	Private	635	42.017953	-120.656408
SS-29-020	7	Private	636	42.008196	-120.659339
SS-42-021	7	Private	636	42.016914	-120.663328
SS-171-005	7	Private	636	42.011853	-120.671582
SS-172-004	7	Private	637	42.00883	-120.676983
SS-172-005	7	Private	637	42.008550	-120.678297
SS-171-010	7	Private	637	42.004735	-120.680623
SS-171-007	7	Private	637	42.011696	-120.682429
SS-172-006	7	Private	637	42.006621	-120.683274
SS-171-007A	7	Private	637	42.012514	-120.683944
SS-199-012	7	Private	637	42.012059	-120.684466
SS-171-011	7	Private	637	42.003577	-120.685045
SS-171-012	7	Private	637	42.003647	-120.685545
SS-199-014	7	Private	637	42.009513	-120.685633

**Table 5.5-2 Oregon Wetlands and Riparian Areas**

<b>Wetland Identification Number<sup>1</sup></b>	<b>Spread</b>	<b>Landowner</b>	<b>MP</b>	<b>coordX</b>	<b>coordY</b>
SS-199-013	7	Private	637	42.010421	-120.686395
SS-171-008	7	Private	637	42.017104	-120.686571
SS-171-00	7	Private	637	42.018899	-120.687783
SS-184-013	7	Private	637	42.020373	-120.689521
SS-184-013A	7	Private	637	42.020568	-120.689523
SS-184-012	7	Private	637	42.021330	-120.692377
SS-184-011	7	Private	637	42.021818	-120.694624
SS-142-011	7	FWNF	639	42.020764	-120.727490
SS-37-001	7	FWNF	639	42.001378	-120.728639
SS-142-010	7	FWNF	640	42.017823	-120.736970
SS-142-009	7	FWNF	640	42.018436	-120.743009
SS-142-008	7	FWNF	640	42.021463	-120.749389
SS-38-003	7	FWNF	642	42.007830	-120.780066
SS-38-004	7	FWNF	642	42.008178	-120.780788
SS-38-005	7	FWNF	642	42.008325	-120.781243
SS-38-006	7	FWNF	642	42.009522	-120.786484
SS-38-007	7	FWNF	642	42.009939	-120.786917
SS-38-008	7	FWNF	643	42.013903	-120.797468
SS-175-002	7	Private	645	42.012450	-120.839038
SS-175-003	7	Private	645	42.011995	-120.843726
SS-156-006	7	Private	645	42.013171	-120.843890
SS-311-006	7	FWNF	646	42.013690	-120.848930

**Table 5.5-2 Oregon Wetlands and Riparian Areas**

<b>Wetland Identification Number<sup>1</sup></b>	<b>Spread</b>	<b>Landowner</b>	<b>MP</b>	<b>coordX</b>	<b>coordY</b>
SS-153-012	7	FWNF	647	42.010616	-120.882723
SS-154-003	7	FWNF	648	42.008110	-120.902266
SS-154-004	7	Private	651	42.005369	-120.943575
SS-154-002	7	Private	651	42.007555	-120.947786
SS-311-005	7	Private	651	42.009041	-120.954846
SS-332-002	7	KFRA	652	42.011212	-120.965483
SS-382-002	7	KFRA	R660	42.003907	-121.117460
SS-382-001	7	Reclamation	R662	42.008594	-121.143308
SS-175-001	7	Reclamation	665	42.002113	-121.216238
SS-156-005	7	KFRA	671	41.998984	-121.318366
SS-156-004	7	Private	672	41.997098	-121.344538
SS-156-003	7	Private	672	41.997098	-121.344538
SS-156-002	7	Private	672.7	41.996588	-121.356335
SS-49-017	7	Private	675.35	41.998732	-121.359496
SS-50-007	7	Private	675.35	42.009721	-121.366231
SS-49-015	7	Private	675.35	42.014655	-121.367937
SS-49-016	7	Private	675.35	42.014509	-121.367990
SS-49-014	7	Private	675.35	42.017110	-121.368243
SS-49-013	7	Private	675.35	42.027338	-121.373260
SS-50-006	7	Private	675.35	42.027249	-121.373270

<sup>1</sup> Data from "Wetland Crossing.xls" and "Waterbody Crossing (1-18-11)\_Revised All.xls"

If a wetland or riparian site becomes unavailable for continued monitoring because of some event such as flooding, excessive OHV travel, or wildfire then a new set of plot(s) may be

established from the populations of candidate sites. A plot relocation discussion would be held with FERC and the appropriate agency to determine suitable action. Appropriate action may include relocating the monitoring site or its abandonment. The decision will be based on the number of years the plot has been monitored and the status of vegetation and soil to meet the performance criteria. The appropriate federal land management agency and ODSL will be consulted in this regard.

### **5.5.1 Wyoming, Utah, and Nevada Monitoring Approach**

Wetlands and riparian areas will be monitored in accordance with the wetland, waterbody, and riparian restoration plan (POD, Appendix Q, Attachment L). Reference plots will be established within the revegetated areas of wetland and riparian sites. Control plots will be established adjacent to the ROW plots; the control plots will have similar dimensions and will be located within the 300-foot biological survey corridor. To the greatest extent possible, the control plots will contain vegetation and terrain similar to those found on lands not disturbed by the Project.

A sampling approach modified from the one described for the upland revegetation monitoring will be applied (Appendix E). Three transects will be randomly (not over the center line) placed parallel across the wetland or riparian areas and control plots. The length of transects will be adjusted according to the shape and size of the wetland or riparian area. Each transect's beginning point, ending point, and azimuth will be GPS recorded. Plant community metrics to be measured will include plant basal and foliar cover, plant density, litter cover, bare ground, and soil aggregate stability. The presence of noxious or invasive weeds along the transects will be recorded. The overall condition of the monitoring sites will be evaluated based on the presence of surface rills, gullies, subsidence, slumping, headcutting, or other signs of erosion that are inconsistent with the control plots.

Nevada BLM has requested that annual productivity be monitored on a wet meadow (ecological site 25XY005NV) associated with perennial streams (Table 5.4-3). Air-dried annual production will be assessed by clipping current year's plant growth in 5 or 10, 1.92 ft<sup>2</sup> circular hoops placed randomly throughout the wet meadow ROW plots and air drying the biomass to a constant weight. The number of hoops that are sampled will depend on the size of the wet meadow. The annual productivity measured in 10, 1.92 ft<sup>2</sup> hoops translates directly to pound per acre. Annual production comparisons will be made to control plots placed outside of the construction ROW but within the 300-ft biological survey corridor. Appropriate adjustments to the air-dried weight may need to accommodate annual precipitation and livestock grazing. Sampling will occur in monitoring years 3, 4, and 5.

**Table 5.5-3 Nevada Wet Meadow on Federal Lands**

Wetland Identification Number	Spread	Federal Landowner	MP	coordX	coordY
WW-06-003 (Pie Creek)	4	EDO	329.46-329.48	41.24607892	-115.7493466

### 5.5.2 Oregon Monitoring Approach

Oregon wetlands and waterway riparian areas will be monitored according to ODSL Permit No. 43783 RF stipulations and the ODSL (2009) guidelines for monitoring vegetation. Table 5.4-4 lists the ODSL monitoring and report requirements for wetlands and waterway riparian areas.

**Table 5.5-4 Oregon Department of State Lands Monitoring Requirements**

Monitoring Reports	Report Requirements
First year	<ul style="list-style-type: none"> <li>Establish permanent monitoring transects and photo locations; document locations with GPS and photos</li> <li>Assess vegetation performance standards</li> <li>Brief narrative that describes maintenance activities and contingency measure to meet rectification within a 24-month period from the date wetland or waterway impacts occur</li> </ul>
Second year	<ul style="list-style-type: none"> <li>Monitor permanent transects and photo locations</li> <li>Assess vegetation performance standards</li> <li>Determine if impacts to each wetland or waterway were rectified with a 24-month period from the date the impact occurred</li> <li>Brief narrative that describes maintenance activities</li> </ul>
Third, fourth, and fifth years	<ul style="list-style-type: none"> <li>Monitor permanent transects and photo locations</li> <li>Assess vegetation performance standards (if ODSL determines temporary impacts were not rectified within a 24-month period from the date wetland or waterway impacts occurred)</li> <li>Additional information required by ODSL if temporary impacts were not rectified within a 24-month period from the date wetland or waterway impacts occurred</li> </ul>

The wetland and waterway riparian areas will be stratified by herbaceous, shrub, forest, and buffer habitat type based on pre-disturbance maps, and/or the alignment of habitats as they occur in control plots located in the 300-foot biological survey corridor. However, some of these wetlands and areas within the ROW may be less than 0.25 acre and habitat stratification will not be required.

The vegetation sampling protocol will be applied as described in Section 5.5.1. Permanent transects in each of the wetland habitat types will be randomly selected from a baseline running perpendicular to the transect. Permanent photo locations will be established at the beginning and end of each transect. The beginning and end of each transect will be GPS-located and marked with a color coded t-post. The t-posts will be removed after monitoring is completed unless LRA, FWNF, KFRA, or Reclamation requests that they remain. Metrics that will be measured using the line-point intercept method include species foliar cover and bare substrate. Species foliar cover will be aggregated to total plant foliar cover, herbaceous plant foliar cover, woody foliar cover, and invasive plant foliar cover. Species diversity and the moisture prevalence index will be calculated from the transect data. Woody plant density will be measured using two, 1.0 x 1.0 m<sup>2</sup> plots placed randomly along the transects. Data will be recorded using the datasheets presented in Appendix E. The Vegetation Manager (VEMA) relational database (available at [www.nwhi.org/index/publications](http://www.nwhi.org/index/publications)) or other method that follows requirements outlined in the routine monitoring guidance will be used for data analyses and report preparation (ODSL 2003). The number of transects, plots, and sampling points will be modified as necessary to achieve data reporting requirements of 80% confidence level and  $\pm 10$  units for all average cover calculations including native plant, invasive plant, and bare-ground cover.

## 6 Performance Criteria

Performance criteria describe the benchmarks by which successful vegetation establishment and soil-surface stability can be determined. The performance criteria must accommodate the inherent variability of restoring native vegetation and be applicable to the several different kinds of upland, wetland, and riparian plant communities across the length of the Project. Monitoring needs to document that progress is being made towards obtaining the end results of desirable plant community establishment, wildlife habitat restoration, and soil surface stability.

### 6.1 ROW Upland Revegetation Performance Criteria

The following section presents plant establishment and soils stability performance standards for defining successful ROW upland and wetland plant establishment. Plant establishment performance would be judged based on foliar cover of herbaceous and woody species in comparison with the foliar cover of herbaceous and woody plants in control plots. Soil stability will be judged based on the soil aggregate stability test in comparison with the soil stability of the control plots. The criteria were defined by BLM, USFS, or Reclamation for their respective lands. Upland revegetation on federal lands will be considered successful when vegetation on the restored ROW supports non-noxious and invasive plants that are similar in forb, grass, and woody plant density and cover to those growing on adjacent lands within the 300-foot survey corridor undisturbed by construction (Tables 6.1-1). Group 1 access road performance criteria would be the same for Utah, Nevada, and Oregon herbaceous plant cover.

The statistical comparisons of the metrics measured in the ROW and control plots will provide a measure of the similarity between the plot sets. Monitoring will occur for five years. Monitoring may be conducted beyond the fifth year as agreed upon by FERC and the appropriate land management agencies if performance criteria have not been met but progress toward achieving the objectives is occurring. Where initial restoration and plant establishment efforts fail to make progress towards meeting revegetation standards after the third year, reseeding may be necessary on some ROW segments as determined by the FERC and appropriate land management agencies.

**Table 6.1-1 Wyoming, Utah, and Oregon Performance Criteria for Upland Revegetation**

Federal Lands	Performance Criteria				
	Seeded		Seedling Transplant Survival (%)	Noxious Weed Relative Cover (%)	Soil Aggregate Stability Class
	Herbaceous (%)	Shrubs (%)			
KFO	Herbaceous and shrub canopy (foliar) plant cover $\geq$ 80 of control plot and presence of $\geq$ 4 desirable species	Herbaceous and shrub canopy (foliar) plant cover $\geq$ 80 of control plot	$\geq$ 50	$\leq$ 26	$\geq$ 2
SLFO	Canopy (foliar) plant cover $\geq$ 80 of control plot and presence of $\geq$ 4 desirable plant species	Canopy (foliar) plant cover $\geq$ 60 of control plot and the presence of $>$ 1 species	$\geq$ 50	$\leq$ 26	$\geq$ 2
UWCNF	Canopy (foliar) plant cover $\geq$ 80 of control plot and presence of $\geq$ 4 desirable	Not required	$\geq$ 50	$\leq$ 26	$\geq$ 2
LRA	Canopy (foliar) grass cover $\geq$ 80 of control plot and presence of $\geq$ 4 desirable	Not required	$\geq$ 50	$\leq$ 26	$\geq$ 2
FWNF	Canopy (foliar) grass cover $\geq$ 80 of control plot and presence of $\geq$ 4 desirable or as predefined attributes similar to Table 6.1-2 as agreed by Ruby.	Not required	$\geq$ 50	At least 75% reduction in weed cover from highest cover recorded.	$\geq$ 3
KFRA	Canopy (foliar)	Not required	$\geq$ 50	$\leq$ 26	$\geq$ 2

**Table 6.1-1 Wyoming, Utah, and Oregon Performance Criteria for Upland Revegetation**

Federal Lands	Performance Criteria				
	Seeded		Seedling Transplant Survival (%)	Noxious Weed Relative Cover (%)	Soil Aggregate Stability Class
	Herbaceous (%)	Shrubs (%)			
	grass cover ≥ 80 of control plot and presence of ≥ 4 desirable				
Reclamation	Canopy (foliar) grass cover ≥ 80 of control plot and presence of ≥ 4 desirable	Not required	≥ 50	≤ 26	≥ 2

Table 6.1-2 lists the revegetation performance criteria for all BLM offices in Nevada. The performance criteria are based on *in situ* attributes. BLM has defined performance standards for the various seeded areas based on their experience with past revegetation efforts. Therefore, control plots will not be required.

**Table 6.1-2 Nevada Reclaimed Desired Plant Community Criteria Minimums for the *In Situ* ROW Vegetation and Soil**

Seed Mix	Minimum Percent Basal and Crown Cover	Minimum Percent Canopy Cover	Minimum Plants per Meter	Minimum Plant Life Forms	Minimum Desirable Plant Species	Maximum Percent Annual Plant Foliar Cover	Minimum Aggregate Stability Class <sup>1</sup>
EDO/WDO Shadscale	10	15	3	2	4	15	>2
EDO/WDO Low precipitation Wyoming big sagebrush	15	20	5	2	4	15	>2
EDO/WDO High precipitation Wyoming big sagebrush	20	25	7	3	6	10	>3
EDO/WDO Low sagebrush	20	25	7	3	6	5	>3

EDO/WDO Predisturbance big sagebrush and bitterbrush	20	25	7	3	6	10	>3
EDO/WDO Mountain big sagebrush	35	45	9	3	8	5	>4
EDO/WDO Black sagebrush	20	25	5	3	5	10	>3
EDO/WDO Little sagebrush	20	25	5	3	5	10	>3
EDO/WDO Black greasewood	15	20	3	2	3	5	>1.5
EDO/WDO Alkali saction	15	20	5	1	2	0	>1.5
EDO/WDO Sandy big sagebrush	20	25	5	2	3	5	0
EDO/WDO Fire fuel break	15	20	5	2	2	10	>3
SFO low precipitation Wyoming big sagebrush	15	20	5	2	4	15	>2
SFO low sagebrush	20	25	7	3	6	5	>3
SFO mountain big sagebrush	35	45	9	3	8	5	>4
SFO Black Greasewood	15	20	3	2	3	5	>1.5
SFO sandy big sagebrush	20	25	5	2	3	5	0

<sup>1</sup> Aggregate stability measures the amount of stable aggregates against flowing water. A slake test measures the stability of soil when exposed to rapid wetting.

## 6.2 Biological Soil Crust Performance Criteria

BSC recovery from disturbance can be a slow process, particularly for mosses and lichens. Recovery rates will depend on factors such as disturbance severity and extent, vascular plant structure, adjacent substrate condition, available inoculums; and weather. Cyanobacteria are expected to be the first BSC organism to colonize the ROW (Belnap et al. 2001). The performance criterion is evidence that cyanobacteria colonies occur on the four areas identified in Table 5.2-1.

### 6.3 Noxious and Invasive Weed Performance Criteria

Performance criteria will require total relative cover of noxious and invasive weeds (see Section 5.3) to be less than 26 percent (Table 6.1-1). The surface stability metric will be the lack of erosion rills deeper than 3-inches at 10-foot intervals. However, if weed cover on lands immediately adjacent to the ROW is greater than 26 percent, then the 26 percent criterion for weed cover on the ROW will not apply. Performance criteria will require total relative cover of noxious and invasive weeds to be less than 26 percent (Table 6.1-1). All application of pesticide will be conducted by a certified applicator. All Federal and state laws and regulations will be followed. All herbicides will be approved by the appropriate BLM, USFS, and Reclamation offices and be approved on the pesticide use permit (PUP).

### 6.4 Wetland and Riparian Performance Criteria

The Project includes restoration of herbaceous and wooded wetland and riparian habitats. Therefore, different revegetation performance standards are needed. Table 6.4-1 lists the performance standards for Wyoming, Utah, and Nevada. Vegetation metrics surveyed in the ROW plots will be compared with pre-disturbance data and/or with data collected from the control plots. Appropriate statistical tests will determine if revegetation is compliant with the performance criteria for control plots.

**Table 6.4-1 Revegetation Performance Criteria for Wyoming, Utah, and Nevada Wetlands and Riparian Areas**

Performance Criteria	Vegetation Strata	
	Herbaceous	Woody
Desirable herbaceous plant aerial cover (%)	Pre-disturbance plant cover or 70% of control plot	Not applicable
Desirable woody plant aerial cover (%)	Not applicable	Pre-disturbance species composition and percent cover or 70% of control plot
Noxious or invasive weed cover aerial (%)	≤ 26	≤ 26
Desirable herbaceous species (No.)	≥ 6	Not applicable
Desirable woody species (No.)	Not	≥ 2

Performance Criteria	Vegetation Strata			
	Herbaceous		Woody	
	applicable			
Soil stability test (aggregate stability class)	≥ 2		≥ 2	
Presence of surface rills, gullies, subsidence, slumping, headcutting, or other signs of erosion are consistent with control plot.	Yes	No	Yes	No
Nevada wet meadow air-dried, annual production of ≥ 1700 pounds per acre for a normal precipitation year or 70 percent of control plot.	Yes	No	Not applicable	

**6.4.1 Oregon Performance Standards**

The ODSL (Permit No. 43783) has specified performance standards for the revegetation of all herbaceous and herbaceous/shrub wetlands and riparian areas crossed by the ROW in Oregon (Table 6.4.2). A combination of pre-disturbance and post-construction criteria will be used for evaluating plant establishment success.

**Table 6.4-2 Oregon Revegetation Performance Criteria for Wetlands and Riparian Areas**

Performance Criteria	Wetland and Riparian Type	
	Herbaceous	Herbaceous/Shrub
Native herbaceous plant cover <sup>1</sup>	100% of pre disturbance cover or ≥ 80% of adjacent, undisturbed wetland habitat <sup>2</sup>	Herbaceous stratum will meet 100% of pre disturbance cover or ≥ 80% of adjacent, undisturbed wetland habitat <sup>2</sup>
Invasive species cover <sup>3</sup>	The cover of invasive species is the lesser of pre-disturbance percent cover or ≤ 10% cover.	The cover of invasive species is the lesser of pre-disturbance percent cover or ≤ 10% cover.
Bare substrate cover	Bare substrate will not exceed either pre-disturbance percent cover or 20% cover.	Bare substrate will not exceed either pre-disturbance percent cover or 20% cover.
Species diversity	Dominant native species <sup>4</sup> in the herbaceous layer will meet pre-disturbance diversity or 80% of control plot located in adjacent, undisturbed wetland.	Dominant native species in the herbaceous layer will meet pre-disturbance diversity or 80% of control plot located in adjacent, undisturbed wetland. Woody vegetation will have a 80% stem density of woody plants in the

Performance Criteria	Wetland and Riparian Type	
	Herbaceous	Herbaceous/Shrub
		control plot.
Moisture Prevalence Index <sup>4</sup>	< 3.0 for all strata	< 3.0 for all strata
Riparian composition	Composition, density <sup>6</sup> , and distribution will be the same as pre-disturbance	Composition, density, and distribution will be the same as pre-disturbance

<sup>1</sup> Native plant defined by the USDA Plants Database (<http://plants.usda.gov>).

<sup>2</sup> Control plots will be established within the 300 ft study area reference in the removal-fill application.

<sup>3</sup> A plant species will be labeled as invasive if it appears on the current Oregon Department of Agriculture noxious weed list, plus known problem species including, but not limited to, *Phalaris arundinacea*, *Mentha pulegium*, *Holcus lanatus*, *Anthoxanthum odoratum*, and, in the case of agricultural fields, the last crop planted if it is non-native. Non-native plants will be labeled as such if they are listed as non-native on the USDA Plants Database.

<sup>4</sup> As defined and calculated in Oregon Department of State Lands (ODSL 2009).

<sup>5</sup> Dominant species are native, represent at least 5% cover, and have a 10% frequency within the habitat class (ODSL 2009).

<sup>6</sup> Plant Density- in order to count, plants have to be alive. In shrub dominated systems, count the # of live plants for shrubs and the # of live stems for trees.

# 7 Monitoring Reports and Release from Monitoring Obligation

## 7.1 Annual Monitoring Reports

Ruby will monitor plant establishment and soil stability for a minimum of five years after revegetation is completed. Annual monitoring reports will be submitted to FERC, BLM, USFS, USFWS, Reclamation, and ODSL after the annual monitoring is completed (reports to ODSL are due by the December 31 of the year the survey was completed). The ODSL and USFWS reports will be stand alone documents and will be included as appendices to the annual report. In addition, Ruby will report any emergency corrective action to FERC and the appropriate land management agency that might be taken separate from the data provided in the annual report.

The annual monitoring reports will include the following information

- An evaluation of seedling establishment for the first growing season, including density and diversity;
- Percent cover, density, and diversity of graminoids, forbs, and shrubs for years 2 through 5;
- Noxious weeds and invasive weed locations and proposed actions;
- Soil surface stability;
- Photographs of plant establishment within the monitoring plots;
- Areas requiring remedial action and proposed corrective actions or actions taken during the year;
- Reports to ODSL will meet all performance criteria called for in DSL 43783; and
- Areas impacted by OHV travel, grazing, wildfire, and annual invasive weeds and proposed actions to reduce impacts to the extent possible.

The first annual monitoring report will include this information.

- Documentation of plant and seed materials received from commercial sources;
- Pre-construction weed treatments;
- Seed mixes and methods of application;
- Soil amendment and mulch applications;
- Seedling plantings; and
- Stream and waterbody crossing restoration treatments.

## 7.2 Right-of-Way Release from Monitoring Obligation

Ruby will request formal release from monitoring when it determines that all, or portions of, the Project footprint (e.g., ROW, ETWS, storage sites, etc.) comply with the performance criteria presented in Section 6. Once monitoring plots are determined to meet performance

criteria, they will no longer be included in the annual monitoring. Determination of restoration and revegetation compliance would rest with FERC and the appropriate land management agency.

## 8 References

Belnap, J., R. Rosentreter, S. Leonard, J.H. Kaltenecker, J. Williams, D. Eldridge. 2001. Biological soil crusts: Ecology and management. Technical Reference 1730-2. Bureau of Land Management, Denver, CO.

BLM (Bureau of Land Management). 2010. Record of Decision for the Ruby Pipeline Project. July 12, 2010.

[http://www.blm.gov/nv/st/en/info/nepa/ruby\\_pipeline\\_project/record\\_of\\_decision.html](http://www.blm.gov/nv/st/en/info/nepa/ruby_pipeline_project/record_of_decision.html).

Accessed April 13, 2011.

Duniway, M.C., J.E. Herrick, D.A. Pyke, and D.Toledo P. 2010. Assessing transportation infrastructure impacts on rangelands: Test of a standard rangeland assessment protocol. *Rangeland Ecology and Management* 63 (5): 524-536.

Elzinga, C.L., D.W. Salzer, and J.W. Willoughby. 1998. Measuring & monitoring plant populations. Technical Reference 1730-1. Bureau of Land Management, Denver, CO.

FERC (Federal Energy Regulatory Commission). 2010. *Final Environmental Impact Statement for the Ruby Pipeline Project*. FERC Docket No. CP09-54-000. June 28, 2010.

<http://www.ferc.gov/industries/gas/enviro/eis/2010/01-08-10.asp>. Accessed April 13, 2011

Herrick, J.E., J.W. Van Zee, K.M. Havstad, L.M. Burkett, and W.G. Whitford. 2005a. Monitoring manual: For grassland, shrubland, and savanna ecosystems: Quick Start, Vol. I. USDA, ARS Jornada Experimental Range. Las Cruces, NM.

Herrick, J.E., J.W. Van Zee, K.M. Havstad, L.M. Burkett, and W.G. Whitford. 2005b. Monitoring manual: For grassland, shrubland, and savanna ecosystems: Design, supplementary methods and interpretation, Vol. II. USDA, ARS Jornada Experimental Range. Las Cruces, NM.

Oregon Department of State Land. 2009. Routine monitoring guidance for Vegetation: A companion document to the compensatory mitigation for non-tidal wetlands and tidal waters and compensatory non-wetland mitigation. Salem, OR.

[http://www.oregon.gov/DSL/PERMITS/docs/dsl\\_routine\\_monitoring\\_guidance.pdf?ga=t](http://www.oregon.gov/DSL/PERMITS/docs/dsl_routine_monitoring_guidance.pdf?ga=t).

Accessed May 5, 2011.



# A Standard Operating Procedures for ROW Upland Seeded Area and Group 1 Access Road Monitoring

## Training

The following training sources teach the fundamentals of applying the line-point intercept method for collecting vegetation data on the ROW and control plots:

Herrick, J.E., J.W. Van Zee, K.M. Havstad, L.M. Burkett, and W.G. Whitford. 2005. Monitoring manual: For grassland, shrubland, and savanna ecosystems, Vol. I. USDA, ARS Jornada Experimental Range. Las Cruces, NM.

[http://usda-ars.nmsu.edu/monit\\_assess/monmanual\\_main.php](http://usda-ars.nmsu.edu/monit_assess/monmanual_main.php).

Training videos: [http://usda-ars.nmsu.edu/monit\\_assess/videos\\_main.php](http://usda-ars.nmsu.edu/monit_assess/videos_main.php).

- Introduction
- Establish a transect
- Line-point intercept
- Photo points
- Soil stability (surface and subsurface)

## Equipment

- 100-m tape
- Two steel pins
- Pointer – long pin flag
- Soil stability kit, stopwatch, 1.0 liter of noncarbonated bottled water
- GPS unit and compass
- Clipboard and data form
- Pencils
- Thick-point marking pen
- Digital camera with 50 mm lens
- Four 60 cm rebar stakes
- Whiteboard or ID card on clipboard
- 1.5 m long, ¾ in diameter PVC pipe
- Laptop computer
- Colored rebar

## Approach

**Line-point intercept:** At the monitoring site establish the ROW and control plots. At each plot lay out the 100-m tape measure on the westerly side of the plots. Use a random number generator to locate the three transects. The beginning of the transects will be GPS-located and marked with a red-colored rebar stake and cover with PVC pipe for safety. Each transects will be located at ninety degree angle to the tape measure and run at the same compass orientation the width of the ROW. The end of the transects will be GPS-located and marked with a blue-colored rebar. The control-plot transects will be established in the same manner. Record the azimuth of all transects. Use the compass to ensure that the tape measure is laid out in the proper orientation on each transects. Use the first steel pin to anchor the tape. Extend the tape out the width of the ROW by walking on the right-hand side of the tape. Place the tape on the ground and pull it taut. Use the second steel pin to anchor the far end of the tape. Point intercepts will be scored for plant foliar and basal cover, litter cover, rock cover, BSC cover, and bare ground at each meter mark. Record point intercept on data sheet. Scan data sheet each day to produce a digital copy. Store data sheet in safe place.

**Plant density:** A one-meter square quadrant will be randomly placed three times (no overlap) along each transect to measure species density. Use a random number generator to select the placement of the quadrants. One corner of the quadrant will be placed on the randomly selected meter mark with the second corner placed at the next higher meter mark. Record the plant species in the plot and count the number of individuals. Greater than 50 percent of the basal portion of the plant must be in the plot for it to be counted. Record the presence of BSC by life form. Assess **grazing** and **OHV travel** using the categories presented in Table 5.1-2.

**Soil stability evaluation** (surface and subsurface) will follow the directions presented in the training materials. Surface soil and subsoil samples will be collected from the center of the one-meter quadrant placed three times along each transect.

**Digital photos** – One photo will be taken per transect. Record the date, location, plot, transect number, and direction on the whiteboard and place at the beginning of the transect leaning against the rebar stake. Remove the PVC cover from the center stake and replace it with the 1.5 m PVC pipe. Set the camera on top of the 1.5 m pole and frame transect 1 with the tape measure centered. Locate the whiteboard in the bottom center of the photo. Take the photo. Repeat the procedure for transects 2 and 3. Download the photo image to a laptop computer at night.

**Control or reference plots** will be set up outside of the ROW in the 300-ft survey boundary. These plots need to be established within the same terrain, aspect, and soils as the ROW plot, to the greatest extent possible. The plant community should be representative of the surrounding vegetation. The control plot will be set up and sampled in the same manner as the ROW plot.

**QA** – make sure that all data sheets are completely filled out and accounted for prior to leaving the site. Store the data sheets in a closeable file. Scan all data sheets each night. Make back-copies of all digital photos. If using data recorders make sure that the data was stored and backup files prior to leaving the site. Double check that digital photos were saved and backup files prior to leaving the site. Account for all field equipment. Collect samples of unknown plant species to identify at a later date.

Data Sheet – Upland Seeded Area Date \_\_\_\_\_  
 Location \_\_\_\_\_

Transect # \_\_\_\_\_ Azimuth \_\_\_\_\_ Crew No. \_\_\_\_\_

PT	Top canopy	Lower canopy layers			Soil	PT	Top canopy	Lower canopy layers			Soil
		Code 1	Code 2	Code 3				Code 1	Code 2	Code 3	
1						26					
2						27					
3						28					
4						29					
5						30					
6						31					
7						32					
8						33					
9						34					
10						35					
11						36					
12						37					
13						38					
14						39					
15						40					
16						41					
17						42					
18						43					
19						44					
20						45					
21						46					
22						47					
23						48					
24						49					
25						50					

**Top canopy codes:** Species code, common name, or NONE (no canopy)

**Lower canopy codes:** species code, common name, L (herbaceous litter), W (woody litter, >5mm diameter)

**Unknown Species Codes:** AF# = annual forb; PF# = perennial forb; AG# = annual graminoid; PG# - perennial graminoid; SH# - shrub; TR# = tree

**Soil Surface (do not use litter):** R = rock >5 mm diameter; BR = bedrock; BSC = biological soil crust; S = Soil without any other soil surface code

## Species density

Transect - Quadrant	Plant Species Code – No. individuals
1 - 1	
1-2	
1-3	
2-1	
2-2	
2-3	
3-1	
3-2	
3-3	

Noxious weeds cover class

Weed Species Code	Cover Class	Weed Species Code	Cover class

Grazing class \_\_\_\_\_ OHV travel class \_\_\_\_\_

Index Class	Definition
1	No apparent grazing, fecal droppings, or hoof prints; or OHV tire marks in the plot
2	<10%t plants grazed, fecal droppings or hoof prints; or OHV tire marks in the plot
3	10-25% plants grazed, fecal droppings or hoof prints; or OHV tire marks in the plot
4	25-50% plants grazed, fecal droppings or hoof prints; or OHV tire marks in the plot
5	>50% plants grazed or fecal droppings or hoof prints; or OHV tire marks in the plot

Soil Stability

Surface

Transect 1		Time		Class	Transect 2		Time		class	Transect 3		Time		Class
Quad (Pos)	Veg	In	Dip		Quad(P os)	Veg	In	Dip		Quad( Pos)	Veg	In	Dip	
1 (1)		0:00	5:00		1 (4)		0:45	5:45		1 (7)		1:30	6:30	
2 (2)		0:15	5:15		2 (5)		1:00	6:00		2 (8)		1:45	6:45	
3 (3)		0:30	5:30		3 (6)		1:15	6:15		3 (9)		2:00	7:00	

Subsurface

Transect 1		Time		Class	Transect 2		Time		class	Transect 3		Time		Class
Quad (Pos)	Veg	In	Dip		Quad( Pos)	Veg	In	Dip		Quad( Pos)	Veg	In	Dip	
1 (10)					1 (13)					1 (16)				
2 (11)					2 (14)					2 (17)				
3 (12)					3 (15)					3 (18)				

**Veg:** **NC** = perennial grass, shrub, tree canopy cover; **G** = perennial grass canopy and grass/shrub mix; **F** = perennial forb; **Sh** = shrub canopy; **T** = tree canopy

## Stability Class Definitions

Stability Class	Definition
1	50% of structural integrity lost (melts) within 5 seconds of immersion in water, <b>OR</b> soil too unstable to sample (falls through sieve).
2	50% of structural integrity lost (melts) 5-30 seconds after immersion.
3	50% of structural integrity lost (melts) 30-300 seconds after immersion, <b>OR</b> < 10% of soil remains on the sieve after five dipping cycles.
4	10–25% of soil remains on the sieve after five dipping cycles.
5	25–75% of soil remains on the sieve after five dipping cycles.
6	75–100 % of soil remains on the sieve after five dipping cycles.

# B Standard Operating Procedures for ROW Upland Seedling Planting Area Monitoring

## Training

The stems of dead plants will be dry throughout and break easily between the fingers. Color under the bark will be brownish gray. Leaves will be lacking or dried. The stems on live plants will be flexible and be green in color under the bark. If there is a question on the plant's status, slightly test each stem to see if it is flexible. Make a small finger nail impression under the bark to determine color. All stems on the plant must be dead for the plant to be recorded as dead. A missing plant is dead.

## Equipment

- 50-m tape
- GPS unit
- Clipboard and data form
- Whiteboard
- Digital camera with 1.5 m PVC pole

## Approach

**Plot setup** will occur by setting out the 115 x 138 ft monitoring plot centered in construction ROW. The ROW is normally 115 feet wide.

Record the four corners of the plot, using GPS.

Record on the data sheet whether each seedling is alive or dead. Record livestock/wildlife grazing in the area, using the categories presented in Table 5.2-1.

Record weed cover within the plot by species, using the categories presented in Table 5.3-2.

Record a **digital photo** of the planting area from each plot corner using the methods described for the line intercept method.

**QA** procedures will follow those outlined for the line intercept method.

Data Sheet – Upland Seedling Survival Monitoring Date \_\_\_\_\_

Location \_\_\_\_\_ Crew No. \_\_\_\_\_

Sagebrush Seedling Survival			% Survival
Species Symbol	Alive	Dead	

Grazing class \_\_\_\_\_ OHV travel class \_\_\_\_\_

Index Class	Definition
1	No apparent grazing, fecal droppings, or hoof prints; or OHV tire marks in the plot
2	<10%t plants grazed, fecal droppings or hoof prints; or OHV tire marks in the plot
3	10-25% plants grazed, fecal droppings or hoof prints; or OHV tire marks in the plot
4	25-50% plants grazed, fecal droppings or hoof prints; or OHV tire marks in the plot
5	>50% plants grazed or fecal droppings or hoof prints; or OHV tire marks in the plot

Noxious weeds cover class

Weed Species Code	Cover Class	Weed Species Code	Cover class

Cover class (%): 1 = 0-5; 2 = 5-25; 3 = 25-50; 4 = 50-75; 5 = 75-95; 6 = 05-100

# C Standard Operating Procedures for Biological Soil Crust Monitoring

## Training

Training specifications will follow those provided by:

Belnap, J., R. Rosentreter, S. Leonard, J.H. Kaltenecker, J. Williams, D. Eldridge. 2001. Biological soil crusts: Ecology and management. Technical Reference 1730-2. Bureau of Land Management, Denver, CO. <http://www.soilcrust.org/crust.pdf> (pages 8–9, 74–75).

## Equipment

- 50-m tape
- 25 x 25 cm quadrant with 5-cm grids
- Water bottle with spray nozzle
- GPS unit
- Clipboard and data form
- Whiteboard
- Digital camera with 1.5 m PVC pole

## Approach

**Plot** - establish a 30 x 30 m plot centered in the ROW

GPS the corners of the plot

The first quadrant will be placed in the center of the plot. Use the spray water bottle to mist the entire quadrant to enhance BSC visibility. Using the point-intercept method to record cover, carefully place the bottom side of the field pin flag on the right side of the 16 interior grid intersections and record the hit as one of the BSC morphological groups.

The next plot will be placed by randomly selecting one of the four cardinal directions on a compass (E, W, N, S). Take five paces in that direction and place the next quadrant. If the plot boundary is intercepted, then turn at a right angle to continue the paces. There will be 15 quadrants placed and recorded per plot.

Record livestock/wildlife grazing in the area using the categories presented in Table 5.2-1.

Record a **digital photo** from each plot corner using the methods described for the line intercept method. Obtain close-up photos of BSC occurrences in the sampling plots.

**QA** procedures will follow those outlined for the line intercept method.

Data Sheet – BSC Monitoring Date \_\_\_\_\_

Location \_\_\_\_\_ Crew No. \_\_\_\_\_

Quadrant No.	BSC Morphological Group				
	Cyanobacteria	Algae	Liverwort	Moss	Licken
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

# D Standard Operating Procedures for Noxious and Invasive Weed Monitoring

## Training

Noxious and invasive weed characteristics and photos:

<http://plants.usda.gov/java/noxiousDriver>

POD, Appendix H, Noxious and Invasive Weed Control Plan, Table A-1 lists noxious weeds identified during the pre-construction weed surveys.

## Equipment

GPS unit

Clipboard and data form

## Approach

**Weed area** - record the area of investigation using GPS.

List the noxious, invasive, and desirable plants in the area of investigation.

Assign a cover class to each species based on the definitions in Table 5-3.2

Record a **digital photo** of the weed area using the methods described for the line intercept method. GPS the photo location. More than one photo may be taken if necessary.

**QA** procedures will follow those outlined for the line intercept method.

## Plant cover classes

Plant Species Code	Cover Class	Plant Species Code	Cover class

Cover class (%): 1 = 0–5; 2 = 5–25; 3 = 25–50; 4 = 50–75; 5 = 75–95; 6 = 95–100

# E Standard Operating Procedures for ROW Wetland and Riparian Area Monitoring

## Training

The following training sources teach the fundamentals of the applying the line-point intercept method for collecting vegetation data on the ROW and control plots. These methods will be adapted for use with wetland and riparian areas.

Herrick, J.E., J.W. Van Zee, K.M. Havstad, L.M. Burkett, and W.G. Whitford. 2005. Monitoring manual: For grassland, shrubland, and savanna ecosystems, Vol. I. USDA, ARS Jornada Experimental Range. Las Cruces, NM.

[http://usda-ars.nmsu.edu/monit\\_assess/monmanual\\_main.php](http://usda-ars.nmsu.edu/monit_assess/monmanual_main.php).

Training videos: [http://usda-ars.nmsu.edu/monit\\_assess/videos\\_main.php](http://usda-ars.nmsu.edu/monit_assess/videos_main.php).

- Introduction
- Establish a transect
- Line-point intercept
- Photo points
- Soil stability (surface and subsurface)

## Equipment

- 50-m tape
- Two steel pins
- Pointer – long pin flag
- Soil stability kit, stopwatch, 1.0 liter of noncarbonated bottled water
- GPS unit and compass
- Clipboard and data form
- Pencils
- Thick-point marking pen
- Digital camera with 50 mm lens
- Six 60 cm rebar stakes
- Whiteboard or ID card on clipboard
- 1.5 m long, ¾ in diameter PVC pipe
- Laptop computer

## Approach

**Line-point intercept plot** - Three somewhat parallel transects will be placed to traverse the wetland or riparian area. The length of a transect will vary according to the width of the wetland or riparian area. The three transects will be randomly placed similar to establishing the upland transects. Record the starting point, ending point, and azimuth of each transect, using GPS. Use a steel pin to anchor the tape. Extend the tape by walking on the right-hand side of the tape. Place the tape on the ground and pull it taut. Use the second steel pin to anchor the far end of the tape. Approximately 50 points placed 0.5 m apart will be scored for plant canopy and basal cover, litter cover, rock, cover, BSC, and bare ground on each transect.

**Plant density** - A one-meter square quadrant will be randomly placed two times (no overlap) along each transect to measure species density. Record the species in the plot and count the number of individuals. Greater than 50 percent of the basal portion of the plant must be in the plot for it to be counted. Assess **grazing** and **OHV travel** using the categories presented in Table 5.1-2. Follow the directions presented in the training materials for point placement, data acquisition, and photograph acquisition. Soil stability (surface and subsurface) will be evaluated per the directions presented in the training materials. The surface soil and subsoil samples will be collected from the center of the one-meter quadrants. If **container-grown plants** or willow stakes were transplanted in the wetland or riparian area as part of revegetation efforts, then count the number of live plants by species for the entire area.

**Control or reference plots** will be set up outside of the wetland and riparian area in the 300-foot survey boundary. These plots need to be established within the same terrain, aspect, and soils as the ROW plot, to the greatest extent possible. The control plot will be set up and sampled in the same as the ROW plot.

**Digital photos** – One photo will be taken per transect. Record the date, location, plot, transect number, and direction on the whiteboard and place at the beginning of the transect leaning against the rebar stake. Remove the PVC cover from the center stake and replace it with the 1.5 m PVC pipe. Set the camera on top of the 1.5 m pole center the tape measure of transect 1 in the frame. Locate the whiteboard in the bottom center of the photo. Take the photo. Repeat the procedure for transects 2 and 3. Download the photo image to a laptop computer.

**QA** procedures will follow those outlined for the line intercept method.

Data Sheet – Riparian/Wetland Area Date \_\_\_\_\_

Location \_\_\_\_\_

Transect # \_\_\_\_\_ Azimuth \_\_\_\_\_ Crew No. \_\_\_\_\_

PT	Top canopy	Lower canopy layers			Soil	PT	Top canopy	Lower canopy layers			Soil
		Code 1	Code 2	Code 3				Code 1	Code 2	Code 3	
1						26					
2						27					
3						28					
4						29					
5						30					
6						31					
7						32					
8						33					
9						34					
10						35					
11						36					
12						37					
13						38					
14						39					
15						40					
16						41					
17						42					
18						43					
19						44					
20						45					
21						46					
22						47					
23						48					
24						49					
25						50					

**Top canopy codes:** Species code, common name, or NONE (no canopy)

**Lower canopy codes:** species code, common name, L (herbaceous litter), W (woody litter, >5mm diameter)

**Unknown Species Codes:** AF# = annual forb; PF# = perennial forb; AG# = annual gramminoid; PG# - perennial gramminoid; SH# - shrub; TR# = tree

**Soil Surface (do not use litter):** R = rock >5 mm diameter; BR = bedrock; BSC = biological soil crust; S = Soil without any other soil surface code.

## Species density

Transect - Quadrant	Plant Species Code – No. individuals
1 - 1	
1-2	
1-3	
2-1	
2-2	
2-3	
3-1	
3-2	
3-3	

Noxious weeds cover class

Weed Species Code	Cover Class	Weed Species Code	Cover class

Cover class (%): 1 = 0–5; 2 = 5–25; 3 = 25–50; 4 = 50–75; 5 = 75–95; 6 = 05–100

Grazing class \_\_\_\_\_ OHV travel class \_\_\_\_\_

Index Class	Definition
1	No apparent grazing, fecal droppings, or hoof prints; or OHV tire marks in the plot
2	<10%t plants grazed, fecal droppings or hoof prints; or OHV tire marks in the plot
3	10-25% plants grazed, fecal droppings or hoof prints; or OHV tire marks in the plot
4	25-50% plants grazed, fecal droppings or hoof prints; or OHV tire marks in the plot
5	>50% plants grazed or fecal droppings or hoof prints; or OHV tire marks in the plot

Soil Stability

Surface

Transect 1		Time		Class	Transect 2		Time		class	Transect 3		Time		Class
Quad (Pos)	Veg	In	Dip		Quad( Pos)	Veg	In	Dip		Quad( Pos)	Veg	In	Dip	
1 (1)		0:00	5:00		1 (4)		0:45	5:45		1 (7)		1:30	6:30	
2 (2)		0:15	5:15		2 (5)		1:00	6:00		2 (8)		1:45	6:45	
3 (3)		0:30	5:30		3 (6)		1:15	6:15		3 (9)		2:00	7:00	

Subsurface

Transect 1		Time		Class	Transect 2		Time		class	Transect 3		Time		Class
Quad (Pos)	Veg	In	Dip		Quad( Pos)	Veg	In	Dip		Quad( Pos)	Veg	In	Dip	
1 (10)					1 (13)					1 (16)				
2 (11)					2 (14)					2 (17)				
3 (12)					3 (15)					3 (18)				

**Veg:** **NC** = perennial grass, shrub, tree canopy cover; **G** = perennial grass canopy and grass/shrub mix; **F** = perennial forb; **Sh** = shrub canopy; **T** = tree canopy

Stability Class Definitions

Stability Class	Definition
1	50% of structural integrity lost (melts) within 5 seconds of immersion in water, <b>OR</b> soil too unstable to sample (falls through sieve).
2	50% of structural integrity lost (melts) 5-30 seconds after immersion.
3	50% of structural integrity lost (melts) 30-300 seconds after immersion, <b>OR</b> < 10% of soil remains on the sieve after five dipping cycles.
4	10–25% of soil remains on the sieve after five dipping cycles.
5	25–75% of soil remains on the sieve after five dipping cycles.
6	75–100 % of soil remains on the sieve after five dipping cycles.

Data Sheet – Wetland/Riparian Transplanted Plant Survival Monitoring  
Date\_\_\_\_\_

Location \_\_\_\_\_ Observers \_\_\_\_\_

Transplanted Plant Survival			% Survival
Species	Alive	Dead	

# F Standard Operating Procedures for Wet Meadow Productivity in Nevada

## Training

The following training sources teach the fundamentals of the applying the line-point intercept method for collecting vegetation data on the ROW and control plots. These methods will be adapted for use with wetland and riparian areas.

Herrick, J.E., J.W. Van Zee, K.M. Havstad, L.M. Burkett, and W.G. Whitford. 2005. Plant production, Chp. 9. In Monitoring manual: For grassland, shrubland, and savanna ecosystems, Vol. II. USDA, ARS Jornada Experimental Range. Las Cruces, NM. [http://usda-ars.nmsu.edu/monit\\_assess/monmanual\\_main.php](http://usda-ars.nmsu.edu/monit_assess/monmanual_main.php).

Training videos: [http://usda-ars.nmsu.edu/monit\\_assess/videos\\_main.php](http://usda-ars.nmsu.edu/monit_assess/videos_main.php).

Plant production

## Equipment

- Grass clippers
- 1.92 ft<sup>2</sup> circular plot
- Paper bags
- Large plastic bags
- Stapler
- Gram spring scales, 0-60 g
- GPS unit and compass
- Ecological site description 25XY005NV
- Clipboard and data forms
- Pencils
- Thick-point marking pen
- Digital camera with 50 mm lens
- Four 60 cm rebar stakes
- Whiteboard or ID card on clipboard
- 1.5 m long, ¾ in diameter PVC pipe
- Laptop computer

## Approach

**Plot** - use the ecological site description to help establish plot boundaries.

**GPS** the corners of the sampling plot

Randomly **10 sampling locations**. Separate the locations by at least 10 m. Avoid sampling sites that have been walked over. GPS and record the sampling locations.

**Harvest** the current year's growth of all vegetation in the circular plot using the grass clippers. Place the material in paper bag(s). It is not necessary to separate species. Label the paper bags with location, data, and sample number, and crew number. Weigh and record the weight of the bag and contents. Staple the paper bag(s) closed. Place the paper bag into a large plastic bag for transportation.

Record a **digital photo** of the wet meadow from each plot corner using the methods described for the line intercept method.

Record livestock/wildlife grazing and OHV travel on the wet meadow using the categories presented in the following table.

Record the presence of noxious and invasive weeds using the table below.

**QA** procedures will follow those outlined for the line intercept method.

**Air-dry** the collected plant material to a constant weight by opening the bags. Weigh approximately 10 bags until a constant weight is obtained. Weigh all bags and record the weight in grams on the data sheet.

Data Sheet – Nevada Wet Meadows Date \_\_\_\_\_

Location \_\_\_\_\_ Crew No. \_\_\_\_\_

Sample plot No.	Location	Bag weight	Wet weight (g)	Air dry weight (g)	Annual productivity (lbs/acre)
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

Grazing class \_\_\_\_\_ OHV travel class \_\_\_\_\_

Index Class	Definition
1	No apparent grazing, fecal droppings, or hoof prints; or OHV tire marks in the plot
2	<10%t plants grazed, fecal droppings or hoof prints; or OHV tire marks in the plot
3	10-25% plants grazed, fecal droppings or hoof prints; or OHV tire marks in the plot
4	25-50% plants grazed, fecal droppings or hoof prints; or OHV tire marks in the plot
5	>50% plants grazed or fecal droppings or hoof prints; or OHV tire marks in the plot

Noxious weeds cover class

Weed Species Code	Cover Class	Weed Species Code	Cover class

Cover class (%): 1 = 0–5; 2 = 5–25; 3 = 25–50; 4 = 50–75; 5 = 75–95; 6 = 05–100