

Viable, alternative solutions presented in
Risky Business – Invasive Species Management on National Forests
A review and summary of needed changes in current plans, policies and programs

<http://www.kettlerange.org/weeds/>

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Chapter 1. Policies

A.1. Policies and plans need clearly defined goals and objectives linked to performance measures.

- Formulate policies and plans with clearly defined goals and objectives.
- Incorporate performance measures into policies and plans.
- Formulate policies based on rational approaches and sound biological principles that are not constrained by management infrastructure.
- Formulate policies specific to invasive species management.
- Formulate policies that manage invasive species over long terms.
- Formulate policy objectives in terms of control, not treatment.
- Formulate policies based on a statement of general governing principles for invasive species management that recognizes their pervasive effects and the great deal of harm that has come from inappropriate measures.

A.2. Plans need a sound, consistent framework for making decisions.

- Formulate plans and policies that incorporate a sound decision-making framework.
- Formulate plans and policies based on the *processes* of invasions.
- Prioritize long-term ecosystem sustainability as a prime goal of management.
- Formulate plans and policies using principles of *ecosystem management* (Appendix A). Principles of ecosystem management should include:
 - 1) Long-term sustainability.
 - 2) Clear, operational goals.
 - 3) Sound ecological models and understanding.
 - 4) Understanding of complexity and interconnectedness.
 - 5) Recognition of the dynamic character of ecosystems.
 - 6) Attention to context and scale.
 - 7) Consideration of humans as ecosystem components.
 - 8) Adaptability and accountability.
- Formulate plans and policies using principles of *true* Integrated Weed Management (Appendix A). Components of an IWM program should include:
 - monitoring
 - integration of multiple objectives
 - integrated strategies
 - periodic re-evaluationA wide variety of pest control options should be considered in IWM with preference for:
 - Practicality - programs should be effective and cost-efficient.
 - Environmental sensitivity - programs should reduce environmental risks.
- Formulate plans and policies to manage invasive species using principles of Integrated Weed Management within a framework of ecosystem management (IWM-EM, Appendix A). The application of IWM-EM includes the following principles:
 - 1) Maintenance of long-term ecosystem sustainability should be the prime goal.
 - 2) Planning needs to address the causes of biological invasions.
 - 3) Program budgets need to be based on performance evaluations and monitoring.
 - 4) Planning and implementation needs to be site-specific.
 - 5) Planning and implementation needs to be species-specific.
 - 6) Planning and implementation need to address prevention.
- Formulate plans and policies based on an analytical approach.

- Use adaptive management (Appendix A).
- Improve coordination among different agencies.
- Improve coordination among agencies and units.
- Improve coordination between agencies and units.

A.3. Programs need to treat the causes of invasions, not the symptoms, if they are to succeed.

- Develop programs that acknowledge and treat the causes of invasions, rather than the symptoms.
- Include explicit acknowledgment of the causes of species invasions in program directions.
- Incorporate plans for invasive species control that include long-term, comprehensive strategies.
- Plans need strong direction to cease the use of unsound management practices which contribute to plant invasions.
- Planning goals should stay within the scope of the project, and avoid unattainable goal statements that use absolutes, e.g., “absence of” and “complete eradication”, which properly belong in vision and policy direction.
- Funds should be allocated and projects prioritized well in advance of anticipated spending, and over multiple-year time frames.

B. Projects and plans must incorporate measurable standards and guidelines.

- Projects and plans must incorporate measurable standards and guidelines.
- Projects and planning standards and guidelines should be reasonable.
- Projects and plans should require the establishment of standards and guidelines for the measurement of action thresholds before approval.
- Projects and plans should require the establishment of standards and guidelines for the measurement of damage thresholds before approval.
- Projects and plans should be based on site-specific standards that consider the biology and causes of species invasions as well as the characteristics of the invaded ecosystem.
- Project funding should be contingent on measurement of action and damage thresholds over the course of the project.
- Compile a national list of potential and known invasive species for which action thresholds should apply, along with the rationale for each species’ inclusion, and the priority it will receive for control or preventive actions.

C. Programs must be held accountable to budgets.

- Hold programs accountable to budgets and secure funding before beginning significant actions.
- Identify required measures as line items in projected budgets.
- Suspend funding for programs that have not developed goals and objectives for invasive species management.

D. Policies, plans, and programs need adjustments based on periodic evaluations.

- Policies and plans should be periodically adjusted, based on reported program evaluations.
- Programs should be required to prepare evaluations based on monitoring reports.
- Provide incentives to make programs effective, and penalize programs that do not accomplish goals and objectives for invasive species management, e.g., halt operations when weed control targets are not being met or when unacceptable environmental impacts are occurring.
- Require that yearly program evaluations be made available to the public and policy-makers in a timely fashion, so that plans can be adjusted when necessary.
- Field units should be required to complete yearly reports in conjunction with invasive species programs that will include the costs of program implementation and administration, ongoing monitoring results for the extent of weed infestations and summary tables of the amount of herbicides used (by formulation and application method). Reports should be filed promptly with the Regional offices.
- Require that evaluation reports include information sufficient to determine the extent of implementation, treatment effectiveness, and whether planning assumptions were correct.
- Fund annual monitoring reports for invasive species programs independently of programs.

Chapter 2. Disclosure

A.1. Planning documents must disclose all potential significant impacts, and provide detailed discussions and mitigation measures for all reasonably foreseeable impacts.

- Planning documents must disclose all potential significant impacts.
- Planning documents must provide detailed discussions and mitigation measures for all reasonably foreseeable impacts.
- Planning documents should include a means for evaluating and reporting project expenditures and outcomes, to be used in determining project effectiveness and in adjusting plans and policies.

A.2. Planning documents must be site-specific.

- Planning documents must include site-specific analyses of the effects of all proposed chemical treatments.
- Planning documents must include site-specific analyses of the response of invasive species to alternatives.
- Planning documents must include species-specific analyses of the response of invasive species to alternatives.

A.3. Planning documents must disclose potential impacts of proposed chemical applications, along with the impacts of other alternatives.

- Planning documents must disclose and analyze the full range of potential impacts.
- Planning documents must present the full range of potential outcomes, pro and con.
- Planning documents must disclose and analyze the full range of potential environmental effects of proposed chemical applications.
- Planning documents must disclose and analyze the full range of adverse effects on humans resulting from proposed chemical applications.
- Planning documents must be comprehensive; issues analyzed must address the full scope of project impacts; all known cumulative and indirect effects must be disclosed and analyzed.
- Planning documents must include a comprehensive list of citations referenced in effects analyses.

A.4. Decisions must not be biased toward the choice of a predetermined alternative.

- Decisions must not be biased toward the choice of a predetermined alternative.
- Planning documents should analyze studies that offer different viewpoints.
- Project objectives should follow the goals of an effective system of invasive species management.
- Projects should follow a process of true Integrated Weed Management, which begins with an honest, unbiased appraisal of the problem, including an examination of the reasons why invasive species are out of control. Actions should be developed based on the use of all available tools, including prevention, site-specificity, monitoring and adaptive management.
- Invasive species management projects should incorporate the results of monitoring. Monitoring should include operational indices such as the ratio of increasers and decreasers used in range management.
- Ineffective programs should be replaced with comprehensive restoration programs that address and correct the causes of plant invasions, while preventing further damage caused by invasive species and inappropriate treatments.

A.5. Planning documents must be prepared by qualified personnel, and based on a thorough review of up-to-date scientific studies.

- Planning documents should be prepared by qualified personnel.
- Planning documents that propose herbicide treatments should be reviewed by qualified medical and chemical experts.
- Planning documents must be based on a thorough, comprehensive review of up-to-date and peer-reviewed scientific studies.
- Planning documents should include references to peer-reviewed studies that provide a wide range of conclusions on potential effects.

- Risk assessments should be supplemented with precautionary principles that act in advance of scientific certainty to prevent harm to humans and the environment (Appendix A).
- The Forest Service should coordinate projects through a scientific advisory board that can offer qualified and independent advice about projects.

B.1. Projects must have goals that accomplish a stated need.

- Projects that manage invasive species must have a stated purpose and need from which goals and objectives of the project will follow.
- Projects should include benchmarks that can validate whether the objectives are accomplishing the purpose of the project.
- Projects should incorporate evaluation and reporting procedures that insure that program goals and implementation procedures conform to regional and national policies.

B.2. Action alternatives which propose herbicide use must demonstrate an overwhelming public need.

- Action alternatives which propose herbicide use must demonstrate an overwhelming public need.
- Planning documents must provide risk assessments for herbicides.
- Planning documents should provide risk assessments for invasive species.
- Planning documents should consider supplementing risk assessments with precautionary principles.

B.2. Herbicides should be considered only a last resort, after all other viable alternatives have been considered.

- Herbicides should be considered only a last resort after all other viable alternatives have been considered.
- Planning documents will present a range of non-chemical alternatives.
- Planning documents will provide an analysis of the long-term effectiveness and environmental costs of all alternatives.

C. All planning documents must address the impacts of invasive species and proposed control measures, whenever soil disturbances are planned or as a result of planned activities.

- All planning documents must address the impacts of invasive species and proposed control measures, whenever soil disturbances are planned or are a result of planned activities.
- Prevention strategies must be built into all projects through their inception, planning and implementation.
- Planning for projects that involve soil disturbances should involve specialists trained in invasive species biology.

D. Decisions must be subject to public review and appeal.

- Decisions must remain subject to appeal.
- Decision documents must be subject to public review and comment.
- Decisions must be subject to peer review and legislative oversight.
- Managers need to provide a documented review process for issues that involve controversy.

Chapter 3. Adverse impacts

A. Adverse impacts of chemicals on human health must be quantified and eliminated.

- In implementing invasive species control projects, the Forest Service must follow NEPA mitigation measures given in 40 CFR Parts 1508.20 that include:
 - (a) Avoiding the impact altogether by not taking a certain action or parts of an action.
 - (b) Minimizing impacts by limiting the degree or magnitude of the action and its implementation.
 - (c) Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.
 - (d) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.
 - (e) Compensating for the impact by replacing or providing substitute resources or environments.
- Planning documents should provide an analysis of exposure routes, including inhalation, that would result from the use of herbicide applications, and determine safety thresholds for allowable

application rates. Where thresholds would be exceeded, treatments with inhalable dusts or volatile compounds should be curtailed.

- Planning documents should provide an analysis of vulnerable groups, including children, fetuses, the elderly, those with impaired nervous, respiratory or immune systems, sensitive individuals, and fertile men and women planning to have children, that have higher exposure risks from the use of herbicide applications. If the possibility of harm to these groups exceeds EPA risk quotients, then such herbicide applications should be curtailed.
- Planning documents should provide an analysis of the potential effects of proposed herbicide applications on incidence rates for human cancer, acute effects, immune system effects, endocrine system effects or behavioral effects. Planning documents should provide descriptions of proposed mitigation measures to compensate for Forest Service-caused increases in incidences of these adverse effects. If the possibility of increased harm from these adverse effects exceeds EPA risk quotients, then such herbicide applications should be curtailed.
- Planning documents should provide an analysis of the synergistic and cumulative effects of proposed herbicide applications on the human environment. If the possibility of increased harm from these adverse effects exceeds EPA risk quotients, or if the effects are essentially unknown, then such herbicide applications should be curtailed.
- Planning documents should provide an analysis of the effects of “inert” ingredients on human health and safety. If the possibility of increased harm from exceeds EPA risk quotients, or if the effects are essentially unknown, then the use of such “inert” ingredients should be curtailed.
- Planning documents should provide an analysis of the negative human effects of herbicide applications that may be volatilized during forest fires.
- Herbicide applications should be avoided in areas where controlled burns are expected to occur. Firefighters fighting wildfires should be provided with warnings when working in areas that have been recently treated with herbicides.
- The Forest Service must track reported and confirmed adverse human effects on an incidents tracking form.
- The Forest Service appeals process must be retained to protect citizens’ rights to have a safe and healthy environment. No sufficiency language should be allowed that insulates the Forest Service from the appeals process or the responsibility to protect human health and safety.

B. Adverse impacts of chemicals on the environment must be quantified and eliminated.

- Invasive species management projects must follow NEPA mitigation measures in 40 CFR § 1508.20, which require:
 - (a) Avoiding the impact altogether by not taking a certain action or parts of an action.
 - (b) Minimizing impacts by limiting the degree or magnitude of the action and its implementation.
 - (c) Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.
 - (d) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.
 - (e) Compensating for the impact by replacing or providing substitute resources or environments.
- Project plans should only consider alternatives that preserve and enhance the diversity of plant and animal communities, as required by 36 CFR 219 § 27 (G).
- Projects should only use herbicides as a last resort, and only after careful consideration of all impacts.
- Planning documents should provide an analysis of the effects of herbicide applications on soils, including soil macro- and micro- organisms, soil nutrients, soil productivity, persistence, and erosion effects. Applications should be avoided in situations where they will negatively impact healthy soils.
- Planning documents should provide an analysis of the effects of herbicide applications on aquatic habitats, including analyses for water quality, aquatic species, riparian vegetation, and persistence. Applications should be avoided in situations where they will negatively impact aquatic habitats and species.

- Planning documents should provide an analysis of the effects of using herbicide formulations on non-target native flora and fauna. Herbicide applications should be avoided in situations where they will predominantly impact native species.
 - Planning documents should measure and analyze effects of herbicide formulations on suitable indicator species. Recommended classes of indicator species include amphibians, fish, algae, lichens, and select vascular plants.
 - Planning documents should specify monitoring and mitigation measures to assure that adverse effects are being avoided and minimized and that damage thresholds are being adhered to.
 - Herbicide applications should be avoided on wildlife forage, particularly where browsed frequently or where the habitat is used by threatened and endangered species.
 - Planning documents should provide an analysis of the cumulative, indirect, and synergistic effects of the use of herbicide formulations on the environment.
 - Planning documents should provide an analysis of the cumulative effects of repetitive treatments of herbicide formulations or other weed treatment activities on the environment, especially when other land management activities, such as livestock grazing, road construction and logging, inhibit the “success” of treatments.
 - Planning documents should provide an analysis of the effects of herbicide formulations on areas that contain invasive species that disrupt the normal fire regime, e.g., cheat grass (*Bromus tectorum*).
 - Planning documents should provide an analysis of increased herbicide resistance in association with herbicide treatments. Herbicide treatments should be avoided on herbicide-resistant species.
- C. Stringent safety precautions for handling chemicals should be followed and applications should strictly adhere to established procedures.**
- Stringent safety precautions should be followed for handling chemicals. See Appendix B for a recommended National Forest Chemical Safety Plan.
 - Safety threshold for herbicide formulations should be specified in planning documents.
 - All chemical handling and spill procedures must follow recognized safety procedures and prior documentation procedures for chemical spills and incidental and accidental exposures.
 - Information to protect human safety must be available on the Districts and with applicators and field personnel working where chemicals are applied or stored. This information includes the following:
 - 1) Material Safety Data Sheets
 - 2) An approved plan of Forest safety precautions
 - 3) Exposure incident reporting forms
 - 4) Herbicide label directions
 - 5) Pesticide background sheets
 - Applicators must have supplies and equipment for spill cleanup and hazardous materials cleanup on hand at all times.
 - Supplies, equipment and safety and cleanup information must be kept in chemical storage areas in the case of chemical spills.
 - Label directions must be strictly followed.
 - Chemical applications will comply with planning documents. Variance from the described procedures will not be permitted.
 - Responsible personnel should always be available during chemical applications, preferably at the treatment site.
 - Managers need to anticipate the amount of staff time that will be necessary to implement projects.
 - Staff need to be carefully chosen to maximize efficient use of personnel resources.
- D. Treatments should receive adequate public notification.**
- Public notification should accompany all herbicide treatments on public lands. Public notification should occur in local newspapers, on local public radio, Forest Service office bulletin boards, Forest Service web sites and any other readily available locations.
 - Treatment locations and maps of treated areas should be available on request by visitors.

- Treated areas should be posted with large, visible signs before the treatment and signs should remain posted for the season. Signs should include date of application and contact information in case of accidental exposure.
- Workers in treated areas should be notified of chemical treatments and given opportunities for alternative assignments.

Chapter 4. Monitoring and reporting

- Project monitoring procedures should be funded separately from other project actions.
- Baseline monitoring must be performed prior to project implementation.
- Monitoring should include these critical components: (1) measurement of the extent of invasive species populations; (2) measurement of the effectiveness of treatments; and (3) assessment of the extent of non-target impacts resulting from treatments.

A.1. Monitoring should be included in all projects with invasive species impacts.

- Invasive species treatments should monitor site-specific, post-treatment conditions for all affected resources.
- Monitoring should be used to determine the effectiveness of treatments and whether project implementation was performed as planned.
- Monitoring should be included in all projects with invasive species impacts, not just “weed” management projects. For example, monitoring of impacts to invasive species’ spread should be occurring in projects involving road maintenance, fire fighting, livestock management, and timber sales.
- Monitoring invasive species needs to be periodically repeated on public lands.
- Monitoring must follow a consistent protocol, with written records maintained in a permanent archive.

A.2. Monitoring reports for vegetation management projects must be available to policy-makers, program managers and the public.

- Monitoring information results should be periodically evaluated and the evaluation summaries transmitted to regional and national offices.
- A summarized account of monitoring results should be readily available for inspection at all supervisory offices and higher. Information gathered during the procedure is strategically important for future accounting needs and should be stored in a safe place, and kept on hand for many years, both on the districts as well as in regional offices, in both raw and summarized formats. The type of information contained on monitoring accounts should include:
 - 1) Date, site description and cross-reference number for mapping purposes
 - 2) Applicator name
 - 3) Application method
 - 4) Time of application
 - 5) Chemical used
 - 6) Additives and carriers used
 - 7) Mix concentration
 - 8) Extent of area treated (as general descriptions and specific locations)
 - 9) Rate of active chemical application (quantity per area)
 - 10) Rate of mix formulation (quantity per area)
 - 11) Total chemical amount applied (quantity per application)
 - 12) Weeds present before and after treatment
 - 13) Field notes
 - 15) Efficacy of treatment
 - 16) Experienced costs of the project (direct and indirect)
 - 17) Residue analysis as appropriate (e.g., water quality, soil quality monitoring)
 - 18) Analysis of unintended effects as appropriate (e.g., non-target vegetation effects)
 - 19) Accidents, spills, drift encountered (reported and experienced)

20) Human health effects as appropriate (e.g., hazards and symptoms experienced)

21) Worker complaints

B.1. Monitoring procedures should be carefully designed to provide useful information about project outcomes.

- Require a rigorous, standardized approach to monitoring as a prior condition of project approval and continued funding.
- For all projects with invasive species impacts, allocate a percentage of implementation funds toward monitoring.

B.2. Monitoring should provide useful answers to relevant questions.

- Determine what important questions need to be answered during projects with invasive species impacts on public lands.
- Include monitoring procedures in planning documents that will ask and answer important questions about proposed actions, both prior to and after project implementation.

B.3. Monitoring should be performed by qualified personnel.

- Insure that personnel involved in a monitoring program have necessary technical qualifications, or receive training for such procedures.
- Monitoring reports must include the names of all participants involved and their qualifications for accomplishing the job.

B.4. Monitoring should use valid statistical and sampling procedures.

- Monitoring procedures should be performed for invasive species programs that incorporate valid statistical and sampling methods.
- Monitoring results should be evaluated for calculations of central tendency, data dispersion, and significance of results.
- Monitoring procedures should use reproducible methods of measurement and replicate sampling to insure statistical validity. Consistent recording procedures and timing of visits should be part of the procedures.
- Monitoring should use quantitative measurements such as frequency, cover and density; plant identification should be carried to the level of the species.
- Use of a map-based system such as a Geographic Information System (GIS) should be used to map invasive species locations.

B.5. Monitoring should include adequate baseline data and experimental controls.

- Monitoring should include adequate baseline data and experimental controls.
- Monitoring of standards and guidelines for damage, action and safety thresholds should be performed prior to and during project implementation.
- Monitoring should include investigating and filing incident reports whenever human harm was reported or suspected.
- Monitoring should be performed over representative areas of a National Forest, using surveys that inventory more than roadsides.
- Quantitative measurements of invasive species should incorporate meaningful measures, including species identification, density, number of individuals, extent occupied, distance from roads, and potential control costs.
- Inventories should be performed periodically to confirm changes in the extent of target populations.

C. Mitigation procedures must include implementation monitoring.

- Legally required mitigation measures, conditional procedures and stipulated agreements must be satisfied as a condition of continued project funding.
- Implementation monitoring should be incorporated into all mitigation measures, conditional procedures and stipulated agreements.

Chapter 5. Prevention of weed invasions

A. Preventive measures must receive high priority.

- Prevention of further weed invasions should be given the highest priority in invasive species programs.
- Prevention measures must be incorporated into all ongoing activities that impact invasive species (see Appendix A).
- The scope of prevention and control measures should be determined by biological and ecological criteria that examines the causes of invasions, not just the symptoms.
- Prevention should be based on a desired future land condition.
- A comprehensive, map-based, baseline inventory of invasive species presence, by species, must be completed prior to initiating control efforts. The inventory should be updated through regular monitoring, and repeated at least every 5 years or before control actions are taken, whichever is shorter.

B. Programs need to incorporate comprehensive prevention strategies.

- Programs should consider all available prevention measures for control of invasive species (a list of prevention measures is given in Appendix A).
- Prevention measures should incorporate damage and action thresholds for invasive species abundance.
- Programs should consider the use of quarantine measures such as area and road closures for vehicles or cattle, and holding pastures for livestock herds.
- Programs should consider using procedures that eliminate weeds and their seeds from forest activities, including the use of weed-free animal feed, cleaning vehicles and fire equipment, and requirements for revegetation using only noxious-weed free seed.
- Programs should consider changing management activities known to increase the spread of weeds, including road building, road grading, vehicle use, ORV use, recreational use, livestock allotment use, timber sales, mining, etc.

Chapter 6. Education and research

- Programs should provide additional funding for education and research efforts within the agencies.
- Programs should provide ongoing training in invasive species management.
- Programs should provide for data sharing and cost-sharing between cooperators and the agencies.
- Concerned groups should work with agencies to perform comparative studies on the effectiveness of various control strategies.