Appendix H - Monitoring Strategy

Frank Church-River of No Return Wilderness
Noxious and Invasive Weed Management

Monitoring Strategy

April 2004

Monitoring Goals:

Monitoring associated with Integrated Weed Management within the FC-RONRW will continue to focus upon (1) trends in infestation number, size and density (2) the effect of noxious/invasive weed infestations on native vegetation and other wilderness resources (3) the effect of treatments on target weeds and desirable vegetation and (4) effectiveness of treatments as implemented.

Monitoring Elements:

1) Evaluate long term effects of treatment on target weeds and non-target vegetation.

   A) Permanent monitoring plots (Nested Frequency) for pre & post treatment plant composition and frequency

   B) Monitor survival, distribution and effectiveness of Biological Control agents (insects and pathogens)

2) Evaluate immediate and short term impacts of treatment on target weeds and non-target vegetation

   A) Monitor and/or document observations shortly after treatment to determine potential need for modifications to treatment strategies.

3) Monitor size and density of weed infestations

   A) Maintain a noxious/invasive plant inventory and database for the FC-RONRW using national protocols. Monitor a sample of infestations to determine expansion and/or reduction of infestations over time.

4) Document effects of noxious and invasive plants on native vegetation and other wilderness values.

   A) Maintain a database of observations and other pertinent information regarding the effects invasive plants have on native vegetation and other wilderness resources within the FC-RONRW.

Specific Monitoring Elements

1.A Permanent monitoring plots (Nested Frequency) for pre & post treatment plant composition and frequency

Beginning in 2000, 15 permanent quantitative monitoring sites were established in the FC-RONRW, primarily along the main and middle forks of the Salmon River. These plots were established to determine and assess significant changes in vegetation composition resulting from treatment activities. Permanent monitoring sites established in the FC-RONRW are shown on the map attached. The sites to be monitored were chosen based on the following factors;

- Noxious/invasive weeds were present
- Treatment was planned in the near future
- Representation of a variety of ecological types
- Locations are relatively easily accessed by boat, raft or small airplane

Base line and first year post treatment information has been collected at these monitoring sites using Forest Service (Region 4) protocol for Nested Frequency monitoring (attachment 1.A). Varying site conditions may influence the effectiveness of treatment on target weeds and also the effects on non-target vegetation. Initial evaluation of monitoring information at these sites indicates successful reduction of noxious/invasive weeds with little or no impact to non-target vegetation.

The majority of the sites were resample in the spring of 2003. Plots will be re-sampled at year 5 following treatment (2005). The need for further monitoring and/or appropriate monitoring intervals will be determined following the evaluation of 2005 data.

Additional monitoring sites may be established at new locations having different site characteristics**.** Site characteristics potentially influencing effectiveness of weed treatment include; aspect, slope and elevation, soil type and texture, amount of bare soil, density of conifer over story, density of noxious/invasive weeds and associated vegetation, shrub component, distance to water, etc.

1.B Monitor survival, distribution and effectiveness of Biological Control agents (insects and pathogens)

The use of Biological Control agents as a component of Integrated Weed Management in the FC-RONRW will be monitored to determine treatment effectiveness. Project elements to be evaluated include, 1) survival and establishment of the biocontrol agent at the target site, 2) biocontrol agents increasing in numbers 3) biocontrol agents affecting the target plants, 4) trend in target plants populations, 5) trend in non-target vegetation, 6) factors influencing survival or effectiveness of biocontrol agents, and 7) potential use for collection and redistribution.

Various monitoring protocols are available to evaluate the effectiveness of biological control. Recommended sampling methods and forms are described in "Biological Control of Weeds in the West", Western Society of Weed Science, 1996. Optional biocontrol monitoring form and instructions are found in Attachment 1.B.

2.A Monitor and/or document observations shortly after treatment

Qualitative monitoring will determine if treatment practices are having the intended affect on weed infestations, while providing protection to other vegetation within the anticipate parameters. Field crews will continuously monitor post treatment effects by observing areas previously treated. This level of monitoring will allow for continuous evaluation of weed treatment practices to insure effective treatment of target weeds and protection of non-target vegetation and resources. Changes to treatment practices can quickly be made at the first indication of potential concerns. Observations by field crews will be documented and pertinent information disseminated to resource managers and field crews. Consistant qualitative monitoring within the FC-RONRW will be achieved by the use of an agreed upon protocol and monitoring report form. Monitoring protocols and forms presently being reviewed (Attachment 2.A) will be formalized by the end of the 2005 field seson.

3.A Maintain a noxious/invasive plant inventory and database

The FC-RONRW will maintain a noxious/invasive plant inventory and database using national protocols. Annually a sample of treated infestations will be monitored to determine expansion and/or reduction of infestations over time.

4.A Document effects of noxious and invasive plants on native vegetation and other wilderness values.

The FC-RONRW will maintain a database of observations and other pertinent information regarding the effects of invasive plants on native vegetation and other wilderness resources.

Attachment 1.A

Nested Frequency Monitoring Form, R4 2200-22

Attachment 1.B

BIOLOGICAL CONTROL MONITORING REPORT

Monitored By: _____ **Monitor Date:** _____/____/____ (yyyy mm dd)

State: ____ **County:** _____ **Target Agent:** _____

Target Weed: _____

Other Agents Present:_____

Land Ownership: BIA BLM CGOV OTH PVLA STAT TNC TRIB USFS USFW USOT

Local Ownership (Optional): _____(Assign a Site Name)

UTM: UTM Datum Zone: __ UTM Year: _ _ _ UTM Easting: _ _ _ UTM Northing: _ _ _ _ _

Lat: Deg _____ Min _____ Sec _____ **Long:** Deg _____ Min _____ Sec _____
LL_Datum: _____

Legal: T _____ R _____ Sec _____ Q _____ QQ _____

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MONITORING INFORMATION

Sampling Time: _____

Weather Conditions: ___ Clear ___ Partly cloudy ___ Overcast ___ Rain ___

(Other: Specify) _____

Air Temperature: (F) __ <60 ___ 60-70 ___ 70-80 __ 80-90 __ >90 Actual Temp: _____
Wind: ____ Calm ____ Light ____ Moderate ____ Strong

BIOLOGICAL CONTROL MONITORING

Visual Observation of any Biocontrol Agent Before Sampling? _____ Yes _____ No

Visual Observation of Biocontrol Agent/5 Minutes: Species: _____ **Number:** _____

Seedheads Sampling: Number Sampled: ____ **Total Number Infested:** ____
Species: _____

Agent Sweeping: Number of Sweeps: ____ **Total Number of Agents Swept:** _____ **Species:** _____

Root Sampling: Number of Roots Sampled: ____ **Total Number Infested:** ____
Species: _____

Estimate of Population Level: ____ Established ____ Marginally Collectable ____ Collectable

*Answer the above questions for each biocontrol organism found present on site and attach.

VEGETATION MONITORING

Photos Taken? _____ Y _____ N
Dominant Plant: _____
Percent Canopy Cover: ____ Tree ____ Shrub ____ Forb ____ Grasses ____ Litter ____ Bare Ground
Type of Sample: _____ Daubenmire frame _____ Other (Specify)
_____
Average Number of Target Weed Stems: _____ (average from reverse side)
Average Height of Target Weed: _____
Average Percent Canopy Cover of Target Weed: _____

MONITORING INSTRUCTIONS

Visual Observation: Sit quietly for 5 minutes in the infested area near the release point and look for the insects. If you see none, then carefully and slowly move the plants aside to look under the leaves and on the stems. Record observations on monitoring worksheet. Summarize results onto page 1.

Seehhead Sampling: Within a 15 meter circle surrounding the release point collect 200 seedheads. Dissect the seedheads and examine for the presence of a biocontrol agent. Record on the worksheet if the seedhead is infested, the species and number of biocontrol agents present. Summarize the results onto page 1.

*If 50% of the seedheads are infested then the population is likely collectible.

Agent Sweeping: First, look over the release area to see if biocontrol agents are visually apparent. Next, sweep 5 sampling points along four lines in N, S, E, and W direction from the release point (20 points total). For each line, begin 1 meter from the release point. Using a 15-inch diameter net, make 4 sweeps (2 to right center, 2 to left center). Carefully examine the net and count and identify species of the biocontrol agents present, then empty the net behind you. Record on worksheet. Move 2 meters out and repeat above steps. Continue until 5 points have been sampled, then repeat over the remaining cardinal directions. Record on monitoring worksheet. Summarize all transect results on page 1.

*If you collect 2 target organisms per sweep or a total of 160 then the population is likely collectible.

Root Sampling: Within a 15 meter circle surrounding the release point, dig roots from 20 randomly selected plants. Select plants with a root crown diameter of atleast 12 millimeters. Dissection of the roots should be done in the field for best results. If this is not possible, place the plants on ice or in a cool place for dissection later. Count the number of infested plants. Record on monitoring worksheet. Summarize results onto page 1.

*If 25 % or more of the plants are infested; the population is likely collectable.

Vegetation Monitoring: Establish 4 transects, in each cardinal direction, from the release point. Place a Daubenmire frame to the right side of each transect line at a point 1, 3, 5, 7, and 9 meters. Within each frame, count the number of stems, record the average height and the percent canopy cover for the target weed. Record on monitoring worksheet and summarize the results onto page 1.

MONITORING WORKSHEET VISUAL OBSERVATION (5 minutes).

SEEDHEAD SAMPLING (Record species and number found. If seedhead is empty, leave blank).

Seedhead #	Species	#Found	Seedhead#	Species	#Found	Seedhead#	Species	#Found
1			68			135		
2			69			136		
3			70			137		
4			71			138		
5			72			139		
6			73			140		
7			74			141		
8			75			142		
9			76			143		
10			77			144		
11			78			145		
12			79			146		
13			80			147		
14			81			148		
15			82			149		
16			83			150		
17			84			151		
18			85			152		
19			86			153		
20			87			154		
21			88			155		
22			89			156		
23			90			157		
24			91			158		
25			92			159		
26			93			160		
27			94			161		
28			95			162		
29			96			163		
30			97			164		
31			98			165		
32			99			166		
33			100			167		
34			101			168		
35			102			169		
36			103			170		
37			104			171		

38			105			172		
39			106			173		
40			107			174		
41			108			175		
42			109			176		
43			110			177		
44			111			178		
45			112			179		
46			113			180		
47			114			181		
48			115			182		
49			116			183		
50			117			184		
51			118			185		
52			119			186		
53			120			187		
54			121			188		
55			122			189		
56			123			190		
57			124			191		
58			125			192		
59			126			193		
60			127			194		
61			128			195		
62			129			196		
63			130			197		
64			131			198		
65			132			199		
66			133			200		
67			134					

AGENT SWEEPING (4 sweeps at each of the 5 points per transect = 20 sweeps per transect. 4 transects x 20 sweeps per transect = 80 sweeps per release site).

Distance from Release Point	Direction			
	N	S	E	W
1m	_____	_____	_____	_____
3m	_____	_____	_____	_____
5m	_____	_____	_____	_____
7m	_____	_____	_____	_____
9m	_____	_____	_____	_____

ROOT SAMPLING *(Samples should be taken within a 15 meter circle surrounding the release point).*

Root	Type of Larva	Number Found
1	_____	_____
2	_____	_____
3	_____	_____
4	_____	_____
5	_____	_____
6	_____	_____
7	_____	_____
8	_____	_____
9	_____	_____
10	_____	_____
11	_____	_____
12	_____	_____
13	_____	_____
14	_____	_____
15	_____	_____
16	_____	_____
17	_____	_____
18	_____	_____
19	_____	_____
20	_____	_____

*Record: AG for Agapeta, CY for Cyphlocleonus or SP for Sphenoptera.

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VEGETATION MONITORING (Sample should be taken on the right side of transect with back to release point facing in the appropriate cardinal direction).

Distance from Release Point		Direction N	S	E	W
1m	Number of Stems	_____	_____	_____	_____
	Average Height	_____	_____	_____	_____
	Percent Canopy Cover	_____	_____	_____	_____
3m	Number of Stems	_____	_____	_____	_____
	Average Height	_____	_____	_____	_____
	Percent Canopy Cover	_____	_____	_____	_____
5m	Number of Stems	_____	_____	_____	_____
	Average Height	_____	_____	_____	_____
	Percent Canopy Cover	_____	_____	_____	_____
7m	Number of Stems	_____	_____	_____	_____
	Average Height	_____	_____	_____	_____
	Percent Canopy Cover	_____	_____	_____	_____
9m	Number of Stems	_____	_____	_____	_____
	Average Height	_____	_____	_____	_____
	Percent Canopy Cover	_____	_____	_____	_____

Attachment 2.A.1

Noxious Weed Qualitative Monitoring Form
Post Treatment

Location:________________________ **Monitoring Date:**__________
Site ID:______________ **Acres:**______ **Examiner:**______________
Soil/Site Conditions:________________ **Distance to Water**__________

Treatment Type:__________________ **Treatment Date:**__________
Amount/Rate:____________________ **Applicator:**______________

Existing Vegetation

Vegetation Canopy Cover	1-5%	6-25%	26-50%	51-75%	76-100%
Target Weeds:					
Grass:					
Forbs:					
Shrubs:					
Trees:					
Moss/Lichens					

Weed Distribution: Isolated___ scattered___ patchy___ scattered patchy___ continuous___ linear___
Weed Density: (plants/meter sq) 0___ 1-25___ 26-50___ 51-100___ 101-150___ >150___

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Treatment Results **Uniform** □ **or Patchy** □
Target Weed Control Rating (Estimated Percent Reduction)

Target Weed	Uncertain	1-20%	21-40%	41-60%	61-80%	81-100%

Effects of Treatment on Other Vegetation	Uncertain	No Effect	Slight Reduction	Significant Reduction	Total Reduction
Grass:					
Forbs:					
Shrubs:					
Trees:					
Moss/Lichens					

Comments/Observations:

Attachment 2.A.2

Noxious Weed Qualitative Monitoring Form

Examiners:_____

Date:	**Time:**	**Site Name:**
Location:		**Site #:**
		T. R. Sec QSec QSec
Target Weed:		**Lat. Long**

	0%	1-5%	6-20%	21-45%	46-70%	71-100%
Weed Name:						
Annual Grass						
Perennial Grass						
Forbs						
Shrubs						
Trees						

Dominant Plants on Site:	
Other Noxious Weeds:	

Noxious Weed Density (Flowering plants/meter sq.)		**Noxious Weed Distribution**		**Phenology Estimated Percent**	
0		**Isolated**		**Rosette**	
1-25		**Scattered**		**Bolting**	
26-75		**Scattered-Patchy**		**BU-1**	
75-100		**Patchy**		**BU-2**	
		Continuous		**BU-3**	
				BU-4	
				Flower	
				Senescent	

Comments/Observations:

(Attachment 2.A.2, cont.)

FCRONR NOXIOUS WEED TREATMENT MONITORING FORM

PROJECT NAME: **FCRONRW Weed Treatment**

SITE/LOCATION: Infestations proposed for treatment. Known populations and habitats for tes plant species, and known noxious weed infestations and susceptible habitat types. Sites will depend on burn units, species, and habitat.

MONITORING OBJECTIVES:

1. To determine the effectiveness of treatment on noxious weed infestations.
2. To determine response of native vegetation to treatment and reduction in noxious weeds, including any TES plant species IF present.

MONITORING TYPE: Baseline, implementation, Effectiveness, and Validation.

PRIORITY: Highest

PARAMETERS: Known infestations by species on each National Forest, in representative habitats of all 3 major watersheds (Upper Selway, Middle Fork, and Main Salmon), for each treatment type. Suitable monitoring sites will be determined by . Weed Coordinators and Forest Botanists. Refer to tables and maps in project file and EIS to determine which sites would be appropriate and accessible (for efficiency).

METHODOLOGY: Baseline and follow-up monitoring using Qualitative Vegetative Monitoring Form (attached).

FREQUENCY/DURATION: Baseline monitoring prior to treatment. Thereafter, plots read every year for 3 years, and every other year for another 5 years.

VARIANCE LIMITS: Decreases or increases in noxious weed infestations. Decreases or increases of native species over 5 years.

CORRECTIVE MEASURES: Increases in noxious weed infestations

DATA STORAGE: Hard copies to be kept in Forest Headquarters, with master copies at Salmon-Challis Headquarters. Electronic forms in Forest electronic files.

REPORT: Hard copy (including maps) and electronic.

PROJEC1ED COST: 4 person/days field time (includes travel) plus 1 person/day office plus travel expenses (approx. $l000/year) per site. Total $10,000 year for entire wilderness.

PERSONNEL NEEDED: Forest Botanist and/or Weed Coordinator and 1 other person (biotech or Forest tes plants coordinator), 4 days per field season, plus 1 day office time, per site.

RESPONSIBLE OFFICIAL: Forest Supervisor/BLM District Manager

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