APPENDIX M Inventory and Monitoring Plan Framework

In addition to the monitoring that is already required under various Forest Plans, this inventory and monitoring plan framework is part of all action alternatives in this EIS. The framework would guide the development of detailed monitoring plans at the sub-regional, or site-specific project scale.

A good monitoring program will be well thought out and have a high probability of detecting change in the resource being monitored (NPS 2002). The Field Guide to Invasive Plant Inventory, Monitoring and Mapping (US Forest Service, no date) has been developed to guide monitoring efforts in conjunction with NRIS TERRA. It suggests a monitoring regime may start with annual monitoring for the first 3-5 years, decreasing in frequency to every other year for the next 5-10 years and further decreasing monitoring frequency to every 3 years for the next ten years until the seed source has been exhausted (i.e. no new germination taking place).

An effective, worthwhile monitoring plan has four components: A question to be answered (which is tied to management objectives), a measurable indicator, a procedure for measuring the indicator, and reported analysis. It is assumed that site-specific project monitoring plans will include these components. (USDA Forest Service November, 2001)

The three monitoring categories described in this plan (implementation, treatment and restoration effectiveness, and environmental effects) can be used to implement a long term adaptive management strategy. By implementing an adaptive management approach, managers will identify and respond to changing conditions and new information on an ongoing basis, and assess the need to make changes to treatment and restoration strategies.

Implementation Monitoring

Implementation monitoring answers the question, "Did we do what we said we would do?" This question needs to be answered on a regional scale, because adaptive management strategies require determination that actions are taking place as described in the Invasive Plants EIS. Monitoring needs to include the timing of actions and mitigation. If actions are not timely, they may not be effective and if mitigation measures are not implemented, effects may be different from what was predicted (USFS, 2001).

As part of annual forest plan implementation monitoring, each forest invasive plant coordinator in Region Six would report to the regional invasive plant coordinator about forest-wide implementation of the standards adopted under this EIS, using a checklist. (See Attachment M-1 for a sample checklist). The intent of the checklist is to assure the Standards are being followed and identify any problems associated with meeting the Standard. The regional weed coordinator would also have the opportunity to highlight successes, and share information to improve the ease and effectiveness of standard implementation across the region.

Treatment and Restoration Effectiveness Monitoring

Treatment and restoration monitoring answers the question, "Were treatment and restoration projects effective?" The invasive plant infestation conditions need to be monitored in order to know when it is appropriate for action to be taken and whether that action is effective (USFS 2001). This question needs to be answered on a project-level scale. Compilation and analysis of project-level results can be used to answer the question at a regional level.

Results of successful invasive plant treatment and restoration projects can be shared across the region to increase the effectiveness of treatment elsewhere. Conversely, if treatment and restoration efforts are ineffective, the site-specific decision maker can review the strategy to determine whether treatment actions need to be changed, or whether ineffective methods can be avoided, if analysis of the failure shows that is appropriate.

A subset of individual projects would comprise a formal treatment and effectiveness monitoring plan. The findings would subsequently be reported to the regional weed coordinator. Every site-specific project should include treatment and restoration questions to be answered. They should be tied to management objectives, regardless of whether a formal monitoring plan will be implemented. Examples of questions to be answered could include:

> Has the project been effective in helping to meet objectives leading to a desired future condition?
>
> Have the number of new invasive plant infestations been reduced?
>
> Has the infestation size for the targeted invasive plant species been reduced in susceptible potential vegetation communities, as well as those of low susceptibility?

Sample Monitoring Plan

A site-specific monitoring plan to answer the first question might look like this:

- What changes in distribution, amount and proportion of invasive plant infestation have resulted due to treatment activities?"
- Which treatment methods, separate or in combination, are most successful for specific invasive species?
- Has infestation size for some or all invasive plant species been reduced?
- Has disturbed ground remained weed-free? Has it revegetated with desirable plants either through passive recovery or active restoration?

Monitoring objectives would be framed to gather information to answer such questions. The following is strictly an example of possible monitoring objectives that address only a couple of the above questions.

Management Objective	Indicator	Sampling Procedure
Decrease the infestation size of spotted knapweed annually by at least X % using herbicide Z.	Number of acres infested by year in NRIS TERRA.	Sort database by infested area of spotted knapweed by chemical treatment and compare reduction annually.
Determine the difference in infestation size reduction of diffuse knapweed using manual removal versus chemical versus a combination of both.	Reduction in infestation size by treatment.	Using a subset of diffuse knapweed treatment areas compare treatment methods using a statistically sound approach.

Environmental Effects Monitoring: Environmental effects monitoring answers the question, "Are the effects as predicted in the site-specific environmental analysis?" This question needs to be answered on a project-level scale. Compilation and analysis of project-level answers to this question can be used to answer the question at a regional level.

The environmental effects of the implemented actions need to be monitored to measure the validity of predicted effects. Monitoring effects will provide Region Six with a basis for staying on course or modifying decisions in the future, guiding and informing decision makers at the site-specific level in making adaptations to on-going and future treatment and restoration projects.

A subset of individual projects will comprise a formal environmental effects monitoring plan. The findings which will subsequently be reported to the regional weed coordinator. Treatment areas within research natural areas, municipal watersheds, wilderness areas, riparian reserves, or other sensitive areas will be the highest priority sites for these more detailed monitoring efforts. Every site-specific project should include environmental effects questions to be answered, tied to the effects described in the site-specific environmental analysis, regardless of whether a formal monitoring plan will be implemented. Examples of questions to be answered could include:

Do prevention standards reduce the amount of seeds or propagules introduced?

Do invasive plant treatments successfully increase or maintain suitable habitat for wildlife species of interest?

Do invasive plant treatments successfully increase or maintain water quality?

Assumptions

Invasive plant treatment and restoration actions are likely to be complex, involve multiple land ownerships and will take years to implement, due to the nature of invasive plant problems. It is likely that a site will be treated multiple times over the years. It is assumed site-specific project planning will include site-specific monitoring.

Invasive plant monitoring in Region Six will use existing personnel and processes to the extent possible. It is assumed every Forest in Region Six has an invasive plants coordinator and is maintaining an up-to-date invasive plant inventory consistent with nationally-accepted (e.g., NRIS/TERRA) protocols. It is also assumes periodic inspection of all Forest Service administrative sites, recreation facilities, roads and rights-of-ways for presence of invasive plants.

Monitoring methods will be consistent with current USDA Forest Service protocols. Where appropriate, such as with water quality monitoring for chemical contamination, protocols from other state or federal agencies will be used to facilitate sharing and regional compilation of data, for analysis of cumulative effects.

For efficiency, monitoring efforts will use information and partnerships with other agencies and interested publics wherever possible. It is assumed that current Forest Plan implementation monitoring of projects on each National Forest within the Region will continue, and results of that monitoring effort will be reported to the Regional Office.

References

Invasive Plant Management Decisions and Environmental Analyses, USDA-Forest Service, November 2001.

Field Guide – Invasive Plant Inventory, Monitoring and Mapping Protocol, USDA-Forest Service, No date.

Invasive Plants Inventory and Monitoring Guidelines, National Park Service, 2002.

Table M-1 Invasive Plant EIS Implementation Checklist.		**Implemented as written? (Y, N, or n/a)**	**Comments/ brief discussion**
Prevention Standards			
1	Prevention of invasive plant introduction, establishment and spread will be addressed in watershed analysis; roads analysis; fire and fuels management plans, Burned Area Emergency Recovery Plans; emergency wildfire situation analysis; allotment management plans, and other land management assessments.		
2	Actions conducted or authorized by the Forest Service that will operate outside the limits of the road surface (including public works and service contracts), require the cleaning of all heavy equipment (bulldozers, skidders, graders, backhoes, dump trucks, etc.) prior to entering National Forest System Lands. This standard does not apply to initial attack of wildfires, and other emergency situations.		
3	Use weed-free straw and mulch for all projects, conducted or authorized by the Forest Service, on National Forest System Lands. If State certified straw and mulch are not available, individual Forests should use materials that meet “weed-free” standards.		
4	Use weed-free feed in all Wilderness Areas and Wilderness Trailheads. If State certified hay is not available, individual Forests should require sources that meet “weed-free” standards or require weed-free pelletized feed.		
6	Through annual operating instructions, and the revision of grazing allotment management plans, incorporate invasive plant prevention measures that help reduce the spread of invasive plants. Plan and implement these measures in cooperation with the grazing permit holder.		

Table M-1 Invasive Plant EIS Implementation Checklist.		**Implemented as written? (Y, N, or n/a)**	**Comments/ brief discussion**
7	Inspect active gravel, fill, sand stockpiles, quarries, and borrow material for invasive plants before use and transport on National Forest System land. Treat or require treatment of infested sources for eradication, and strip and stockpile contaminated material before any use of pit material.		
8	Conduct road blading, brushing and ditch cleaning in areas of high concentrations of invasive plants in consultation with District or Forest-level invasive plant specials, incorporate invasive plant prevention measures as appropriate.		
Treatment and Restoration Standards			
11	Prioritize infestations of invasive plants for treatment at the landscape, watershed or larger multiple forest/multiple owner scale.		
12	Develop a long-term site strategy for restoring/revegetating treated infestations of invasive plants.		
13	Native plant materials are the first choice in revegetation for restoration and rehabilitation where timely natural regeneration of the native plant community is not likely to occur. Non-native, non-invasive plant species may be used when: 1. needed in emergency conditions to protect basic resource values (e.g., soil stability, water quality and to help prevent the establishment of invasive species), 2. as an interim, non-persistent measure designed to aid in the re-establishment of native plants, 3. native plant materials are not available, and 4. in permanently altered plant communities. Under no circumstances will non-native invasive plant species be used.		
14	Use only APHIS and State-approved biological control agents. Agents demonstrated to have direct negative impacts on non-target organisms would not be released.		

Table M-1 Invasive Plant EIS Implementation Checklist.		**Implemented as written? (Y, N, or n/a)**	**Comments/ brief discussion**
15	Application of any herbicides to treat invasive plants will be performed or directly supervised by a State or Federally licensed applicator.		
16	Select from herbicide formulations containing one or more of the following **10 active ingredients:** chlorsulfuron, clopyralid, glyphosate, imazapic, imazapyr, metsulfuron methyl, picloram, sethoxydim, sulfometuron methyl, and triclopyr. All herbicide application methods are allowed including wicking, wiping, injection, spot, broadcast and aerial, as permitted by the product label. Chlorsulfuron, metsulfuron methyl, and sulfometuron methyl will not be applied aerially. The use of triclopyr is limited to selective application techniques only (e.g., spot spraying, wiping, basal bark, cut stump, injection). Additional herbicides may be added in the future at either the Forest Plan or project level through appropriate risk analysis and NEPA/ESA procedures.		
18	Use only adjuvants (e.g. surfactants, dyes) and inert ingredients reviewed in Forest Service hazard and risk assessment documents such as SERA, Inc., 1997a, 1997b; Bakke, D. 2002.		
19	To reduce or eliminate direct or indirect negative effects to water quality and aquatic biota from the application of herbicide, consider site-specific soil characteristics, proximity to surface water and local water table depth to determine *herbicide formulation* (e.g. use of aquatic labeled products), size of buffers needed, if any, and application method and timing.		

Table M-1 Invasive Plant EIS Implementation Checklist.		**Implemented as written? (Y, N, or n/a)**	**Comments/ brief discussion**
20	Design invasive plant treatments to reduce or eliminate adverse effects to proposed and listed species, and their critical habitat. This may involve surveying for listed or proposed plants prior to implementing actions within unsurveyed habitat if the action has a reasonable potential to adversely affect the plant species. Use site-specific project design (e.g. application rate and method, timing, wind speed and direction, nozzle type and size, buffers, etc.) to mitigate the potential for adverse disturbance and/or contaminant exposure.		
21	Provide a minimum buffer of 300 feet for aerial application of herbicides near developed campgrounds, recreation residences and private land.		
22	Prohibit aerial application of herbicides within legally designated municipal watersheds.		